

**DETERMINANTS OF DELAYS IN COMPLETING IMMUNIZATION REGIMEN
AMONG CHILDREN IN BORO DIVISION, SIAYA COUNTY, KENYA**

BY

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DECLARATION

This research project is my original idea and has not been submitted for an award of any degree or an academic qualification in any other Institution or University.

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This research project is dedicated to my wife Damaris Moraa and Daughter Christina Aloo Budi for the support and inspiration they accorded me throughout this study period.

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ABBREVIATIONS AND ACRONYMS

AFENET:	African Field Epidemiology Network
BCG:	Bacillus Calmette Guerin
ICDDR:	International Centre for Diarrhoeal Disease Research, Bangladesh
DPT:	Diphtheria Pertusis Tetanus
EPI:	Expanded Program for Immunization
FHI:	Family Health International
GAVI:	Global Alliance for Vaccine and Immunization
GIV:	Global Immunization Vision
HBM:	Health Belief Model
Hep B:	Hepatitis B
Hib:	Hemophilus Influenza Vaccine
KDHS:	Kenya Demographic Health Survey
KEPI:	Kenya Expanded Program for Immunization
KNBS:	Kenya National Bureau of Statistics
NCSRT:	National council for Science Research and Technology
SPSS:	Statistical Package for Social Sciences
PCV:	Pneumococcal Vaccine

RTHC: Road to Health Card

UNICEF: United Nation Children Emergency Fund

USD: Unites States Dollar

WHO: World Health Organization

ABSTRACT

Immunization remains one of the most cost effective and efficient ways of preventing childhood diseases across the world. Delay in completing immunization schedule as required by the government puts the children at a risk of contracting the vaccine preventable diseases. The study was anchored on the theory of health Belief that originated in the US and is used in health education. The purpose of this study was to investigate the determinants of delays in immunization regimen completion among children between 1 and 4 years living within Boro Division, Siaya County. Immunization regimen completion depend on a number of factors that include, distance to the health facilities, healthcare system, availability of vaccines at the health facilities, socio demographics characteristics of the mothers or caretakers, their levels of knowledge and levels of education, their perception and attitude on childhood immunization program and finally on the socio economic status of the mothers and caretakers. The objectives of the study included; To investigate the extent at which socio demographic characteristics of the mothers and caretakers affect timely completion of immunization, to determine how socioeconomic status of the mother and caretakers influence timely completion of immunization, to examine how the education and knowledge of mothers/caregivers affect completion of immunization regimen and finally to explore how the mothers and caretakers attitude and perception towards immunization affect timely completion of immunization for the children within this age group. The findings of the study will help the regional and central governments, policy makers and other agencies develop regional strategies aimed at improving immunization completion as stipulated in the EPI guidelines. Descriptive cross sectional study design employing quantitative methods was used in this study. The target population were mothers of children between 1-4 years who have lived in Boro division in the past one year. Simple random sampling technique was used to come up with a proportional Sample size per location of 382 from a target population of 6800 mothers and caretakers, of which 364 (95.3%) questionnaires were administered and returned for analysis. Village reporters and traditional birth attendants were employed to direct the interviewers to potential participants in the households where there are children between the required age brackets. Pilot testing of the data collection tool was done before actual data collection process to validate the tool. Data collected were coded, entered and analyzed using Statistical Package for Social Scientists (SPSS) for Windows version 12.0 and the results presented in tables. The results showed 17% of children did not complete immunization at 1 year. That being divorced, being of African Instituted churches (16.76%), not attended formal education (6.3%) and being in unskilled labor (24.7%) were significantly associated with delays in completion of immunization regimen among children in Boro Division, Siaya County. However, the perception and attitude variables had no significant association with delay in completion of the KEPI immunizations regimen among children in Boro Division. The researcher recommends that the government improves its image, health facilities to expand the scope of what they teach mothers. Suggestions of further studies on effect of clinical trials on immunization uptake and the determinants of other health related on delayed immunization completion. In conclusion, marital status, religions, educational level and occupations of the mothers/caretakers of children between 1-4 years were determinants of delays in completion of immunization regimen.

CHAPTER ONE

INTRODUCTION

1.1 Background of the study

Immunization in children has had a long history of success, studies across the world show that immunization has an impact on vaccine preventable diseases that cause infant death; and that it has also positively determined trends of mortality and morbidity among children from different communities (Ashton, 1988). Childhood immunization is thought to prevent 2 to 3 million childhood deaths each year (World Health Organization (WHO), 2011). Despite this, vaccine preventable diseases still remain the most common cause of childhood mortality with an estimated 3 million deaths each year (Centre for Global Development, 2005). Vaccines, which protect against disease by inducing immunity around the world are widely and routinely administered based on the common principle that it is better to prevent people from falling ill than to treat them once they do and therefore suffering, disability and deaths are avoided.

To reach its full benefit, WHO requires that complete vaccination coverage should reach 90% at the country level and 80% in the districts or equivalent administrative units by the year 2010 (Global Immunization Vision (GIV), 2004). If this is achieved, global childhood morbidity and mortality due to vaccine-preventable diseases will have been reduced by at least two thirds compared to 2000 levels.

Globally, numerous studies have been conducted on immunization of children below the age of 5 years and have yielded different outcomes with regards to immunization coverage and various determinants of immunization completion (Abdel *et al* (2009), Bhola, (2007) and Aboubakary *et al*, 2009). In European countries like Italy, over the past ten years, several surveys have reported high immunization coverage for compulsory vaccines (D'Amelio, 1993),

whereas for non- mandatory vaccinations, in particular pertussis, vaccine coverage was lower than the level set as a goal for the control or elimination of major childhood disease by the WHO Expanded Programme on Immunization (EPI) for the year 2000 (United Nations, 1990). Mis-conceptions about contraindications for vaccination were frequently indicated as causes of unnecessary delay in administering vaccines (Gindler, 1993).

In United States of America (USA), complete immunization coverage was found to be very high compared to some of the developed countries; however there were big differences in various states (Rosenthal *et al*, 2004). According to a study conducted in four states in the USA, complete coverage for the mandatory vaccination series was significantly higher for children in New York (84%) and San Diego (86%) than for children in Detroit (66%) and rural Colorado (75%). Although differences in coverage levels by ethnicity varied by site, differences were not significant. In addition, the vaccination coverage was lower for children in Detroit whose parents reported problems accessing the healthcare system because lack of transportation, compared with those who did not report such problems; however, the difference did not reach significance.

In Turkey, the Expanded Program of Immunization (EPI) aims for 95% coverage for each vaccine and complete vaccination for 90% of children below 1 year of age (Primary Health Care Division, 2001). All the vaccines included in the national vaccination schedule are provided free of charge in the primary health services all over Turkey. Although the coverage of all vaccines in the country has increased, the EPI targets have not been achieved yet (Health Ministry, 2001). In 2003, full vaccination coverage rate in the Istanbul region for children under 2 years was 62.3% (Tezcan, 2004). According to a study in a region of the country, full vaccination rates for children less than 5 years and less than 1 year was 68.3% and 79.5%, respectively (Topuzoglu, 2005). The Umraniye Health District reported in 2002, the full

vaccination rate of 53.8%, which indicates that there was still a big gap between EPI targets and vaccination coverage rates.

Immunization completion is dependent not only on provision of the services but also on other factors including knowledge and attitude of mothers, (Matsumura, 2005, Torun, 2003) density of health care workers, accessibility to vaccination clinics and availability of safe needle and syringes (Anand, 2007). Other factors like ethnic disparities in vaccination completion rates have been reported in countries like Mali, Niger and Senegal where it has also been shown that functioning of the health care system and services are key elements in vaccination coverage (Streefland, 1999).

In Asia studies on immunization uptake have given mixed results (WHO 2011). In Bangladesh for example, of 12-23 months old children, 71% of children aged 12 months are fully immunized but coverage remains low in some areas. In 22 rural (hard-to-reach) districts, the full immunization coverage ranged from 44% to 60%, (International Centre for Diarrhoeal Disease Research, Bangladesh (ICDDR,B), 2012). The government together with other stakeholders are developing other strategies to increase immunization completion coverages in these areas.

Despite significant increases in routine immunization coverage since the launch of the Expanded Program on Immunization (EPI) in 1974, unacceptable low coverage rates still persist in sub-Saharan Africa, (African Field Epidemiology Network (AFENET), n.d) where it is estimated that only about 50% of children are completely immunized during their first year of life. Additionally, about one-fifth of children who begin the vaccination schedule do not complete it, limiting the effectiveness of doses that they have received and of immunization on a larger population scale (Slim *et al*, 2009). In different African countries, the immunization completion is still sub optimal and Nigeria for example, accounts for half of the deaths from

Measles in Africa, the highest prevalence of circulating wild poliovirus in the world, and the country is among the ten countries in the world with vaccine coverage below 50 percent (Antai, 2009) having been persistently below 40 percent since 1997 (WHO, 2005).

In Kenya, the proportion of children aged 12-23 months who have received all recommended vaccinations is 77.4% (Kenya National Bureau of Statistics (KNBS), 2009). However, this proportion varies from North Eastern Province (48.3%) to in the Central Province (85.8%). This geographical inequality in coverage reflects the variation in the influence of determinants of full vaccination across the different provinces. In Nairobi, 73% of children in this age range are reported to have received all vaccinations (KNBS, 2009), but estimates in the slums within the city are usually much lower (APHRC, 2002). A study across the slums of Nairobi showed that full vaccination coverage of children was about 44% compared to 73% for the whole of Nairobi (Magadi, 2004). Lower immunization coverage rates have been observed in facilities within the slums settlements in Nairobi and are thought to be due to missed opportunities and inappropriately administered vaccines (Borus, 2004).

According to the Kenya Demographic Health Survey, KDHS (2009) the national trend of immunization has been varying over time, it steadily declined from 79% in 1993 to 65% in 1998 and finally 57% in 2003. It picked up again in 2008 reaching 77%. Universal immunization of children against the six vaccine-preventable diseases (namely, tuberculosis, diphtheria, whooping cough (pertussis), tetanus, polio, and measles) is crucial to reducing infant and child mortality. Other childhood vaccines given in Kenya protect against Rotavirus, Hepatitis B and Haemophilus influenza Type B (Hib) and Pneumococcal infection.

Assessing immunization coverage and delays in immunization completion helps to evaluate progress in achieving immunization program objectives and in improving service delivery (Bonu, 2003). In addition, it also helps provide evidence on whether substantial progress towards achieving vaccination targets is being made. This is also useful for program

planning and targeting resources and strategies toward areas most in need and maintaining performance in areas of good performances.

1.2 Statement of the problem

Despite a well-established and supported KEPI, immunization coverage in Nyanza province remains low (KDHS, 2009). The results of the KDHS (2009) showed that Nyanza province has the highest levels of under-five and infant mortality rates with almost one in seven children dying before attaining age of five (149/1,000), and even more higher in some divisions like Karemo with 184/1000 deaths (Otieno, 2011). Thus, the risk of dying before age five is almost three times higher in Nyanza than in a province like Central. Infant mortality is highest in Nyanza province (95/1,000) and lowest in Eastern province (39/1,000) part of the country (KDHS 2009). According to the KNBS (1999), infant mortality rate in Siaya District stood at 135.6 and under five mortality at 234/1000.

According to KDHS (2009) nationally, only 65 percent of children were fully immunized by their first birthday. Because of the low coverage, there is increased mortality and morbidity due to the vaccine preventable disease. Nyanza Province, in which Boro Division is found, ranks the second last provinces with the least complete immunization coverage at 65% and 4.4 % of the children never receiving any vaccination before the age of 12-23 months.

According to the website www.hiskenya.org, (accessed February 2012), only immunization data from 2011 January for Siaya District can be retrieved. This makes it difficult to even gauge the immunization coverage in the district. Unfortunately, the statistics estimates from the household surveys are conducted every after five years but outside these statistics, they don't provide reasons for the delays experienced in immunization completion for the children. More so, there has not been a study conducted in Boro Division, Siaya County or even in Nyanza

province with the establishing the reasons why some children get complete vaccination by the time they are 12 months of age and others don't.

For us to achieve the EPI targets as outlined by the government and the WHO, information on the determinants of delays in completing immunization regimen for children above 12 months is very important. Lack of Knowledge on these determinants in the sub regions has made it difficult for the health service providers to focus their activities appropriately. Delays in immunization regimen completion lead to deaths, disability and hospitalization of the children involved; this is devastating for the governments and the communities.

Furthermore, Boro Division is ranked the second poorest in the county, (Hungry for life international 2007) and according to www.SoftKenya.com, (accessed March 2012), poverty level in siaya district is 57.9% (rural) and 37.9 (Urban). The literacy level in Siaya County is average with approximately 70.3% of the population having primary level education while only 10.3% have secondary education.

1.3 Purpose of the Study

The purpose of this study was to establish the determinants of delays in completion of immunization regimen among children of 1 and 4 years living in Boro Division, Siaya County.

1.4 Objectives of the Study

The study was based on four key objectives as outlined below:

1. To establish the extent to which socio demographic characteristics of the mothers/caretakers affect completion of immunization regimen among children in Boro Division.
2. To determine how socio-economic status of the mother/caretakers affect completion of immunization regimen among children in Boro Division.

3. To examine how education and knowledge of mothers/caregivers affect completion of immunization regimen among children in Boro Kenya.
4. To assess how attitude and perception of mothers/caretakers affect completion of immunization regimen among children in Boro Division.

1.5 Research Questions

The study was aimed at answering four research questions as listed below:

1. To what extent do the socio demographic characteristics of the mothers/caretakers affect completion of immunization regimen among children in Boro Division.
2. How does the socio-economic status of the mothers/caretakers influence completion of immunization regimen among children in Boro Division.
3. How does the education and knowledge of mothers/caretakers affect completion of immunization regimen for children in Boro Division.
4. How does the attitude and perception of mothers'/caretakers' affect completion of immunization regimen among children between 1-4 years of age.

1.6 Significance of the study

Complete immunization is important for a complete prevention against vaccine preventable diseases at individual and at community level. This study aimed at establishing the reasons why some children between 1 and 4 years don't get completely immunized whereas the national KEPI immunization program should have been completed by the age of 9 months latest at one year.

As the country gears towards the implementation of the regional governments, the results of this study may be useful in constructing local immunization strategies and programs aimed at tackling the immunization problem in this region of the country. The results of this study may

also be important for the planning, monitoring and supervision of the immunization services in order to improve immunization completion coverage and the quality of health status of children in this region. Consequently, the results of this study may also be applicable in planning and strategizing for immunization programs in different regions of the country with the same geographic and socio-economic characteristics with the aim of improving immunization completion by the time the children reach the age of 9 months or as soon as possible thereafter.

It is hoped that the study will also be important in helping international institutions like WHO and United Nations Children Fund (UNICEF) reach their targets for 2006-2015 in the global Immunization Vision by making them focus their activities in different sub regions of the countries rather than the whole country alone.

1.7 Basic Assumptions of the Study

The study assumed that all the mothers of children between ages of one and four were of the appropriate age to consent for the study. The study also assumed that it will be well accepted within the community for it to be able to collect adequate data to be able to answer the research questions.

1.8 Limitations of the Study

The Study was conducted in Boro Division of Siaya County. Few limitations were foreseen; first, there were supplemental vaccination activities were conducted in different section of the country alongside the national immunization program mostly involving immunization against polio and measles to prevent out breaks. According to the Ministry Of Health, three mass anti polio drives had been conducted in the western part of Kenya in the past one year. These immunizations contribute to the overall immunization coverage in the region but may not be accurately captured due to lack of proper documentations and probability of recall bias by

mothers and caregivers though studies have shown that vaccination information taken from the mothers recall is accurate (Abdelsalam and Sokal, 2004). The study strived to collect the immunization information from the Road To Health Card (RTHC) but where there are no sufficient documentation, mothers and caretakers were probed further to ensure the information collected is as truthful as possible.

The second limitation was poor accessibility of some parts of the proposed study area due to poor infrastructure especially on the villages that neighbor Yala swamp and Lake Kanyaboli. This limitation was overcome by using motorcycles and bicycles to access areas that were not accessible by motor vehicles. The area was also very vast, and this was overcome by employing the services of research assistant in data collection.

The third limitation was lack of vital data at the regional offices for example at the District Health Information offices and KNBS offices since the data were never kept at all or if available then were not easily retrievable or in a form that could be used easily. Because of the lack of important information at the regional levels, some of the data were extrapolated from higher level estimates that were easily available for example population of the 1-4 years was extrapolated from the constituency data while immunization completion data was extrapolated from the provincial values.

1.9 De-Limitation of the Study

The study was delimited to Boro Division, Siaya County which had an approximate area of 189 square kilometers and comprises of 3 locations namely Alego Central with 5774 households, North Alego with 5099 households and South Central Alego with 1975 households (KNBS, 2010). According to Hungry for life international (2007), Boro Division is the second poorest division in Siaya county. The community has suffered greatly due to lack of long term food security, poor drinking water and the AIDS epidemic. Despite this the Division is readily

accessible by road from Siaya town. The Study was also delimited to mothers/caretakers of children between the ages of 1 and 4 years who had lived in Boro division in the past one year, since they are primarily responsible for the health of the babies. The study was further delimited to the use of assisted questionnaire to collect the information needed to meet research objectives and answer the research questions

1.10 Definition of Significant Terms to be used in the study

Delayed immunization completion: This is when the children attain the ages of 1 year without getting all the immunizations as required by the KEPI.

Complete Immunization regimen among children: Is when children have received all the immunizations as stipulated in the KEPI schedule by the age of one year.

Infant: Are persons aged between 0 and 12 months calculated from the date of birth noted on the clinic cards or from mothers/caretakers responses.

Child: Is person aged between 12 months and 4 years calculated from the date of birth indicated on the RTHC or from mothers/caretakers responses.

Socio Demographics characteristics: Are the physical characteristics of mothers and caretakers such as age (10-14, 15-19 etc), sex (male/female), marital status (single, divorced, married, widowed) and religion (Christian, Muslim or atheist).

Socio-economic Status: Is an individual's or group's position within a hierarchical social and economic structure dependent on the occupation and income.

Education is the act or process of imparting or acquiring general knowledge, developing the powers of reasoning and judgment, and generally of preparing oneself or others intellectually for mature life. (Education levels include, none, primary, secondary and tertiary)

Knowledge is the acquaintance with facts, truths, or principles on immunization completion.

Attitude of mothers and caretakers: Refers to manner, disposition feeling, position of the mothers and caretakers with regard to childhood immunization completion.

Perception of mothers and caretakers: Refer to the way in which immunization program is regarded, understood, or interpreted by the mothers and caretakers.

Caretakers of the babies: Are the individuals, male or female who take the responsibility of looking after the babies when the mothers are not around or busy with other activities

Caregivers: Are individuals tasked with the responsibility of providing health care to the general public for example immunization of children.

1.11 Organization of the Study

The research project report is organized into five chapters: chapter one which is the introduction, includes, the background of the study, statement of the problem, purpose of the study, objectives of the study, research questions, significance of the study, basic assumptions of the study, limitations of the study, delimitations of the study and definitions of significant terms. Chapter two contains the literature review and focuses on 4 key areas as described in the objectives of the study: effect of socio-economic, socio-demographic, perception/attitude, knowledge and education on completion of immunization. It also highlight on the theoretical framework and conceptual framework. Chapter three focuses on the methodology to be employed. This includes the following sub-areas, research design, population, sample procedures and sample size, Instruments, validity and reliability, procedure for data collection and data analysis. Chapter 4 includes and chapter five includes...At the very end are the references, appendices, financial budget, time frame and the map of Boro Division.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter looks described the literature and it delves on the concept of completion of immunization, it describes how education and knowledge, socio demographics, socio-economic and perception and attitude contribute to delayed completion of immunization regimen among children in Boro. It also describes the theoretical framework, conceptual framework and gives the summary of literature review.

2.2 The concept of completing Immunization among children

Completion of Immunization regimen is vital for prevention of killer diseases like Polio and Tuberculosis. Different countries have adopted the immunization regimen developed by the WHO either the way it is or with modifications and. therefore children are considered to have completed the immunization regimen if they get all the vaccinations within the stipulated time periods. In Kenya children are considered fully vaccinated when they have received a vaccination against Tuberculosis (also known as BCG), three doses each of the Diptheria Pertusus Tetanus (DPT-Hep) B-Hib (also called Pentavalent) and polio vaccines, and a vaccination against measles. The BCG vaccine is usually given at birth or at first clinical contact, while DPT- Hep B-Hib and polio vaccines require three vaccinations at approximately 6, 10, and 14 weeks of age, and measles should be given at or soon after reaching 9 months of age (MOH, 2012). In February 2011, the pneumococcal vaccination was also introduced in Kenya as part of the KEPI immunization schedule (Gavi, 2011), and is also administered at 6, 10 and 14 weeks of age.

2.3 Education and Knowledge of Mothers/Caretakers and Completing Immunization regimen

Knowledge and education are usually interrelated and according to oxford online dictionary (2012), education is the act or process of imparting or acquiring general knowledge, developing the powers of reasoning and judgment, and generally of preparing oneself or others intellectually for mature life. In this context education refers to acquisition of the knowledge by undergoing a formalized education system while knowledge is the acquaintance with facts, truths, or principles for example on immunization. Education should therefore enable an individual to acquire enough information to help in decision making and judgment as far as childhood immunization are concerned.

Studies in different parts of the world (Antai, 2009) have demonstrated that taking children to the hospital when they are sick and during vaccination visits is the responsibility of mothers and not fathers, but there may be exceptions for example in cases where the mothers are absent, ill or there are twins when the fathers can take children to the hospital including for vaccinations. It is therefore very important for mothers and caretakers to understand the importance of vaccinations as they are the ones who have the responsibility of taking children for vaccinations until the regimen is complete (Alister, 2007).

In Japan (Matsumura, 2004) education attainment of the mothers/caretakers was found to be associated with immunization rates while in almost similar study conducted in Istanbul (Torun, 2006), immunization rates were higher in parents with higher education than the others with lower educational levels. The vaccination coverage for children whose mothers had at least primary education was about 9 times higher than those whose parents had no education. The vaccination coverage was also affected by educational level of the fathers, where the children of fathers with less than secondary level of education were 2.3 times more likely to be non-vaccinated (Matsumura, 2004)

In the Lucknow slums of Indian (Bhola, 2007), children (12-23 months of age) of illiterate mothers were found to be about four times more likely to have incomplete immunization than children of literate mothers with at least class XII education, this surprisingly had no significant bearing on complete non immunization.

In Sicily Italy (Coniglio *et al*, 2011), mothers and caregivers showed good knowledge of immunization benefits and side effects. Being a developed country with good social and health infrastructures, they either received this information from mass media or family pediatrician. Their knowledge of side effect did not affect immunization of their children because the benefits of vaccinations outweighed the associated risks. Mother's decision to vaccinate their children was not because it was a mandatory requirement by the authorities but because the mothers knew the benefits of vaccinations to their children. Angelillo (1999), supported the results of the study in Sicily where mothers knew most of the mandatory vaccinations, for example respondents rightly believed that vaccinations for hepatitis B (87.5%), poliomyelitis (79.9%), tetanus (74.4%), and diphtheria (66.3%) were required for all infants. However, there were some misconceptions about which vaccinations were mandatory, and respondents clearly overestimated requirements for their children. In the same study, about 53.4% of mothers knew about all four mandatory vaccinations for infants, and the results of the multiple logistic regression analysis also showed that this knowledge was significantly greater among those with a higher rather than lower education level.

Generally, these results indicate that lack of knowledge on vaccination prevents Italian mothers from playing an effective role in the eradication of vaccine-preventable diseases in that country. Unfortunately, only half of the respondents could identify all the mandatory vaccines for infants and of even greater concern was that only approximately 20% of the mothers interviewed knew that pertussis, measles, mumps, and rubella were diseases that are vaccine-

preventable in children. Moreover, the mothers' lack of knowledge about vaccinations was supported by the finding that the main reason for not vaccinating or not completing the vaccination schedule was that they had not been advised about it (Angelilo, 1999).

Manjunath (2002), in a cross sectional study using a 2 random sampling, in India showed that majority of the mothers were able to mention at least one benefit of immunization as preventing illness, paralysis, or death. Polio prevention was the most often mentioned benefit. Mothers of fully and partially immunized children mentioned more than one benefit in general. Average number of correctly identified diseases for which EPI vaccines are given was only 2.01 among the mothers of fully immunized children. Further analysis of the data showed that 75.3% named "polio" correctly. Only four mothers named "Diphtheria" and two correctly identified all the diseases. Mothers' inability to name or identify diseases other than poliomyelitis indicates that health education in that part of India should be emphasized to enhance mother's knowledge about the complete program. This recommendation underlines further the need for mothers' awareness and knowledge towards childhood immunization.

Data from the Demographic and Health Survey in Malawi showed that the levels of education attained by mothers directly affected the likelihood that their children are vaccinated (Alister, 2007). This is because they are directly involved in ensuring children are vaccinated as required. This data shows that in the year 2000, 88% of the mothers with secondary school education and higher had their children fully immunized compared to only 67% of children of mothers with primary (Level 1-4) education and 64% of children of mothers who had no education at all. In 2004 however, slightly lower level of 84% of the children whose mothers had secondary school and above level of education were fully vaccinated at the time of the survey compared to 55% of the children whose mothers had no education at all. There was a clear difference in vaccination completion between the children of the mother with secondary

school education and children of mothers with no education at all considering that childhood vaccination in this country is offered both at outreach and facility level. From this, it was evident that the higher the level of education of the mothers the higher the likelihood that the children would be completely immunized.

According to Aboubakary *et al* (2009), in a study conducted in Burkina Faso, literacy of the mothers was found to significantly determine vaccine uptake among children in rural areas. In urban areas, parents who attended school and mother's attendance in literacy classes in the rural areas were found to be related to vaccination status, this also supports findings from other studies. Mothers' knowledge of the reasons for childhood immunization and completion of immunization schedule was found to be associated with complete immunization. To this end, it can be deduced that the knowledge acquired from schools is important in understanding disease progression, seriousness and curative and preventive strategies.

It is commonly presumed that the level of knowledge should be commensurate with the level of education attained; this is not always true as some people with modest educational background are able to make excellent decisions in terms of immunization and general child health. Studies have also shown that there are numerous confounding factors that affect immunization completion like religion, a factor that may also come into play when looking at the influence of education on immunization completion (Olumuyiwa, 2008).

In a Mozambican study (Jani, 2008), the schooling level of the mothers showed a strong association with vaccination uptake. However, no association was identified between schooling level of mothers and missed opportunities for vaccination. Mothers' educational levels had no influence on the child's vaccination status, probably because in this study very few mothers had more than primary school education and therefore no clear judgment could be made. In

Mathare valley also, level of education did not influence completion of immunization (Kamau and Esamai, 2001).

Mothers' knowledge on immunization has a significant bearing on immunization uptake and completion. Knowledge on when specific vaccines should be administered and the whole immunization process completed is significant in having a completely protected population. In a cross sectional study conducted in 10 administrative wards of Nigeria (Abdulraheem, 2011) about 14.1% of the mothers knew that vaccination against childhood killer diseases should be completed at the age of 9 months and only a few mothers, some of whom were employed as teachers knew the various time points for administering BCG (at birth) and that hepatitis B vaccines could also be given at birth. In as much as parents and authorities may wish to have complete immunization for the children, vaccine safety concerns may sometimes come into play. In this area for instance, parents objection and mothers concern about safety of the vaccines was found to be the major reason (38.8%) for incomplete vaccination among other host of health system specific issues.

Abdel *et al* (2009) demonstrated in a study conducted in Mali that insufficient information to parents regarding immunization was the major reason (63.3 % of respondents) for incomplete immunization, this finding supports the findings of a study in Indian slums (Bhola, 2007) where mothers lack of knowledge about vaccination was found to be an independent predictor for incomplete vaccination among children between 12-23 months of age.

In assessing of factors associated with complete immunization coverage of children between 12-23 months in Burkina Faso (Aboubakary *et al*, 2009), the complete immunization coverage was found to be 50.2% (CI: 45.71–54.69) with 2.52% (CI: 1.10–3.90%) having never been vaccinated. This coverage, at a country level is still very much below the expected levels

by the WHO and the Ministry of Health. Approximately 59.7% of parents in Burkina Faso (CI: 45.71–64.11) knew that the objective of vaccinating children was to prevent disease, while 10.29 % (CI: 7.57–13.03) of parents had no idea about the objectives of vaccination; others parents knew that all vaccinations were to prevent specific diseases like poliomyelitis among others. The majority of respondents rightly identified poliomyelitis (66.4%) as the primary example of vaccine-preventable disease this was probably due to the publicity during mass immunization programs and media campaigns to eliminate this disease though vaccination, this was followed by malaria (31.87%), although there is no known vaccine against malaria up to date. Tuberculosis (1.87%), whooping cough and diphtheria (<1%) were given less consideration as preventable diseases.

In the same study above, respondents were also asked about specific concerns that prevented them from participating in vaccination sessions. From the 476 respondents, 318 (66.8%) mentioned communication problems (they did not understand what the health workers wanted; they thought their child was totally immunized) and 5% (25/476) complained about the organization of immunization. It can be deduced from this study that the majority of health system related factors and negative perception of the health system are the major hindrances in immunization completion in Burkina Faso.

As already stated above, different confounding variables like religion have been shown to influence knowledge on immunization, for example a study conducted in rural Nigeria (Olumuyiwa, 2008) showed that children of Christian mothers were more likely to have complete immunization status than of the other religions. In this case, religion was identified as a confounding factor because of the influence of Christianity on education. In this study more than 50% of the mothers were found to be knowledgeable about symptoms of vaccine preventable diseases except for difficulty in breathing. Cough was the most correctly identified

symptom (83.8%) and almost all (99.1%) felt that immunization was beneficial. The mean score for mothers' knowledge on immunization was 3.9 ± 1.2 points with 295 (87.0%) of the mothers scoring above 3 marks and were classified as having a satisfactory knowledge on the aspects inquired. Age ($p = 0.38$), marital status ($p = 0.09$) and place of residence ($p = 0.09$) were not significantly associated with higher level of knowledge. The literacy level here was expected to be high since this was among the first areas in Nigeria to introduce free and compulsory primary education in 1955 and has continued to be one of the regions with the highest primary school enrollment in the country.

The influence of knowledge was also evident in a study conducted in the Mathare Valley, informal settlement in Nairobi (Kamau and Esamai, 2001) where most mothers and caretakers (90%) were able to define immunization and a good number were able to name all the vaccine preventable diseases in the EPI schedule. 46.1% could mention all 6 vaccine preventable diseases, with the most mentioned disease being polio at 75% and the least mentioned was diphtheria with 11.3%. The level of knowledge is generally expected to be higher in urban areas and this could have a positive influence on the knowledge on Immunization. It would be interesting to compare the findings of this research to a village set up (Sebahat, 2005) where the mothers probably are less educated and may not be having very strong knowledge on immunization.

According to Yarwood (2005), in a study aimed at tracking mothers' attitudes and conducted between 1991-2001 in a more developed part of the world with high literacy and immunization awareness levels, mothers were more strongly influenced by the perceived risk that a vaccine carries and were unable to balance the overall risks and benefits of vaccinating against not vaccinating. This was attributed to the fact that mothers were not aware of the risk of disease or had difficulty assessing risks. Respondents were asked to assess the safety of a

number of immunizations by rating them on a four-point scale: ‘completely safe’, ‘slight risk’, ‘moderate risk’ and ‘high risk’. Overall, mothers considered that all childhood immunizations offered a high level of safety but whooping cough vaccine was the least likely to be considered safe by mothers. This was up to August 1997 thereafter this concern was later replaced by MMR

Knowledge can also be gathered through experience, and the same should be applicable to knowledge on Immunization. Mothers who have experienced more than one births should have gained additional knowledge from dealing with the immunization issues of the first and probably second borns. In a study on age appropriateness of Immunization, mothers with multiple births were shown to have increased awareness and knowledge on immunization, but this unfortunately did not translate into complete immunization coverage because of numerous confounding factors among them lack of time because of commitment looking after the other children etc. (Eun-Young and Moo-Sik, 2010).

In North West Bengal (Manna, 2009), a rural area in India with high illiteracy level, knowledge on immunization was directly related to immunization completion. In some areas like this, parents who are illiterate with very poor knowledge of immunization are not expected to be serious about immunization. It was found out that negligence was the major cause for non-immunization while guardian engagement in other work was the major cause for partial immunization. Mothers were also not aware of the beneficial effects of vaccinations to their children. This study pointed out the need for the government to create more awareness on immunization especially for poor and illiterate populations in order to achieve higher coverage and complete immunization. In almost a similar set up in Ethiopia, Hemoke (2009) demonstrated that knowledge of mothers or immediate caretakers about schedule of vaccines had significant association with completion of immunization (p-value < 0.001). Mothers who did know the schedules of vaccine were 3 times more likely to vaccinate their children fully

than mother who didn't know vaccine schedule, [OR = 3 (95% CI: 1.4, 6.3)]. Mothers or immediate caretaker who did not know the benefits of immunization in preventing the occurrence of epidemic were 6.4 times more likely to have defaulter children than mother who knew the benefits, [OR = 6.4, (95% CI: 0.43, 9.53)]. In Japan, low knowledge was also significantly associated with incomplete vaccination against measles. As in other studies (Abdelraheem, 2011 and Kamau and Esamain, 2001) , age of the mothers, birth orders and concern on vaccine safety and were also associated with incomplete vaccination. To investigate how different levels of knowledge regarding measles and its vaccination and varying degrees of concern about possible adverse events could influence uncompleted vaccination, respondents were categorized into four groups according to their levels of knowledge (cutoff points = the median values) and degree of concern. A logistic regression analysis was then carried out using three dummy variables, namely, X_1 , X_2 and X_3 . Results showed that the odds ratio of uncompleted measles vaccination was highest for Group 4 (i.e. "low knowledge" and high concern about adverse events), followed by Group 2 ("low knowledge" and low concern about adverse events), Group 3 ("high knowledge" and high concern about adverse effects), and Group 1 ("high knowledge" and low concern about adverse events). This further emphasizes the fact that knowledge on immunization could be an important determinant in completion of immunization.

More knowledge and awareness on immunizations can also be acquired through attendance of immunization lessons and even by introducing immunization lessons in the educational curriculums. Health facilities where mothers take their babies for vaccination is a good venue for offered lessons on immunization. In countries with strong health systems and infrastructure, mothers are usually educated and actively informed on different issues on immunization for example safety, benefits, age appropriate for administration among others. Knowledge on immunization acts as a motivating factor for completing immunization schedule

for the baby, mothers are willing to sacrifice in order to get this service for the babies (Jagrati *et al*, 2008).

2.4 Socio-economic status of mothers/caretakers and Completion of Immunization Regimen

Countries with strong economies are bound to have strong health care systems with economically empowered citizens, a combination that may positively influence immunization uptake, immunization completion and other preventive modes of disease control. Most of the countries in the developing worlds and especially in Africa south of Sahara and some parts of Asia have poor households, weak economies and poor health infrastructures that don't adequately support childhood immunization. Household with low socio economic status may have to give priorities to those requirements that guarantee immediate continued existence for example food and may not give much attention to preventive methods of disease control like immunizations but may be reactive to disease situations.

In a study conducted in India, by Bhola (2007), low socioeconomic status in Indian slums was a significant predictor of non-immunization but not partial immunization. This could be because immunization is accessible and affordable to everyone irrespective of their socioeconomic status. In the study conducted in a low socio economic region of Nigeria (Antai, 2009), family monthly income was found to be strongly associated with immunization completion among children, this was also in support of the findings by Renstein (1990). Family income has also been associated with immunization coverage levels, and low family income identified as a risk factor for low immunization (Klevens and Luman, 2001; Bates and Wolinsky, 1998).

Many African families have the fathers as the heads of the households and often the fathers' income will dictate the socioeconomic status of the household. In the cross sectional

study conducted in Burkina Faso, Aboubakary *et al* (2009), demonstrated that children of non-educated fathers among the higher fourth quartile had better immunization coverage compared to those of non-educated fathers in the poorer lower quartile in rural setting. Better immunization coverage is not equal to immunization completion but is a strong indication of the likelihood of complete immunization (Antai, 2009). This finding supported the results of many other studies indicating that economic power of the family can be an important predictor for immunization completion. Profession has sometimes been associated with immunization completion but this was not evident in this study where there was no significant difference noticed in immunization coverage between farmers and other professions (Zuber, 2010).

In unmatched case control study conducted in Ethiopia to determine the predictors of defaulting among mothers of children between 9 and 23 months, monthly family income was found to be an outstanding and a significant predictor of defaulting immunization (Hemoke, 2009). As elucidated in other studies, defaulting of immunization tend to increase the risk of incomplete immunization. Even after adjusting for other socio-demographic factors, family income still retained its significance as a major predictor for immunization coverage. This study showed that mothers or caretakers who had monthly family income of 44–88 USD were 81.1% less likely to have defaulter children than mothers or immediate caretakers who had monthly family income below 22 USD, [OR = 0.430 (95% CI: 0.20, 0.94)]

In Burkina Faso, higher socio-economic condition of the parents has also been shown to be associated with greater probability of the child being vaccinated under a routine vaccination program compared to vaccination under the mass campaigns (Zuber, 2001).

2.5 Socio demographics characteristics of mothers/caretakers and Completion of Immunization Regimen

Many authors who have published in this area have often looked at the effect of socio-demographics characteristics of the mothers and caretakers on immunization. Socio demographics characteristics of individual affect the way they behave under different circumstances. These studies have shown mixed results in terms of how socio demographic characteristics like age, marital status, religion and educational levels of the mothers and caretakers come into play in health seeking behaviour including childhood immunization.

In a study conducted in Gabon by Schwartz *et al.* (2009), mothers who give birth at younger ages were more likely not to adhere to the immunization schedule because of fear to take their children to the hospital where they faced ridicule from the other mothers and the health care staff because of giving birth at young ages. They also had difficulties in following the clinic procedures. Kamau and Esamai, (2001) in the study conducted in Mathare Valley Kenya also found out that age of the mother was a significant influencing factor for completion of immunization schedule; this finding was also supported by a study done in japan (Matsumura, 2005) where children of younger mothers are more likely to be completely immunized than those of older mothers. This could be explained by other finding in this study that knowledge on immunization was found to be inversely proportional to the ages of the mothers. Mothers who were younger were less knowledgeable on childhood immunization than older mothers. In Ghana (Owusu, n.d) however, the age of mothers was not found to be a significant social determinant for incomplete immunization. Therefore because of the mixed outcome of these studies one cannot make a conclusive judgment on the effect of the mothers age on the completion of immunization regimen

Aboubakary et al. (2009) in the study conducted in Nigeria, found out that in the poorer quartile, children from muslin families had lower immunization coverage compared to the other

religions. Being a non-Muslim was therefore found to significantly increase the chances of complete immunization by 1.8 (OR = 1.81; 95% CI = 1.102-2.985). Olumuyiwa's (2008) finding in Nigeria is supported by the outcome of a study conducted in the urban slums of Luknow India (Bhola, 2007) which showed that children from Muslim families were also at risk of incomplete immunization than their counterparts from the other religions.

2.6 Attitude and Perception and Completion of Immunization Regimen

Attitudes and perception of the mothers and caretakers of the children are thought to be strong determinants of immunization completion. Attitude refers to manner, disposition feeling, position, etc., with regard to childhood immunization while perception will refer to the way in which childhood immunization and childhood immunization program is regarded, understood, or interpreted by the mothers and caretakers.

Myths arising out of inadequate or complete lack of knowledge and misinformation have been identified as a barrier against immunization (Begg and Nicoll, 1994). This is in agreement with another study among economically disadvantaged group in the US (Bates 1998) which showed that mothers' misperception on benefits of immunization is related to under vaccination of children below 2 years. Bates revealed that mothers often expected that their children would not fall sick after vaccination, and therefore have lost faith in immunization. Immunization is only able to prevent specific diseases and therefore it is not possible that vaccination can prevent all diseases. This is therefore a typical case of lack of good knowledge on the benefits and reasons for immunization that has affected the perception of the mothers and caretakers towards childhood immunization.

Abdelraheem (2011) in Nigeria also demonstrated that mothers who had negative attitude about health facility were 2 times more likely to have incompletely vaccinated children than mothers who had positive attitude. This finding is also supported by Coreil et al (1989). It

was also evident according to Schwars (2009) that in Gabon mothers were very positive about vaccination despite the fact that there is confusion on whether vaccinations also cure or just prevents diseases; the other members of the families did not also seem to have a disapproving attitude towards childhood vaccination.

In Ethiopia, Hemoke, (2009), perception of mothers/immediate caretakers of the children toward health institutions support had significant association with completion of child vaccination (p-value < 0.001). Respondents who had negative perception toward health institutions support were 2.7 more likely to have defaulter children as compared to their counterparts, [OR = 2.71,(95% CI: 1.39, 5.26)] and therefore children would reach the age of 12 months without completing the immunization. However, in the study in Mathare attitudes of the mothers towards immunization was not found to be statistically significant in influencing completion of Immunizations (Kamau and Esamai, 2001).

2.7 Birth Order, sex of the child and Completion of Immunization Regimen

In different parts of the world it has been shown that Birth order has a strong association with immunization of children under the age of 5. In Brazil (Barreto, 1992), where 47% were fully vaccinated and 53% incompletely vaccinated, children of higher birth order were found to be highly likely to have incomplete immunization. Children from large families have been shown to have tendency for incomplete vaccination coverage. These findings have also been supported by the findings of the study in Italy where mothers who had adhered to the schedule for all the mandatory vaccinations indicated that among all the mother and child attributes, only birth order significantly predicted vaccination non-completion (Angelillo, 1999). Children who had at least one older sibling in the household were significantly less likely to be age-appropriately vaccinated and this therefore means that some of the children may likely reach the age of one year without completely receiving all the immunizations available.

In Malawi, children born into larger families have been shown to have low vaccination uptake and first born children being more likely to be completely immunized on time than second born children (Munthali, 2007). In the same study, in the year 2000, 79% of the first born children aged 12-23 months were fully vaccinated compared to 58% of the children who were 6th or above in the birth order. In 1996, 89% of the first born children were fully vaccinated compared to 74% of those children who were 6th + in the birth order. Hence, as other studies have shown, in Malawi birth order seems to be an important determinant of vaccination status with first born children more likely to be vaccinated than those who are not.

In most of the developing world girls are less privileged to access social services such as education and health care. Different communities give preference to the boy child at the expense of the girl child. For example, in Bangladesh the vaccine coverage for girls were less than for boys by about 5% between the year 1993 to 2000 (Chowdhury, 2002). In Malawi however between the year 1992 and 2000, the percentage of female children between 12-23 months who were fully vaccinated was the same (Munthali, 2007), but in 1996 and 2004 more male children were fully vaccinated compared to female children. These findings were therefore not very conclusive with regards to the influence of the child's sex on immunization completion. In rural Nigeria, the percentage of girls of 12-23 months with complete immunization was found to be higher than that of boys but not significant. This is also in support of another study conducted In Nigeria in 2011.

2.8 Theoretical Framework

This Study will be anchored upon the theory of The Health Belief that was proposed in the 1950s by some two social psychologists, Hochbaum and Rosenstock, in the United States Public Health Service. The theory was proposed to understand the widespread failure of people to accept disease preventive and medical screening program offered by the Ministry of Health

particularly for tuberculosis (Bourne, 2009)., The theory relates well with the study since it will help understand the reasons why the uptake of immunization as a preventive method of disease control as expected by the authorities lead to incomplete vaccination regimen. The Health Belief theory was designed to account for the failure of people to become involve in preventative and detection disease programs (Hochbaum, 1958; Rosenstock, 1960); and then it evolved to people's response to symptoms with a later expansion that entails individuals' behaviour in response diagnosed dysfunctions (Becker, 1974). Hence, embedded in the HB theory are preventative actions, illness behavior, and sick-role behavior, suggesting that dysfunction is the primary focus of this theory.

Health Belief model is by far the most commonly used model in Health Education and Health promotion. According to the Health Belief Model (nd) as published by Jones and Bertlet publishers this theory hypothesizes that health-related decisions for example the decisions to immunize children against vaccine preventable diseases revolves around four theoretical constructs: Perceived seriousness, Perceived susceptibility or vulnerability, Perceived benefits and perceived barrier (FHI, 2004). In addition to the four constructs, Health Belief theory suggests that the behavior is also influenced by cue to action; events, people or things that move people to change their behaviors g illness of a family member, media reports (Graham, 2002) etc. Based on this theory, to increase completion of immunization regimen in the study area, then it is important for the authorities to establish the interrelationship between the key construct of this theory and mothers/caretakers education/knowledge, perception/attitude, socio demographics and socio economic status.

Health belief Model

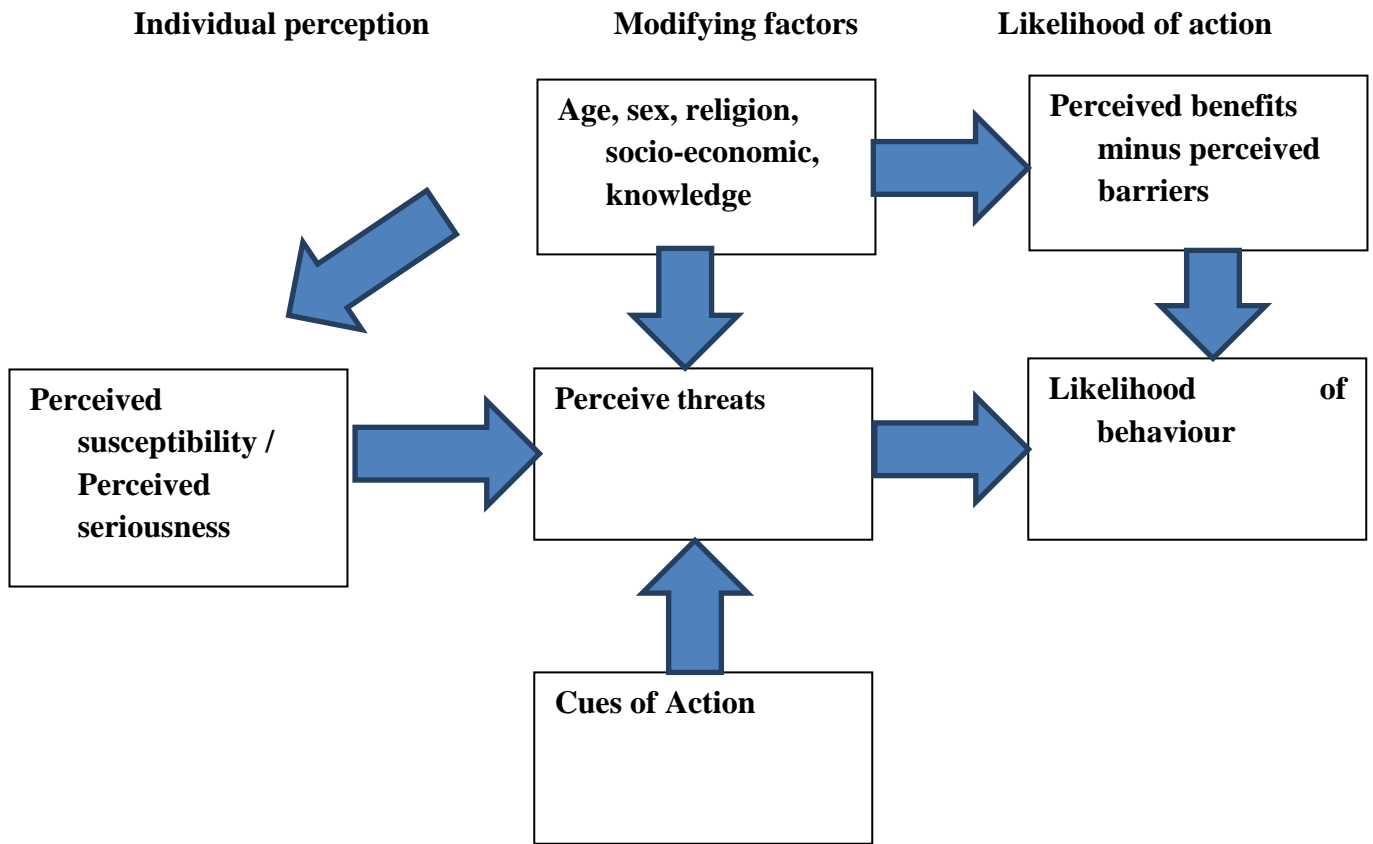
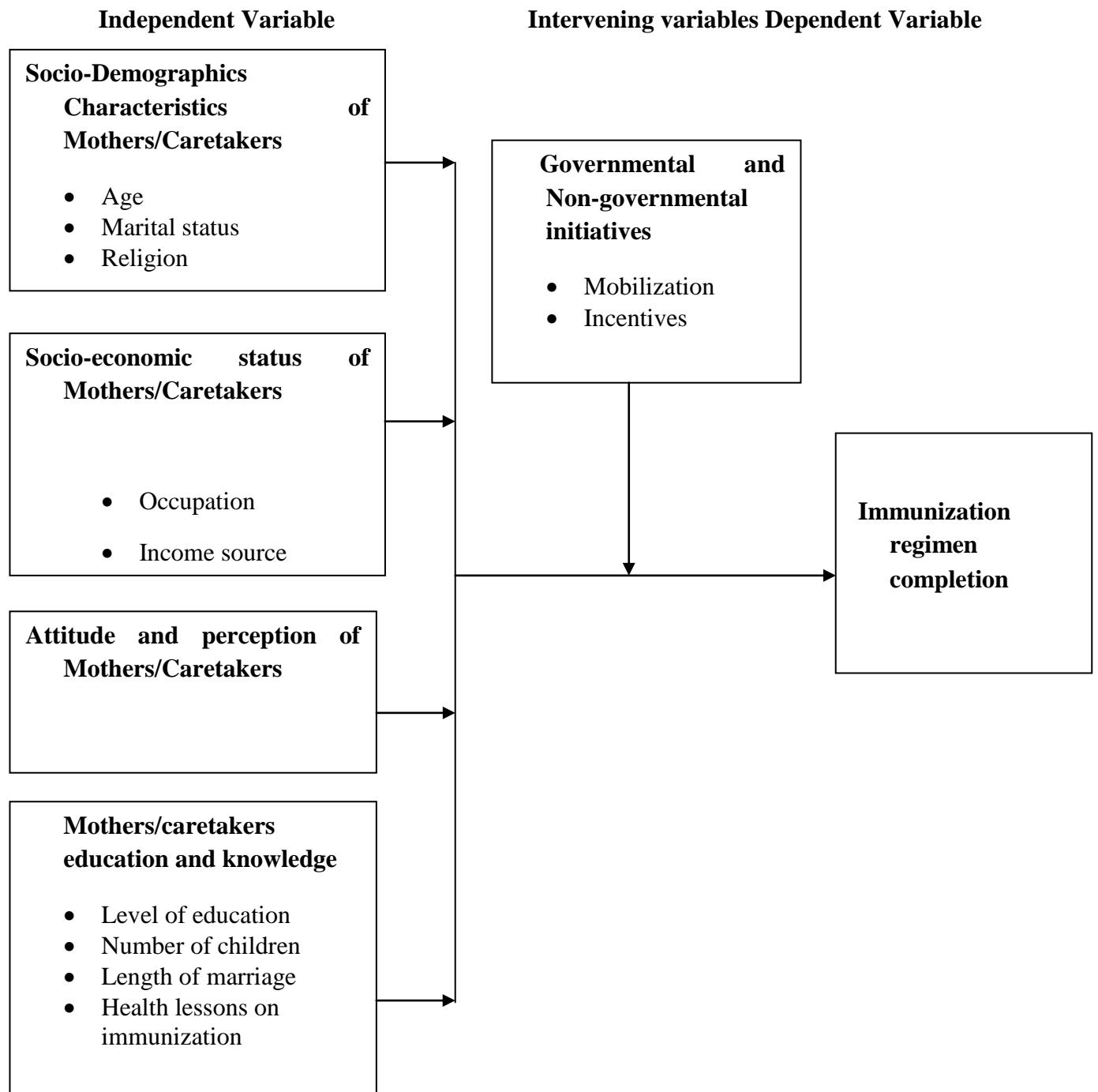


Figure 1. Source: Stretcher and Rosenstock, 1997

2.9 Conceptual Framework

Figure 2. Conceptual framework showing relationships between variables



Individual factors of the mother play an important role in influencing completion of immunization regimens. The individual factors are Socio demographics, socio-economic status,

education and knowledge together with attitude and perception towards the immunization and health care providers influence completion of immunization regimens. A number of decisions made by the mothers to ensure completion of immunization regimen in a timely manner are dictated by the socio demographic composition of an individual like age, sex and marital status. Currently in our society, the economic power of an individual or family will also dictate various activities undertaken and decisions made by an individual and society. Additionally, level of knowledge, education, perception and attitudes are also strong factors that determine completion of immunization regimen.

Some other factors may come into play in this interaction of the independent and dependent variable. Governmental and nongovernmental initiatives like mobilization and initiatives are tailored to encourage completion of immunization regimen. These will therefore be considered the intervening variables.

2.10 Summary of Literature Review

An extensive research on literature review was done by the researcher and numerous works that have been carried out throughout the world have given a mixed results pertaining the determinants of Immunization completion. Studies have shown that demographic characteristics like age, religion of the mothers affect completion of immunization regimen. Some studies have still given mixed results in terms of the effect of socio demographic characteristics of the mothers and caretakers on completion of immunization regimen.

Studies done especially in West Africa and Asia also showed that mothers education and knowledge on immunization have direct impact on completion of immunization. It was also evident in most of the literature reviewed the more education and knowledge of the mothers positively influence completion of immunization regimens, and the more educated or knowledgeable the mother/caretaker is, the more they will strive to ensure completion of

immunization regimen in a timely manner, this means that less knowledgeable or less educated individuals will tend to experience lapses in completion of immunization regimen.

Literature reviewed have also shown clearly the effect of economic status on immunization regimen completion. It is clear from the literatures that stronger socio economic status have positive influence in completion of immunization regimen. It was also evident that economic status of the fathers are very important and should be considered in the determining immunization regimen completion

The literature also highlighted the importance of attitude and perception in determining completion of immunization regimen. Attitude and perception are also dependent on numerous factors among them education and knowledge. Perception and attitude was also noted to be a wider problem and not only confined to developing countries but even in first world countries like Italy.

From the review it is clear that extensive research has been done on this area especially in Western Africa and Asia. Comparatively there is very little research that has been done in the Eastern Africa region and especially Kenya. It therefore follows that very little information on this subject exists especially on the study area or on Siaya District as a whole. It is from this background that a gap of information was realized and problem statement originated

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter describes the methodology that was used in conducting the study in order to get information aimed at meeting the research objectives and answering research questions. These are described under the following headlines: Research design, target research population, sample selection and sample size, research instrument, data analysis and ethical considerations.

3.2 Research Design

A cross sectional study design was employed in implementing the study. This design involved collection of data at one time point without follow up (Schoenbach, 2011). It is fast and inexpensive, there is no loss to follow up as the data is collected at one time point and associations between variables can be determined. However, it cannot be used to determine causality or used to establish/determine rare outcome. Nachmias (1996) sees a cross sectional design as the most predominant design employed in social sciences. Kothari (2004) also shows that this type of design minimizes bias and maximizes reliability of the data collected and analyzed.

Owens (2002) recommends this methodology of design because the information to be gathered is not available from other sources and it will give unbiased representation of population of interest and the same information is collected from every respondent. A similar study design was also used by Abdelraheem (2011) in a study to determine reasons for incomplete vaccination and factors for missed opportunities among rural Nigerian children.

3.3 Target Population

The study population was made up of mothers/caretakers of children of ages between 1 and 4 years who have lived in Boro Division of Siaya District in the last one year of their lives. According to The Ministry of Planning and National development (2010) the population of Boro Division is 52, 703 with a total household of 12848. The crude birthrate in Siaya district where Boro Division lies is approximately 2100 per annum (KNBS, 1999). The District statistics Office Siaya estimated the population of mothers of children between 1-4 years to be 6800. The population distribution of mothers/caretakers of children in Boro Division per location is as follows (KNBS, 2010).

Table 3.1

Target Population Table

Location	Population	Percentage Population
Central Alego	3027	44.5
North Alego	2801	41.2
South Central Alego	971	14.3
Total	6799	100

According to Yamene (1967), Sample size estimation from a proportion can be done using the method below, at a confidence level of 95% and error level of 5%.

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

Where:

n = Desired Minimum sample (When the population is less than 10,000).

N = The total Population

e = Level of precision at 95% confidence level $e=0.05$.

From the above formulae, a sample size of 378 was obtained. A margin of relative error of 5% at the 95% confidence level on the key indicators was estimated and additional 10% of the sample size was added to cover for the anticipated non-response and spoilt tools (United Nations, 2005). This therefore brought the total minimum sample size required to be 382 mothers.

The study area was divided into three locations namely Central Alego, North Alego and South Central Alego. From the sample size of 382, sample sizes per location was distributed based on the percentage proportions of 1-4 years as shown in the sampling table below.

Table 3.2:

Sampling table

Location	Population	Percentage Proportion	Sample
Central Alego	3027	44.5	170
North Alego	2801	41.2	157
South Central Alego	971	14.3	55
Add 10%	-	-	4
Total	6799	100	382

A table showing the samples size per location of Boro Division.

3.4 Sample Size and Sample selection

A sample is a section of the population that is suitable enough to represent the characteristics of the whole population. According to Mugenda and Mugenda (1999), a sample size must be large enough to adequately represent the salient characteristics of the accessible population. Generally, the sample size selection depends on factors such as the number of variables in the study, the purpose of the study, population size, the risk of selecting a "bad" sample, the type of research design, the method of data analysis and the size of accessible population and the allowable sampling error (Israel, 1992). In addition to the above factors, three criteria usually will need to be specified to determine the appropriate sample: the level of precision, the level of confidence or risk, and the degree of variability in the attributes being measured (Miaoulis and Michener, 1976).

3.4.1 Sample Size

From the target population a sample size of 382 was used. The sample size was calculated as proposed by Yamane (1967).

3.4.2 Sample Selection

Simple random sampling method was employed during data collection. In this division, there were village reporters who were trained to support KEMRICDC activities in the division by reporting and keeping records of births and even deaths. From these village reporters the KEMRICDC was been able to maintain a comprehensive database of the of all mothers and guardians with children of ages between 1 and 4 years. From the list of all the mothers and guardians with children this age bracket, a random sample of 382 was drawn, considering proportion per location as shown on the population table. The function RAND () in excel was be used to select the required number of participants to interview. The interviewers began the interview from the Centre of the location, and approached and interviewed the first eligible mothers with children between 1-4 years. In cases where there were more than one child within this age bracket then the youngest one was the reference child. The starting point of the interviews was at the middle of the location and the first homestead for the interview identified by spinning a bottle. In every location, the interviewer administered the questionnaires until the required sample per location was achieved. The mothers, traditional birth attendants and the village reporters directed the interviewers to mothers/guardians with children between the ages of 1 and 4 years. Inclusion criteria included: Mothers or caretakers of child between 1 and 4 years of age and must have lived in Boro Division in the first one year of life.

3.5 Research Instrument

The study employed the use of assisted questionnaires to collect the required information. The questionnaires were administered by an interviewer who asked the

mothers/caretakers questions as outlined in the questionnaire and completed adequately. According to Mugenda and Mugenda (1999) questionnaires are research instruments that gather data of large samples and is therefore suitable for this study. In this vain, a questionnaire was designed to capture the various variables of the study and had both open and closed ended questions covering issues on the determinants of delays in completion of immunization regimen among children in Boro Division, Siaya County. The questionnaire accommodated all the indicators attached to the four variables namely, mothers education and knowledge, mothers socio demographic status, socioeconomic status of the mothers and finally the perception and attitude of the mothers towards completion of immunization regimen. Open ended questions permitted free responses from the mothers without providing or suggesting any structure for replies. The closed ended questions enabled the respondents to be limited to the stated alternatives. The questionnaire was chosen because it enabled the researcher to collect large amount of information within a short time and also uphold confidentiality. The questionnaire were administered by the interviewer.

3.5.1 Pilot Testing

Pilot testing allows the researcher to identify any difficulty with the materials and investigate the accuracy and appropriateness of the instrument developed. Pilot testing was an important step in testing the questionnaire to ensure that quality data is collected at the end of the study. During pilot testing the questionnaire was used to collect information from real participants in the field. The main reasons of pilot testing was to gauge the participants understanding of questions, test the appropriateness of the responses and also determine question clarity. Delport (2002) also argues that it is essential for newly developed questionnaire to be thoroughly piloted before being used in the main investigation. It also gives the interviewer the chance to get feedback regarding the suitability of the data collection tool

that will help improve and ensure efficiency in collection of data. Additionally, it gives the prospective interviewers the opportunity to familiarize themselves with the data collection tool. Test retest method will be used in piloting for this study.

According to Mugenda and Mugenda (1999) a pretest sample of a tenth of the sample respondents with homogenous characteristics is appropriate for a pilot study. Before the study initiation, the data collection staff administered the questionnaire to approximately 38 mothers/caretakers within Karemo division which is outside the study area. It was clearly explained to the mothers/caretakers that the data collected are for the purpose of testing the questionnaire and not for the purpose of the study. The data collected was analyzed and interpreted. The questionnaire was reviewed and appropriate corrections and adjustments to the tool made to make them suitable for use in the study. According to Migenda and Mugenda (2003) pilot testing of research too enhances their reliability and validity. After a period of 2 weeks the corrected questionnaire were administered to the same respondents again after which they were deemed suitable for data collection

3.5.2 Validity of the Instrument

Traditionally, validity has been defined as the degree to which an instrument measures what it purports to measure. It can also be defined as the accuracy, truthfulness and meaningfulness of inference that are based on the data obtained from the use of a tool or scale for each construct or variable in the study (Mugenda, 2004). Validity establishes the relationship between the data and the variable or construct of interest. After construction of the questionnaires, they were presented to the supervisors who are experts in research from the University of Nairobi. Their recommendations were taken into account and used to improve both face and content validity

As it is not possible to determine validity from the instrument alone, data collected during the pilot testing was used to determine and establish validity. From the feedback of the

pilot testing, the questionnaires were corrected and adjusted as appropriate to ensure suitability for the intended use and therefore enhance validity

3.5.3 Reliability of the instrument

According to De Vellis (1991) reliability is the proportion of variance attributable to the true measurement of a variable and estimates the consistency of such measurement over time. It measures the degree to which a research instrument would yield the same result or data after repeated trials, its influenced by random errors that may arise from coding, ambiguous instructions, to interviewer and interviewee fatigue, bias among others (Mugenda, 2008).

In this study, reliability testing was done by using test-retest method. The questionnaires were administered to selected mothers (10% of the sample size) from a neighboring division of Karemo. The questionnaire weree administered to the same group of mothers after a period of 2 weeks. The results of the test-retest was factored into statistical test to determine correlation between the test and the retest. Using statistical package for Social sciences (SPSS), the results of the first test was correlated with that of the second test. Perfect correlation was not be possible because of the confounding factors and therefore a Karl Pearsons correlation coefficient of 0.8 was obtained and this fell within the acceptable range of 0.70-0.90 (Kathuri and Pals, 1993). The Karl Pearsons formula for correlation wasused:

$$r = \frac{\sum(y-Y)(x-X)}{\sqrt{\sum((y-Y)^2)\sum(x-X)^2}}$$

r=Karl Pearsons coefficient of correlation

y=Values of the first test

x=Values of the retest

Y=Mean of the first test

X=Mean of the retest

3.5.4 Data collection procedures

Data collection began after the approval of this proposal by the University of Nairobi School of distance and continuing education and the permit granted by the NCST. Data collection team underwent a rigorous training on research ethics, data collection process and use of data collection tool. During this training the data collection personnel also read through the questionnaire to ensure that all the questions were clear. Assisted questionnaire were administered only to the participants who accepted to participate in the study to collect key information with regards to the objectives of the study. The interviewing personnel assessed eligibility criteria before proceeding to interview the eligible participants. All the answers provided were completed in appropriate spaces in the questionnaire. The questionnaires were administered between 8.30 am and 5.00 pm. Data collection process took approximately 10 days because some of the sections of the division are sparsely populated with long distances between homesteads.

3.6 Data analysis techniques

After data collection, it underwent editing, coding, classification and tabulation so that they could be easily analyzed. Data entry tables were developed in access and excel before the data was transferred to SPSS. After data entry, data was analyzed using descriptive statistics techniques which include frequency counts, mean and mode. Data was presented using frequency tables and percentage tables.

3.7 Ethical Considerations

Because this was a study involving human participants, all the research ethical principles were observed throughout the planning, data collection, analysis and dissemination of the results to ensure the right, safety and well being of the study participants was upheld. Protecting the right and welfare of the participants was therefore the major obligation of the investigative team. The research proposal were reviewed and approved by a panel of distinguished scholars at the UoN School of distance and continuing education and NCST before it could be conducted. The investigator also ensured that privacy of the participants and confidentiality was maintained thorough out the entire study. Participants were identified only by study numbers and no personally identifiable information was collected. Informed consent was administered to all participants prior to participation in the study, participation was voluntary and participants were at liberty to withdraw from the study at anytime without any consequences.

CHAPTER FOUR

DATA ANALYSIS, PRESENTATION, INTERPRATATION AND DISCUSSION

4.1 Introduction

This chapter looks at questionnaire response rate, the background information on immunization, results on socio demographic characteristics of respondents, socio-economic determinants of the respondents, education and knowledge of respondents and the attitude and perception of the respondents on immunization regimen completion. The chapter looks at how these characteristics influences delay in completion of immunization regimen among children between 1-4 years in Boro Division, Siaya County, Kenya

4.2 Questionnaire Response Rate

A total of 382 questionnaires were sent to be administered and 364 questionnaires were returned for analysis yielding a response rate of 95.2%. This response rate was achieved as a result of proper co-ordination with the field assistants and provincial administrations of Boro Division and also adequate information dissemination to the community members on the importance and purpose of the study. This high rate was also achieved as a result of good attitude and welcome given to the study in the community.

4.3 Background Information on Childhood Immunization

This section gives insight to the background information on childhood immunization within the study area. It is important to understand all the background information that play different roles in childhood immunization. This section presents the overall immunization status of the children in the study area, reasons for incomplete immunization, relationship of the respondents to the child, spouse view on immunization, religion and immunization, family size, birth order of children, cost of immunization, modes of transportation and educational levels of the mothers/caretakers.

4.3.1 Availability of Road To Health Cards (Clinic Immunization cards)

The availability of RTHC is important because it shows how the health records and health information are kept and regarded by the respondents. The respondents were asked if they had Road to Health (Clinic) Card used to record the child's immunization status. The table below shows the availability of the RTHC among the responders.

Table 4.1:

Availability of RTHC (Clinic Immunization Cards)

Cards Available	Frequency	Percent
Yes	249	68.4
No	115	31.6
Total	364	100

Table 4.1 show that 249 (68.4%) of the respondents had the RTHC of their children while, 115 (31.6%) of the respondents did not have the RTHC for their children in as much as they had received some of the immunizations. The table shows that a significant number of respondents are not good at keeping the health records for their children. This may be attributed to the fact that they lost or misplaced the cards or were unable to access the cards at the moment. In as much as the cards were missing, (Abdelsalam and Sokal 2004) in a study conducted in Nigeria found out that responses from the mothers are accurate and can be relied upon during immunization coverage surveys. Other studies conducted in different parts of the world have also shown less than 100% RTHC availability.

4.3.2 Immunization Completion Rates

Immunization completion rate provides a general insight on the number of children who actually complete immunization program as per KEPI and the number of those who don't

complete the program as required. It is very important to know the completion rate because it shows the number of children who are completely covered against vaccine preventable diseases and those not fully covered. The respondents were asked if the child had completed immunizations as per KEPI schedule as per the RTHC card or via verbal response in case the card was not available. The table 4.2 represents the outcome of the question.

Table 4.2:

Children Completed immunizations as per KEPI schedule

Completed immunizations	Frequency	Percent
Yes	302	83
No	62	17
Total	364	100

As shown in the table 4.2, approximately 302 (83%) of the respondents said that the child had completed all the Immunizations as per KEPI schedule and that the immunizations were completed when the child was one year old. Delay in completion of KEPI vaccinations was measured based on those respondents who had not completed their KEPI vaccines 62 (17%) at the time of the study. Percentage completion rate is very high and a good number of children are actually completely covered against the vaccine preventable diseases. The completion rate of 83% is above the national and the provincial averages which are 77% and 65.5% respectively (KNBS, 2009). This high coverage rates are highly encouraged if these vaccine preventable diseases are to be eliminated

4.3.3 Reason for not completing KEPI Immunizations

In as much as the completion rates are very high for this study population, there are 17% of children within the age bracket who did not complete the immunization program as required

by KEPI. It is very important for those involved in the health sector to understand the reasons behind non completion of immunization program within the recommended one year of birth because this knowledge contributes in designing programs and coming up with various strategies to circumvent these huddles.

The 62 (17%) of the respondents said that their child had not completed the KEPI immunizations were asked the main reasons why they did not have the immunization completed for their children by the first birthday. The responses are presented in the table 4.3.

Table 4.3:

Reason for not completing KEPI Immunizations

Reasons	Frequency	Percent
Place or time of immunization unknown	14	22.6
Fear of side effects of vaccines	4	6.5
Lack of money	12	19.4
Fear of health care system	4	6.5
Do not see the importance	2	3.2
Ignored	2	3.2
Mother Busy	8	12.9
Mother sick	4	6.5
clinic far away	2	3.2
Not specified	10	16.1
Total	62	100

In table 4.3, the respondents cited various reasons as place or time of immunization unknown 14 (22.6%), fear of side effects of vaccines 4 (6.5%), lack of money 12 (19.4%), fear of health care system 4 (6.5%), do not see the importance 2 (3.2%), ignored 2 (3.2%), mother busy 8 (12.9%), mother sick 4 (6.5%) and clinic far away 2 (3.2%), 10 (16.1%) did not specify the reason for not completing the KEPI vaccines as shown in table 4.3. Most of those who did

have their children complete immunization during the first 12 months of their lives did not bother to have them given the vaccination later, which still makes the babies vulnerable to the vaccine preventable diseases. Among those whose children did not have complete immunization, the majority of the respondents did not take children for completion of immunization because they didn't know the facility and time of immunization. This could be those who migrated into the study area and were therefore not conversant with the geographical distribution of the health facilities in the region. Despite the fact that immunization services are offered free in the government facilities a handful did not take the children for completion of immunization program because of lack of money. These mothers and caretakers could be implying that they did not have the money for transport purposes and not for immunization services because this is offered free of charge.

4.3.4 Relationship of the respondent to the child

The relationship of the respondents to the child provides the information on who takes care of the child and the information that they have on the immunization status of the child. This information may be useful when designing strategies to improve immunization targeting the primary caretakers of the children. The respondents were therefore asked how they were related to the child and the results presented in table 4.4

Table 4.4:

Relationship of the respondent to the child

Relationship	Frequency	Percent
Mother	349	95.9
Father	10	2.8
Grandmother	1	0.3
Sister	2	0.6
Not specified	2	0.6
Total	364	100

From the table, majority of the respondents interviewed were mothers 349 (95.9%) of the children, 10 (2.8%) being fathers, 1 (0.6%) grandmother and 2 (0.6%) sisters of the children and 2 (0.6) did not specify their relationship to the child. This results show that most children are taken care of by their mothers unless the mother is not around that's when a guardian takes care of them in which case the guardian can either be the grandparents or siblings. It is also evident that it is the mothers who take the children to the health facilities for immunization and when the mothers are not in then the fathers, grandparents and sisters can take the responsibility. These results support the findings by Antai, (2009) in Nigeria which showed that the responsibility of taking children to the hospital for vaccination is the responsibility of the mother and not the father.

4.3.5 Spouse view of child immunization

Support of the spouse in child care is important; spouses can either positively or negatively influence the uptake of immunization depending on their view on immunization. The researcher therefore assessed the view of the spouses of the respondents to see whether they support immunization of the children or not. The results are presented in table 4.5.

Table 4.5:

Spouse view of child immunization

Spouse view	Frequency	Percent
Positively	224	61.5
Negatively	12	3.3
Neutral	13	3.6
Don't know	45	12.4
Not specified	70	19.2
Total	364	100

The results show that most of the spouses 224 (61.5%) positively view child immunization, 12 (3.3%) negatively view child immunization, while 12 (3.6%) are neutral about the subject., 45 (12.4%) didn't know and 70 (19.2%) did not specify. This implies that child immunization is highly supported by the spouses of the respondents for those who are married and this might have therefore led to the high completion rates experienced in this division. Childhood immunization should therefore be supported by all the stakeholders. It is also clear from the table that many respondents are not aware whether their spouses support childhood immunization or not and therefore said they did not know and some did not specify.

4.3.6 Religion and immunizations

Religion plays a key role in immunization of children as some religions do not support childhood immunizations. It is therefore important to know the religious beliefs of the mothers and caretakers and how this affects childhood immunization. The researcher wanted to assess if this is the case with the various religious groups in the study area and hence asked the respondents whether their religion supports child immunizations. The results are presented in table 4.6.

Table 4.6:

Religion supports immunizations

Religion supports immunizations	Frequency	Percent
Yes	263	72.3
No	4	1.1
Don't know	97	26.6
Total	364	100

The study found out that a majority 263 (72.3%) of the respondents said that their religion or denominations were in support of childhood immunizations with just a handful 4 (1.1%) against child immunization, 97 (26.6%) of the respondents were not aware if their churches were in favor of childhood immunization or against. The support of immunization by religion could have contributed to the high coverage of immunization in this area. The finding of this study is supported by the findings of a study conducted in rural Nigeria (Olumuyiwa, 2008) that shown that children of Christian mothers were more likely to have complete immunization status than of the other religions. This implies that most churches are enlightened about the importance of child immunizations making them to embrace the idea.

4.3.7 Respondents number of children

The size of the family can sometimes influence the parents on child immunization, it is this respect that the respondents were asked to state the number of children they have. The results were presented in table 4.7

Table 4.7

Respondents' number of children

Number of children	Frequency	Percent
1-3	271	74.5
4-6	91	25.0
7-9	2	0.5
Total	364	100

The results from the survey showed that the parents have a sizable family 271 (74.5%) of between 1-3 children, 91 (25%) of the respondents have between 4-6 children while 2 (0.5%) of the parents had between 7-9 children as shown in table 4.6. The number of children is very important in determining delayed immunization completion because the mothers with more children may not prioritize the responsibilities of taking the child for immunization in time; this however was not analyzed as a contributing factor in determining delayed immunization completion.

4.3.8 Order of birth of the child aged between 1 and 4 years

Birth order is important in when we need to understand the uptake of immunization. This is because the birth orders of the child affect the way the children are taken care of. The responders were therefore asked to state the birth orders of the child. The results of this question is shown in the table The researcher found it of interest to understand the birth order of the child interviewed as this may influence completion of immunization regimen of the children. The respondents were therefore asked to state the birth order of the child. The results were presented in table 4.8.

Table 4.8:

Order of birth of the child aged between 1 and 4 years

Order of birth of the child	Frequency	Percent
First	134	36.8
Second	113	31.0
Third	75	20.6
Fourth	30	8.2
Fifth	10	2.8
Over 5	2	0.6
Total	364	100

Table 4.8 shows that 134 (36.8%) of the children whose parents were interviewed were first born, 113 (31.0%) were of the second birth, 75 (20.6%) children were of the third birth, 30 (8.2%) fourth born, 10 (2.8%) fifth born while 2 were over the fifth birth order. The respondents are mostly have young families and this is because most of them are still very young with an average of 26 years. In other studies conducted in other parts of the world show that the first born are properly taken care of as compared to the other children down the line. In this study, it was however not assessed if this contributed to delayed completion of immunization for the children between 1-4 years of age.

4.3.9 Cost of immunization services

Knowing the cost of immunization is important in determining whether the mothers and caretakers are able to pay for the services and therefore able to have their children complete immunizations. In order for the researcher to understand if there were underlying costs charged

for immunization services, the respondents were asked to mention if the immunizations were offered free of charge. The results are presented in table 4.9

Table 4.9:

Cost of immunization services

Immunization services free of charge	Frequency	Percent
Yes	330	90.7
No	27	7.4
Not specified	7	1.9
Total	364	100

The study revealed that most respondents 330 (90.7%) know that immunization services are offered free of charge in the government facilities that are found within the village, with a few 27 (7.4%) charging some fee for the service. This finding is in line with the government policies of offering free immunization services for all children in the government health facilities. There are also very few privately owned health facilities in the division and are not accessible to the residents of this region. Among the respondents who mentioned to have paid a service charge for immunizations, 23 (85.2%) were able to comfortably pay for the services from their income and those who could not pay comfortably get the money from relative 6 (26.1%) and spouse 17 (73.9%) in case they want to take the child for immunization. This therefore shows the cost of immunization is not a factor in immunization completion.

4.3.10 Mode of transport used when taking child for immunizations

Ability to access immunization services is important in determining whether the mothers and caretakers are able to take their children easily to the health facilities for immunization. In accessing the immunization clinics, knowing the means of transport commonly used to the

immunization health facilities is important since it gives is a pointer to the distribution of health facilities and to the economic power of the resident of the region. In order to access the immunization services, the researcher asked the respondents to name the mode of transport they use when going to the health facilities offering the services. The results were presented in table 4.10.

Table 4.10:

Mode of transport used when taking child for immunizations

Mode of transport	Frequency	Percent
Walking	255	70.1
Public transport	104	28.6
Private transport	41	11.3
Total	364	100

Majority 255 (70.1%) of the respondents walk to the health facilities to get the services because most of the facilities are within walking distances, 104 (28.6%) use public transport while 41 (11.3%) use private transport in order to access the immunization services. There is a small percentage of those who use more than one transport means for example walking and private means. This show that the clinics are situated within walking distances and that the residents are also able to pay for other modes of transport to enable them access the immunization services.

4.4 Socio-Demographic characteristics of the respondents and delayed completion of immunization regimen

This section presents results for the socio-demographic characteristics of the respondents involved in the study. The socio demographic characteristics include, gender, age and marital status.

4.4.1 Gender of the respondents and delayed completion of Immunization regimen

The study found it very important to understand the gender distribution of respondents. This is important since it could provide background for analysis of the effect of gender on completion of immunization. For this purpose the respondents were asked to state their gender. The results were represented in the table 4.11.

Table 4.11:

Gender Distribution of the Respondents

Gender	Frequency	Percent
Female	352	96.7
Males	12	3.3
Total	364	100

A large number 352 (96.7%) of respondents were female while only 12 (3.3%) were male. This implies that most of the females assume the sole responsibility of taking care of the children and even taking children to the hospital. Most of the times for the interview the fathers were not at home and were probably out at work or with friends. Most of the respondents were mothers of the babies and only a handful were males, the gender of the respondent was not found to be associated with delayed immunization completion.

4.4.2 Age distribution of the respondents and delayed completion of immunization regimen

The study did find it necessary to understand the age distribution of the respondents. This is important as it gives the data for analysis of age schemes and how age of the mothers may play a role in the completion of immunization regimen. In that case the respondents were asked to state their ages in completed years, the responses were categorized as presented in table 4.12

Table 4.12:

Age distribution of the respondents

Age category	Frequency	Percent
Less than 20 Years	37	10.2
21-25 Years	173	47.5
26-30 Years	81	22.3
31-35 Years	26	7.1
36-40 Years	28	7.7
Over 40 Years	17	4.7
Not specified	2	0.6
Total	364	100

Results from the study showed that the average age of the respondents was 26 years (SD 6.3) ranging from 19-50 years. The age distribution show slightly half of the respondents 173 (47.5%) aged between 21-25 years, 81 (22.3%) aged between 26-30 years, 37 (10.2%) of the respondents were less than 20 years old, 26 (7.1%), 28 (7.7%) and 17 (4.7%) of the respondents aged between 31-35 years, 36-40 years and over 40 years respectively as shown in table 4.12. Most of the respondents are relatively younger and have young families. These attributes have been shown to positively affect completion of childhood immunization

Effect of mother/caretakers age on delayed completion of immunization regimen

A cross tabulation was therefore done between the age of the mothers/caretakers and completion of the KEPI immunizations. Further analysis (Chi square test) was then done to confirm the extent to which age of the mothers/caretakers influence delay in completion of immunization regimen among children in Boro Division, a p-value of < 0.05 was considered significant. The results were presented in the table 4.13

Table 4.13:

Effect of mother/caretakers age on delayed completion of immunization regimen

Variables	Delay in completion of KEPI Immunizations		Chi square p-value
	Yes	No	
Age category			
Less than 20 Years	8 (2.21%)	29 (8.01%)	
21-25 Years	22 (6.08%)	151(41.71%)	
26-30 Years	20 (5.52%)	61 (16.85%)	0.0983
31-35 Years	6 (1.66%)	20 (5.52%)	
36-40 Years	2 (0.55%)	26 (7.18%)	
Over 40 Years	2 (0.55%)	15 (4.14%)	

Majority of the respondents were between the ages of 21-25 years, this is consistent with the findings of KDHS, 2009. In some studies, age of the mothers has been shown to influence vaccination uptake in children. In this area however, age was not found to be associated with delayed immunization completion. These finding differ from the findings of a study conducted in Gabon by Schwartz *et al.* (2009) and another conducted in Kenya by Kamau and Esamai,

(2001), mothers who give birth at younger ages were more likely not to adhere to the immunization schedule and therefore complete the immunization regimen within the stipulated timeframe. The findings of these studies are in contradiction to a study done in Japan (Matsumura, 2005) where children of younger mothers are more likely to be completely immunized than those of older mothers. Therefore because of the mixed outcome of these studies one cannot make a conclusive judgment on the effect of the mothers age on the completion of immunization regimen because it tends to depend on the set ups.

4.4.3 Marital status of the respondents

In order to understand the marital status of the respondents, they were asked to state their marital status. The results were tabulated in table 4.14. The marital status was grouped into married, single, divorced and widowed.

Table 4.14:

Marital status of the respondents

Marital status	Frequency	Percent
Married	284	78.0
Single	50	13.7
Divorced	10	2.8
Widowed	20	5.5
Total	364	100

Table 4.14 shows that most of the respondents 284 (78.0%) were married followed by single 50 (13.7%), widowed 20 (5.5%), and divorced 10 (2.8%) respectively. Most of the families are still young as shown by the size of the families and the age brackets of the mothers and the caretakers. The respondents who were widowed or widowers were elderly compared to the average age of 26 and had relatively larger families A good number of children between this

age are therefore taken care of by their mothers and fathers, therefore both parents have a role to play in terms of the health of the children including childhood immunization. These results are also consistent with the findings of the KDHS, (2009).

Effect of the marital status of the respondents on delays in completion of immunization regimen

A cross tabulation was therefore done between marital status and delayed completion of the KEPI immunizations. Further analysis (Chi square test) was then done to confirm the extent to which these socio demographic characteristics influence delay in completion of immunization regimen among children in Boro Division, a p-value of < 0.05 was considered significant. The results of this analysis were presented in the table 4.15

Table 4.15:

Effect of the marital status of the respondents on delays in completion of immunization regimen

Variables	Delay in completion of KEPI Immunizations		Chi square p-value
	Yes	No	
Marital status			
Married	42 (11.54%)	242(66.48%)	
Single	10 (2.75%)	40 (10.99%)	
Divorced	6 (1.65%)	4 (1.10%)	0.0023
Widowed	4 (1.10%)	16 (4.40%)	

Analysis showed that being married (66.48%) is a significant determining factor for completion of immunization for children between 1-4 years living in Boro. This can also supported by the fact that most of the spouses (61.5%) had a positive view towards immunization completion, and immunization program in general and therefore supports the

mothers have more encouragement and support to have their children complete the immunization regimen. However, those mothers whose spouses had negative view on immunization were more likely to experience delays in completion of immunization regimen. From the results it is also very evident that children of mothers who were divorced were 1.5 times more likely to have delays in completion of immunization regimen than those who were married. This may be attributed to lack of support from the spouse; therefore support of the spouse is critical in ensuring timely completion of immunization regimen.

4.4.4 Religion of the respondents

Religion in a community plays an important role in various aspects of life that may include immunization uptake in this region. It is in this interest that the researcher found it important to ask the respondents to state their religion as this can give an insight into child immunization. The results are presented in table 4.16.

Table 4.16:

Religion of the respondents

Religious affiliation of the respondents	Frequency	Percent
Christian	70	19.2
Catholic	145	39.8
SDA	34	9.3
ACK	24	6.6
African Instituted Churches	91	25.0
Total	364	100

Table 4.16 shows that 145 (39.8%) of the respondents are Catholic's, 70 (19.2%) are Christians, 34 (9.3%) are SDA's, 24 (6.6%) belonged to ACK while 91 (25%) worship in other African Instituted Churches. From the above lumping together the other Christian denominations, those affiliates to Christianity were 75% while other African instituted churches

like *Legio maria, Hera, Roho* among others formed the remaining 25%. The majority of the respondents in this area are therefore Christians with a few of the African affiliated religions and none is a muslim. Generally, Christianity has been known to support immunization of children immunization.

The influence of the respondents religion on delay in completion of immunization regimen

A cross tabulation was done between respondents religion and delayed completion of the KEPI immunizations. Further analysis (Chi square test) was then done to confirm the extent to which religion influence delay in completion of immunization regimen among children in Boro Division, a p-value of < 0.05 was considered significant. The results of this analysis were presented in the table 4.17

Table 4.17:

The influence of the respondents religion on delay in completion of immunization regimen

Variables	Delay in completion of KEPI Immunizations		Chi square p-value
	Yes	No	
Religion of the respondents			
Christian	8 (2.20%)	62 (17.03%)	0.0001
Catholic	18 (4.95%)	127 (34.89%)	
SDA	2 (0.55%)	32 (8.79%)	
ACK	4 (1.10%)	20 (5.49%)	
African Instituted Churches	30 (8.24%)	61 (16.76%)	

Religion was also shown to significantly support (72.3%) immunization completion. Furthermore children of those mothers/caretakers whose religion do not support childhood

immunization were more likely to have delay in completion of immunization regimen than those from religions that supported childhood immunization . Those religions that didn't support immunization were mostly the African Instituted churches this can be attributed to the fact that these churches try to blend a lot of African traditional beliefs and the modern Christianity practices and some still advocate for the use of traditional medicine and not the modern medical practices. From previous literature, it has also been shown that children from the Christianity background tends to have higher uptake of immunization as opposed to other religion like Islam and Buddhism. This study could not compare with Aboubakary *et al.* (2009) in the study conducted in Nigeria, that found out that children from muslim families had lower immunization coverage compared to the other religions and therefore being a non-Muslim was therefore found to significantly increase the chances of complete immunization by 1.8. These findings supports the outcome of a study conducted in the urban slums of Luknow India (Bhola, 2007) which showed that children from Muslim families were also at risk of incomplete immunization than their counterparts from the other religions

4.5 Socio-Economic characteristics of the respondents

This section presents the results of socio-economic characteristics (occupation of the respondents, income and cost of immunization services) of the respondents involved in the study. This is aimed at determining how socio economic status of the respondents may influence immunization completion.

4.5.1 Occupation of the respondents

The study found it necessary to understand the sources of income for the respondents, as a result they were asked to state their occupation and the results are as tabulated in table 4.18.

Table 4.18:

Occupation of the respondents

Occupation of the respondents	Frequency	Percent
Professional/technical/managerial	8	2.2
Skilled manual	85	23.4
Unskilled manual	90	24.7
Domestic service	54	14.8
Peasant farmer	48	13.2
Business woman	73	20.1
None	6	1.7
Total	364	100

Table 4.18 shows that 90 (24.7%) of the respondents had unskilled manual jobs, 85 (23.4%) had skilled manual jobs, 73 (20.1%) were business women, 54 (14.8%) had domestic service jobs, 48 (13.2%) were peasant farmers while 8 (2.2%) had professional jobs, 6 (1.7%) of the respondents do not have any kind of job. The results showed that almost equal proportions of the respondents have unskilled and skilled jobs, the other proportions were smaller and distributed across the other occupations. The findings are also in agreement with the findings for the KDHS (2009) for this area.

A cross tabulation was therefore done between the occupation of the respondent and delayed completion of the KEPI immunizations. Further analysis (Chi square test) was then done to confirm the extent to which occupation of the respondents influence completion of immunization regimen among children in Boro Division, a p-value of < 0.05 was considered significant. This is shown in the table 4.19

Table 4.19:

Effect of the occupation of the respondents on delayed completion of immunization regimen

Variables	Delay in completion of KEPI Immunizations		Chi square p-value
	Yes	No	
Occupation of the respondents			
Professional/technical/managerial	2 (0.55%)	6 (1.65%)	
Skilled manual	4 (1.10%)	81 (22.25%)	0.0209
Unskilled manual	20 (5.49%)	70 (19.23%)	
Domestic service	8 (2.20%)	46 (12.64%)	
Peasant farmer	12 (3.30%)	36 (9.89%)	
Business woman	14 (3.85%)	59 (16.21%)	
None	2 (0.55%)	4 (1.10%)	

The result showed that children whose mothers/caretakers has skilled manual occupation were more likely to have completed immunization regimen within the stipulated time period than those of the other occupations. This is probably because those in skilled jobs are most likely more educated than the respondents in other occupations and are therefore more empowered with knowledge on immunization. The skilled jobs could also be providing good return hence economic empowerment for the respondents

4.5.2 Main source of income of the respondents

The economic aspect of life was also assessed by the researcher as this would have an effect on completion of the immunization regimen of the children. The results were presented in table 4.20.

Table 4.20:

Main source of income of the respondents

Main source of income of the respondents	Frequency	Percent
Professional/technical/managerial work	8	2.2
Skilled manual work	85	23.4
Unskilled manual work	90	24.7
Domestic service work	54	14.8
Farming	42	11.5
Business	73	20.1
None	6	1.7
Not specified	6	1.7
Total	364	100

Table 4.20 shows that 90 (24.7%) of the respondents earn their income from unskilled manual jobs, 85 (23.4%) from skilled manual jobs, 73 (20.1%) from business, 54 (14.8%) from domestic service jobs, 42 (11.5%) from peasant farming, 8 (2.2%) from professional jobs while 6 (1.7%) do not have any source of income.

A cross tabulation was therefore done between source of income and delayed completion of the KEPI immunizations. Further analysis (Chi square test) was then done to confirm the extent to which the source of income influences completion of immunization regimen among children in Boro Division, a p-value of < 0.05 was considered significant and the results presented in the table below

Table 4.21:

Effect of the main source of income of the respondents on delay in completion of immunization regimen

Variables	Delay in completion of KEPI Immunizations		Chi square p-value
	Yes	No	
source of income			
Professional/technical/managerial work	2 (0.56%)	6 (1.68%)	0.0395
Skilled manual work	4 (1.12%)	81 (22.63%)	
Unskilled manual work	20 (5.59%)	70 (19.55%)	
Domestic service work	8 (2.23%)	46 (12.85%)	
Farming	8 (2.23%)	34 (9.50%)	
Business	14 (3.91%)	59 (16.48%)	
None	2 (0.56%)	4 (1.12%)	

The results showed that occupation of the respondents, and source of income of the respondents were significantly associated with delay in completion of immunization regimen among children in Boro Division. Therefore those with those in unskilled manual (5.49%) category more likely to have delays in completion of immunization regimen for their children than those from the other categories; - skilled manual (1.10%) and farmers. Most of those employed in unskilled manual employments may not be very well empowered with adequate education and economically as the other respondents in better occupations.

4.5.3 Monthly income of the respondents

The level of income of the respondents is important in determining coverage of immunizations. As a result of this importance, the researched assessed the level of income of the respondent by asking them to state their income levels per month. The results are presented in the table 4.22

Table 4.22:

Monthly income of the respondents

Monthly income of the respondents	Frequency	Percent
Below 5,000	115	31.6
5,001-10,000	18	5.0
10,001-15,000	30	8.2
15,001-20,000	0	0
Above 20,000	0	0
Not specified	166	45.6
Total	364	100

The result revealed that the average income was 2500.62 ranging from 450 to 14,000 115 (31.6%) of the respondents earned less than Kshs 5,000 a month, 18 (5.0%) had an income of between Kshs 5,001-10,000per month, 30 (8.2%) had an income of between Kshs 10,001-15,000 while 166 (45.6%) didn't specify how much they earn per month. This is thought to be because in most of the families the husbands seem to be the sole breadwinners and women are reduced to look after the babies alone and taking care of the family. This question therefore did not target the income of the household.

A cross tabulation was therefore done between the level of income of the mother/caretaker and delayed completion of immunization regimen. Further analysis (Chi square test) was then done to confirm the extent to which these socio economic characteristics influence completion of immunization regimen among children in Boro Division, a p-value of < 0.05 was considered significant. The results are presented in the table below.

Table 4.23:

Effect of income level of the respondents on delayed completion of immunization regimen

Variables	Delay in completion of KEPI Immunizations		Chi square p-value
	Yes	No	
Monthly income of the respondents			
Below 5,000	2 (1.01%)	33 (16.67%)	0.2374
10,001-15,000	2 (1.01%)	16 (8.08%)	
15,001-20,000	6 (3.03%)	24 (12.12%)	
Above 20,000	22 (11.11%)	93 (46.97%)	

From the analysis, respondents' monthly income was not significantly associated with delay in completion of immunizations regimen among children in Boro Division as shown in table 4.23. Previous studies conducted in Africa and Asia looked at the house hold income rather than individual respondent's income and therefore showed a significant association between immunization completion and monthly household income (Antai, 2009 and Reinstein, 1990). In this study however, there was no significant difference between the different occupations for example between peasant farmers and skilled laborers, this is in support of the findings by Zuber (2010).

4.6 Knowledge on immunizations and educational level of the respondents

This section presents the results of the respondent's knowledge of immunization and their level of education. Knowing the educational level and the level of knowledge that the respondents have on immunization is important in understanding the uptake of immunization within any region. The variables investigated include education level of the respondents and their spouses, source of information about immunization, had education with regard to

immunizations, reasons for childhood immunizations, awareness of government immunization program and common preventable diseases that the babies are immunized against.

4.6.1 Education level of the respondents

The education level of the respondents was assessed as this could have a great impact on the completion of immunization by the children. The researcher therefore asked the respondents to state their education level and the results are presented in table 4.24.

Table 4.24:

Education level of the respondents

Education level of the respondents	Frequency	Percent
None	29	8.0
Primary	266	73.1
Secondary	59	16.2
College	8	2.2
Not specified	2	0.6
Total	364	100

Table 4.24 shows that majority 266 (73.1%) of the respondents have primary education, 59 (16.2%) had secondary education, 8 (2.2%) had college education while 29 (8%) of the respondents did not attain any formal education. This shows a high level of literacy in this region and this is good for immunization uptake and this is also evident from the exceptionally high immunization completion rates that are above the national or even provincial averages. This level of literacy is in agreement with the findings of the Hungry for Life International, (2010) that showed 70.3% of the residents of Boro division having primary education and 10% secondary education.

The researcher therefore sought to determine whether the educational level of the respondents had any influence on delayed completion of immunization regimen among children in Boro Division. This was investigated in order to meet the third objective of the study. For this reason further analysis (Chi square test) was done to confirm the extent to which educational level of the respondents influence completion of immunization regimen among children in Boro Division, a p-value of < 0.05 was considered significant. The results are presented in the table 4.25

Table 4.25:

The influence of educational level of the respondents on delayed completion of immunization regimen

Variables	Delay in completion of KEPI Immunizations		Chi square p-value
	Yes	No	
Education level of the respondents			
None	22 (6.08%)	7 (1.93%)	
Primary	36 (9.94%)	230 (63.54)	< 0.0001
Secondary	2 (0.55%)	57 (15.75%)	
College	2 (0.55%)	6 (1.66%)	

The results showed that education level of the respondents ($p < 0.0001$) is a significant determinant in delayed completion of immunization regimen. From the analysis, children of mothers and caretakers with no formal education at all were more likely to have delay in completion of immunization regimen. This finding is in agreement with a similar study conducted in Malawi by Alister (2007) that showed that education level of the mothers influence immunization completion, therefore those with at least primary education are more likely to have children have complete immunization.

4.6.3 Source of information about childhood immunizations

The information relayed to the child's parents can influence completion of immunizations of the children. %). Knowing the source of information is important because it is a pointer towards which areas can be best used as source of providing immunization information to the parents and to the general public.

The researcher therefore asked the respondents to state their source of information regarding to child immunization. The results were then tabulated in table 4.26

Table 4.26:

Source of information about childhood immunizations

Source of information about childhood immunizations	Frequency	Percent
Media	24	6.6
Health facility	310	85.2
TBA	13	3.6
Chiefs bazaar	10	2.8
Home	2	0.6
Neighbor	1	0.3
School	4	1.1
Total	364	100

Table 4.26 shows that majority 310 (85.2%) of the respondents get the information about child immunization from health facilities followed by media 24 (6.6%), TBA 13(3.6%), chiefs barazas 10 (2.8%), schools 4 (1.1%), home 2 (0.6%) and neighbors 1 (0.3%). It is evident that the majority of the responders get the information on immunization from the health facilities. This good because it shows that use the health facilities around them and that the health care providers also play their roles of passing these important information to them

whenever they visit these facilities either for immunization services or any other health care services.

4.6.4 Had education/information on childhood immunizations

The respondents were asked if they had any formal education/information with regards to immunization in order to see if this affects completion of immunization. The results were presented in table 4.27.

Table 4.27:

Had education/information on childhood immunizations

Had education/information	Frequency	Percent
Yes	156	42.8
No	206	56.6
Not specified	2	0.6
Total	364	100

The result revealed that almost half 156 (42.8%) of the respondents had formal education/information on childhood immunization, 206 (56.6%) have not had any education on childhood immunization and 2 (0.6%) did not specify. This shows that slightly more than half the respondents have had formal education or information on immunization. The kinds of education/awareness campaigns the respondents have had include kick polio out of Kenya, education on measles and TB vaccination and general immunization of the children. Majority of the respondents who received education on childhood immunization have benefitted in that 145 (93%) had their child complete vaccinations. However even those who haven't received any

education or information on immunization still took had their children complete immunization within the stipulated time period.

The researcher therefore sought to determine whether having formal education/information on immunization had any influence on delayed completion of immunization regimen among children in Boro Division. For this reason further analysis (Chi square test) was done to confirm the extent to which having formal training/education influence completion of immunization regimen among children in Boro Division, a p-value of < 0.05 was considered significant. The results are presented in the table 4.28

Table 4.28:

The influence of immunization information on the respondents on delayed completion of immunization regimen

Variables	Delay in completion of KEPI Immunizations		Chi square p-value
	Yes	No	
Had education/information on childhood immunizations			
Yes	20 (5.52%)	136 (37.57)	
No	42 (11.60%)	164(45.30%)	0.1241

From the table 4.28 it was clear that having formal education /information on immunization was not a significant determinant of delayed immunization completion. This can be contributed to the fact that 85% of the respondents had information on immunization, formal or otherwise from the health facilities. What comes out from this is that the information from the health facilities are more significant and reaches higher numbers of respondents and should therefore be encouraged.

4.6.5 Reasons for childhood immunizations

The study also sought to investigate the knowledge of the respondents with regard to reasons for vaccinating their children. It is important to gauge if the respondents are aware of the reasons behind vaccination of their children. The respondents gave various reasons tabulated in table 4.29.

Table 4.29:

Reasons for childhood immunizations

Reasons for childhood immunizations	Frequency	Percent
Maintain good health of the baby	24	6.6
Prevent diseases	261	71.7
Prevent reoccurrence of diseases	2	0.6
To prevent babies from various infections	12	3.3
To prevent measles, polio and TB	3	0.8
boost the body	10	2.7
help prevent other childhood diseases	2	0.6
keep away illnesses	4	1.1
prevent emergence of other immunizable diseases	4	1.1
prevent measles	2	0.6
prevent polio	6	1.7
promote good health	4	1.1
Treat disease	2	0.6
Don't now	22	6.0
Not specified	6	1.7
Total	364	100

Majority of the respondents 261 (71.7%) reported that they vaccinate their children to protect them from getting diseases followed by maintain good health of the baby 24 (6.6%). Two (0.6%) respondents mentioned prevention of reoccurrence of diseases, 12 (3.3%)

mentioned prevention of various infections, 3 (0.8%) mentioned to prevent measles, polio and TB. This shows that the mothers are well aware of the reasons for administering vaccination i.e. to prevent diseases, still a good number mentioned specific vaccine preventable diseases such as Polio, Measles and TB other responses were not very far from the required response showing the high level of awareness as far as the main reason for the administration of vaccines are concerned.

4.6.6 Awareness of the current government immunization program

The current government immunization's awareness by the respondents was also assessed to understand how the program has been picked u by the community. This was important to the researcher since it could have a big impact on completion of immunizations among children in Boro Division. The results were presented in table 4.30.

Table 4.30:

Awareness of the current government immunization program

Awareness of government immunization program	Frequency	Percent
Yes	308	84.6
No	54	14.8
Not specified	2	0.6
Total	364	100

The study results revealed that the governments program on immunization has penetrated the community well as most of the respondents 308 (84.6%) were aware of the program, 54 (14.8%) did not know of the immunization programs initiated by the government while 2 (0.6%) respondents did not answers this question (table 4.30). This awareness of the

immunization program by the government is important because it helps improve the uptake of the services offered in the government facilities.

4.6.7 Common preventable diseases that babies are immunized against

In order for the researcher to assess the level of knowledge the respondents have about preventable diseases that babies are immunized against, the respondents were asked to state the various diseases that immunization can prevent. The results were presented in the table (4.31) below.

Table 4.31:

Common preventable diseases that babies are immunized against

Diseases	Frequency	Percent
Polio	306	84.1
TB	62	17.0
Rotavirus	4	1.1
Diphtheria	4	1.1
Tetanus	34	9.3
Hemophilus Influenza	6	1.7
Pertusis	2	0.6
Hepatitis B	2	0.6
Measles	258	70.9
Pneumococcus	15	4.1
Total	364	100

The study results revealed that polio 306 (84.1%) is commonly known among parents followed by measles 258 (70.9%), TB 62 (17.0%), tetanus 34 (9.3%), hemophilus influenza 6 (1.7%), rotavirus 4 (1.1%), diphthera 4 (1.1%), Pertusis 2 (0.6%) and hepatitis B 2 (0.6%) as shown in table 4.32. Polio and measles are notably the most serious vaccine preventable

diseases that are still common and therefore there are high levels of awareness. The government and its development partners have always organized mass immunization campaign in the country to educate people on these diseases and also to immunize large number of children below the age of five.

4.7 Perception and attitude of immunizations of the respondents

This section presents the results of the respondent’s perception and attitude of immunization. The variables investigated include ability to encourage child immunizations, perception on the organization of the provision of immunizations by the health facilities and satisfaction with the healthcare providers giving immunizations.

4.7.1 Childhood immunizations to be encouraged

The researcher found it of importance to investigate whether the respondents encourage childhood immunizations as this could have a direct impact on the completion of immunization regimen among the children. The respondents were then asked to state if they would encourage childhood immunizations and the results were tabulated in table 4.32.

Table 4.32:

Childhood immunizations to be encouraged

Childhood immunizations to be encouraged	Frequency	Percent
Yes	358	98.3
No	6	1.7
Total	364	100

The study results showed that a majority 358 (98.3%) of the respondents encourage childhood immunizations with only a few 6 (1.7%) of the respondents saying they do not encourage child immunizations. This shows that they respondents have understood the

importance and the benefits of immunization and in their opinion (98.3%) want immunization to be encouraged. This can also be interpreted that the respondents have a positive attitude and perception on childhood immunization and that is why they want it encouraged.

The researcher therefore sought to determine whether the attitude of the respondents had any influence on delayed completion of immunization regimen among children in Boro Division. To determine this, Chi square test was done to confirm the extent to which perception of the respondents influence completion of immunization regimen among children in Boro Division, a p-value of < 0.05 was considered significant. The results are presented in the table 4.33

Table 4.33:

Attitude of immunizations and completion of immunization regimen among children in Boro Division

Variables	Delay in completion of KEPI Immunizations		Chi square p-value
	Yes	No	
Childhood immunizations to be encouraged			
Yes	60 (16.4%)	298(81.8%)	0.2842
No	2 (0.55%)	4 (1.10%)	

From the analysis it is evident that the respondent has a positive attitude and perception on childhood immunization. This however was not found to be a significant determinant of delayed immunization. Having a positive attitude and perception encourages the mothers and caretakers to take the babies for immunization services and therefore enabling them to complete the immunization regimen within the stipulated time period.

4.7.2 Perception about the organization of the provision of immunizations

The organizations of the provision could influence the completion of immunization among the children; Mothers'/caretakers perception can either be positive or negative and this can affect immunization uptake and ultimately completion of immunization regimen. This was assessed to see how it impacts completion of immunization regimen among the children. The results were presented in table 4.34.

Table 4.34:

Perception about the organization of the provision of immunizations

Perception about immunizations	Frequency	Percent
Poor	82	22.5
Average	180	49.5
Good	85	23.4
Very good	13	3.6
Don't know	4	1.1
Total	364	100

Table 4.34 shows that 180 (49.5%) of the respondents have an average perception about the organization of the provision of immunization, 85 (23.4%) had a good perception on the organization of the provision of immunizations, 82 (22.5%) had poor perception while 13 (3.6%) had very good perception of the organization of immunization. In as much as the respondents say that the immunization should be encouraged, they have varied perception for the immunization program offered by the government.

A cross tabulation was gone to determine how this perception of the whole immunization program affect completion of immunization regimen. For this to be determined a chi square test was performed and the results presented in the table 4.35.

Table 4.35:

Effect of perception of the respondents on delayed completion of immunization regimen

Variables	Delay in completion of KEPI Immunizations		Chi square p-value
	Yes	No	
Perception on provision of immunizations			
Poor	8 (2.20%)	74 (20.33%)	0.0628
Average	30 (8.24%)	150 (41.21%)	
Good	18 (4.95%)	67 (18.41%)	
Very good	4 (1.10%)	9 (2.47%)	
Don't know	2 (0.55%)	2 (0.55%)	

The table above shows that perception of the mothers/caretakers is not a significant determinant of delayed completion of immunization regimen among this population.

4.7.3 Satisfied with the healthcare providers giving vaccinations

To gauge the level of satisfaction the parents had on the immunization program as a whole the respondents were asked if they were satisfied with the services offered within the KEPI and the results presented as follows table 4.36

Table 4.36:

Satisfied with the healthcare providers giving vaccinations

Satisfied with the healthcare providers	Frequency	Percent
Yes	218	59.9
No	146	40.1
Total	364	100

Table 4.36 shows that 218 (59.9%) of the respondents were satisfied with the healthcare providers giving vaccinations while 146 (40.1%) were dissatisfied with the healthcare providers. The dissatisfaction reasons provided by the respondents included unfriendliness of the healthcare providers 63 (43.2%), they don't care about the clients 62 (42.5%) and lack of vaccines at the health facilities 21 (14.4%).

Further analysis (Chi square test) was then done to confirm the extent to which satisfaction with the health providers influence delay completion of immunization regimen among children in Boro Division, a p-value of < 0.05 was considered significant. The results are represented in the table 4.37

Table 4.37:

Effect of parents' satisfaction with the health facility on delayed completion of immunization regimen

Variables	Delay in completion of KEPI Immunizations		Chi square p-value
	Yes	No	
Satisfied with the healthcare			
Vaccinations			
Yes	42 (11.54%)	176(48.35%)	0.1661
No	20 (5.49%)	126(34.62%)	

From the above cross tabulation, it was evident that satisfaction with health facility is not a significant determinant of immunization regimen completion. It is important to note that none of the perception and attitude variables had any significant association with completion of the KEPI immunizations regimen among children in Boro Division. Interestingly majority of the respondents 59.9% were not satisfied with the services offered at the health facility and a good percentage rated the services offered at these facilities as average. The results of this study is in contradiction to the results of other studies conducted in Ethiopia by Hemoke (2009) and Abdelraheem (2011) in Nigeria

CHAPTER FIVE

DISCUSSION AND CONCLUSION

5.1 Introduction

This chapter discusses in details a summary of the findings, conclusions, recommendations, recommendations for further studies and contribution to the body of knowledge.

5.2 Summary of Findings

The objectives of this study was to determine the extent to which socio demographic characteristics of the mothers/caretakers affect completion of immunization regimen among children in Boro Division, determine how socio-economic status of the mothers/caretakers influence completion of immunization regimen among children in Boro Division, determine how education and knowledge of mothers/caretakers affect completion of immunization regimen for children in Boro Division and lastly to determine how attitude and perception of mothers/caretakers affect completion of immunization regimen among children between 1-4 years of age.

For the first objective that was to determine the extent to which socio demographic characteristics of the mothers/caretakers affect completion of immunization regimen among children in Boro Division, the results showed that 78% of the respondents were married, 13.7% single, 2.8% divorced and 5.5% widowed. It was found that the mothers or fathers who were married (P-Value 0.0023) were more likely to have children with completed immunization regimen. Christian religion (74.9%), and religious support of child immunization (72.3%) were significant determinants of completion of immunization regimen among children in Boro Division. Therefore the children of mothers from the African Instituted churches were more likely to have delayed completion of immunization for their children than children of mothers

who are Catholics. Mothers from religions that don't support immunizations were also more likely to have delayed completion of immunization regimen. It was also evident that children of mothers whose spouses viewed childhood immunization negatively were more likely to have delayed completion of immunization regimen

For the second objective that was set to determine how socio-economic status of the mothers/caretakers influence completion of immunization regimen among children in Boro Division. Two point two percent (2.2%) were professionals/technical, 23.4% in skilled manual employment, 24.7% were unskilled laborers, 14.8% were employed as domestic workers, 20.1% were business women and 13.2% were farmers Division it was evident that occupation of the respondents ($P=0.0209$), and source of income of the respondents ($P=0.0395$) were significant determinants of completion of immunization regimen among children in Boro Division. Therefore children of mothers will unskilled manual occupation were more likely to have delayed completion of immunization regimen for their children than those of mothers with skilled manual employment.

For the third objective that was set to determine how education and knowledge of mothers/caretakers affect completion of immunization regimen for children in Boro Division. The results showed that those with no formal education were 8.0%, those with primary level education were 73.1%, and respondents with secondary school education were 16.2% while 2.2% had college education. The results showed that education level of the respondents ($p < 0.0001$), is also a significant determinant of delayed immunization completion. Education level of the respondents spouses ($p=0.0402$) and awareness about the governments immunization program ($p < 0.0001$) were significantly associated with delayed completion of immunization regimen among children in Boro Division. From the results, children of mothers

who did not have any formal education were more likely to delay completion of immunization regimen than children whose mothers attended formal trainings.

Lastly for the fourth objective that was to determine how attitude and perception of mothers/caretakers affect completion of immunization regimen among children between 1-4 years of age. Approximately 98.3% of the respondents positively perceived immunization and thought that it should be encouraged against 1.7% who thought otherwise. This was not found to be a significant ($P=0.2842$) determinant of delayed immunization completion. On the organization of the immunization program, 22.5% perceived it as poor, 49.5% as average, 23.4% as good, and 3.6% as very good. This perception was also insignificant ($P=0.0628$) determinant of delayed immunization completion. It is important to note that none of the perception and attitude variables had any significant association with completion of the KEPI immunizations regimen among children in Boro Division. From the results even the children of those mothers with poor attitude and perception towards immunization completed immunization regimen for their children within the first one year of their lives.

5.3 Conclusions

In relation to the first objective that was to assess how socio demographic determinants influence completion of Immunization regimen, it can be concluded that some of the socio demographic elements like marital status and religion are determinants of Immunization regimen completion while others are like age of the mothers are not. Children of divorced mothers are more likely to delay completion of immunization regimen

As far as the second objective that was to assess the influence of socioeconomic status of the respondents is concerned, it can be concluded that occupation and source of income have been identified to be significant determinants of immunization completion. Children whose

mothers work as unskilled manual are more likely to have delays in completion of immunization regimen.

Concerning the third objective looking at how education and knowledge on immunization influence completion of immunization regime, it can be concluded that level of education of the mothers/caretakers, education level of spouse and awareness of the immunization initiatives by the government is a positive contributing factors to completion of immunization regimen. Children of mothers who did not have any formal education are more likely to have delays in immunization regimen completion

In the fourth objective that looked at how perception and attitude of the mothers and caretakers affect immunization completion, it was concluded that neither perception nor attitude towards immunization are significant contributing factors to immunization regimen completion.

5.4 Recommendations

From the results and conclusion drawn from this study, it was noted that majority of the mothers and caretakers do not have good perception of the immunization services offered at the health facilities most of which are run by the government and therefore a good majority of the respondents were not satisfied with the services offered. Even though perception and attitude are not significant determinants in this study, they may influence attendance to health facilities. I therefore recommend that the government should invest in changing the unfavorable attitude and perceptions that the mothers have towards this program. Secondly it appeared that the mothers are well aware of the importance of immunization to the children but are only able to mention a handful of the vaccine preventable diseases, therefore in the health facilities, the healthcare providers should expand the scope of the information they give to the mothers and caretakers to include the various vaccine preventable diseases that children are immunized against

5.5 Suggestion for Further studies

Having reviewed the finding of the study, the following areas may need further exploration. First there is need to look at determinants of age appropriateness of immunizations administered so that we get to know what are the contributing factors to receiving or not receiving individual vaccines at the right age of the child as stipulated in the KEPI schedule. Secondly I would recommend further study on the determinants of immunization completion other than those associated with the mothers and caretakers as done in this study, determinants like vaccine availability, distance to the health facility, and attitudes of the health care providers need to be looked at. Lastly, I recommit further studies on the effect of clinical trials on immunization coverage within the study area. This is because in the past one year, numerous pediatric studies have been initiated in the health facilities and they depending on their objectives and goals, they may influence immunization uptake in this area.

5.6 Contribution to the body of Knowledge

Objective	Knowledge
To establish the extent to which socio demographic characteristics of the mothers/caretakers affect completion of immunization regimen among children in Boro Division.	It was discovered that most of the respondents were married, and majority are Christians with catholic being the predominant denomination in this area
To determine how socio-economic status of the mother/caretakers affect completion of immunization regimen among children in Boro Division	Most of the mothers work as unskilled manual workers although some of them are skilled manual workers. Monthly income of the mothers isn't a determinant of immunization completion
To examine how education and knowledge of mothers/caregivers affect completion of immunization regimen among children in Boro Kenya	Most of the respondents and their spouses have at least primary education and that education level was shown to influence immunization completion
To assess how attitude and perception of mothers/caretakers affect completion of immunization regimen among children in Boro Division	Perception and attitude on immunization program do not influence immunization completion

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APPENDICES

Appendix A: Letter of Transmittal

Gabriel Omwalo

P.O.BOX 1578-40100, Kisumu

Email:gomwalo@gmail.com

Cell phone no. 0737899280

Dear respondent,

RE: Request for your participation in an academic research

I am a masters of Arts student at the University of Nairobi. As part of the requirements of the Masters Degree in Project Planning and management, I am conducting research for my project on the above mentioned. This research may lead to improved understanding of the determinants of delay in completion of immunization regimen among children between 1 and 4 years and may lead to better policies on the same.

To be able to this collect data, you have been selected as one of the participants of the study. Kindly complete the questionnaire attached and ask for assistance from the person administering if need be. This research is for academic purposes only and thus your responses will be treated with utmost confidentiality. You are requested to give your responses as honestly as possible.

Thank you in advance for participating in this research.

Yours sincerely

Gabriel Omwalo

Appendix B:Questionnaire:

Tick as appropriate and any writing should be legible and in the space provided

Location of Residence: _____ **Village:** _____

1. **Date of birth of the child** __ __ / __ __ __ / __ __ __ __ (DDMMMYYYY)
2. **Is the Road To Health (clinic) Card of the child available** Yes No

Socio Demographics

3. **What is your relationship with the child (Name)?**
 Mother Father Caretaker Others specify _____
4. **Gender of the respondent** Male Female
5. **What is your age in completed years?** _____
6. **What is your marital status**
 Married Single unmarried divorced/separated Widowed
 Don't Know
7. **If married, how does your spouse view childhood immunization**
 Positively Negatively Neutral Don't Know
8. **What is your religion**
 Christian Catholic SDA ACK Others
(Specify) _____ Muslim None
 African Instituted Churches (Specify) _____
9. **Does your religion support childhood immunization?**
 Yes No Don't Know
10. **How many children do you have or directly taking care of in this house?**
 1-3 4-6 7-9 Over 9
11. **What is the birth order of the child aged between 1 and 4 years of age?**
 1st 2nd 3rd 4th 5th Above 5th

Socioeconomic determinant

12. **What is your occupation?**
 Professional/technical/Managerial Skilled manual Unskilled manual
 Domestic Service Peasant Famer
 None Others specify _____

13. What are your main sources of income?

- Professional/technical/Managerial Skilled manual Unskilled manual
 Domestic Service Peasant Farmer
 None Others specify_____

14. What is your average income in Kshs per month?

15. Are immunization services offered free of charge?

- Yes No

16. If yes, are you able to comfortably pay for the immunization services from your own income?

- Yes No

17. If No, where do you normally get money to pay for immunization in case you needed to take the child for immunization?

- Relatives Spouse Friends None

18. What transport means do you use when taking the child for immunization at the health facility?

- Footing Public Transport Private Transport

19. Approximately how much in Kshs do you use in transport to and from the health center?

- 10-50 50-100 100-200 200-300 Over 300

20. Are you able to pay for your transport to the health facility

- Yes No

21. If No, where would you get money to pay for transport to the health facility in case you needed to take the child for immunization?

- Relatives Spouse Friends None

22. How can you describe your ability to pay for immunization services offered?

- Poor Average Good Very good

Immunization Status

23. Vaccines administered as recommended by KEPI , Kindly circle and indicate date administered if yes.

Vaccine	Age	As per card	(Verbal response If no card available)
Was the child given BCG	At birth or at the first contact	Yes No Date:_____	Yes No Date:_____
Was the child given POLIO (OPV 0)	At birth or within 2 weeks	Yes No Date:_____	Yes No Date:_____
Was the child given PCV 1	6 weeks (1 ½ months)	Yes No Date:_____	Yes No Date:_____
Was the child given Penta 1 (DPT ₁ -HeB ₁ -Hib ₁ DOSE POLIO (OPV 1))	6 weeks (1 ½ months)	Yes No Date:_____	Yes No Date:_____
Was the child given PCV 2	10 weeks (2 ½ months)	Yes No Date:_____	Yes No Date:_____
Was the child given Penta 2 (DPT ₂ -HeB ₂ -Hib ₂ DOSE POLIO (OPV 2))	10 weeks (2 ½ months)	Yes No Date:_____	Yes No Date:_____
Was the child given Penta 3 (DPT ₃ -HeB ₃ -Hib ₃ DOSE POLIO (OPV 3))	14 weeks (3 ½ months)	Yes No Date:_____	Yes No Date:_____
Was the child given PCV 3	14 weeks (3 ½ months)	Yes No Date:_____	Yes No Date:_____
Has the child received Measles vaccine	Given between 6-9 months	Yes No Date:_____	Yes No Date:_____

24. Has the child completed immunization as per the KEPI schedule?

- Completed Incomplete/Partial None

25. Was the vaccination completed by the time the child was one year

- Yes No

26. What date was the last vaccination administered?

27. If incomplete or none in 25, what is the reason why the child has not/did not complete immunization by the age of one year as per the KEPI schedule?

- Did not know about vaccination Place or time of immunization unknown
 Fear of side effects of vaccines Lack of Money
 Did not like the immunization and or the immunization program
 Fear of the health care system Others
Specify_____

28. Has the child received any other vaccinations during the regional mass immunizations conducted by the government?

- Yes No

29. Which vaccination did the child receive?

30. If yes, which vaccinations?

- Measles Polio Others (Specify)_____

Knowledge and Educational level

31. What is your educational level?

- None Primary Secondary College University Don't know

32. If married, what is the educational level of the spouse?

- None Primary Secondary College University Don't Know

33. Where did you get information about childhood immunization?

- Media Health facility TBA Chiefs Barazas
 Others (specify)_____

34. Have you had any education or information on childhood vaccination/immunization?

- Yes No

35. If yes, what kind of education or information?

36. If yes, has the education or information that you received improved immunization completion for your child?

- Yes No

37. What do you think is the main reason (objective) of childhood immunization?

38. Are you aware of the current government immunization program for children (KEPI)?

- Yes No

39. What are some of the vaccine preventable diseases that you know that babies are immunized against? (Multiple answers allowed)

- Polio Tuberculosis Rota Virus Diptheria
 Tetanus Rota Virus Hemophilus Influenza
 Pertusis Hepatitis B Measles Pneumococcus

Perception and Attitude

40. Do you think childhood immunization is a good thing and should be encouraged?

- Yes No

41. What do you think about the organization of the provision of immunization?

- Poor Average Good Very good Don't know

42. Are you satisfied with the health care providers giving vaccination at the health facilities?

- Yes No

43. If No why?

- They are unfriendly They don't care about the clients
 they lack of vaccines Others specify _____

Appendix C. Participant Informed consent Form

You are being requested to participate in this study to determine the reasons for incomplete immunization among children between 1-4 years in Boro Division. The decision to participate in this study is completely yours.

Vaccines are administered to children to help prevent diseases. There is a program known as KEPI (Kenya Expanded Immunization Program) that should be followed to ensure that children receive all the vaccinations against specific diseases. This vaccination program ideally is supposed to be completed by the time the child is 9 months. In some situations this is not always possible.

The study aims at establishing the reason why there are delays in immunization completion among children between 1 and 4 years of age. It will establish whether socio-demographic characteristics, socioeconomic status, knowledge and education, attitude and perception of the mother towards immunization program affect immunization completion among the children

You may choose to not be in this study. You can leave the study at any time. You will not lose any benefits. We will need permission from you and before you can take part in this study.

If you agree to take part in this study, a study staff will administer certain questions to you. You will be requested to respond to the questions the way you feel is appropriate

Mothers with children between the ages of 1 and 4 years will be eligible to participate in the study as long as they have lived within the study area in the past one year.

There will be no risks from participating in the study. There are no direct benefits from participating in this study but it is hoped that the results of this study will help positively shape immunization policies in this region

No money will be paid for taking part in this study.

We will keep all records strictly private. Nobody but the researchers in this study will see your records and your name will not be in any publication written from this study.

In case you may have any question about this study please contact the chief investigator. Gabriel Omwalo through phone number +254720899280/+2540737899280 or email gomwalo@gmail.com

The consent form has been read to me and I have understood it. I have also been given chance to ask questions and all my concerns addressed adequately. I therefore agree to participate in this study:

Name of Participant _____

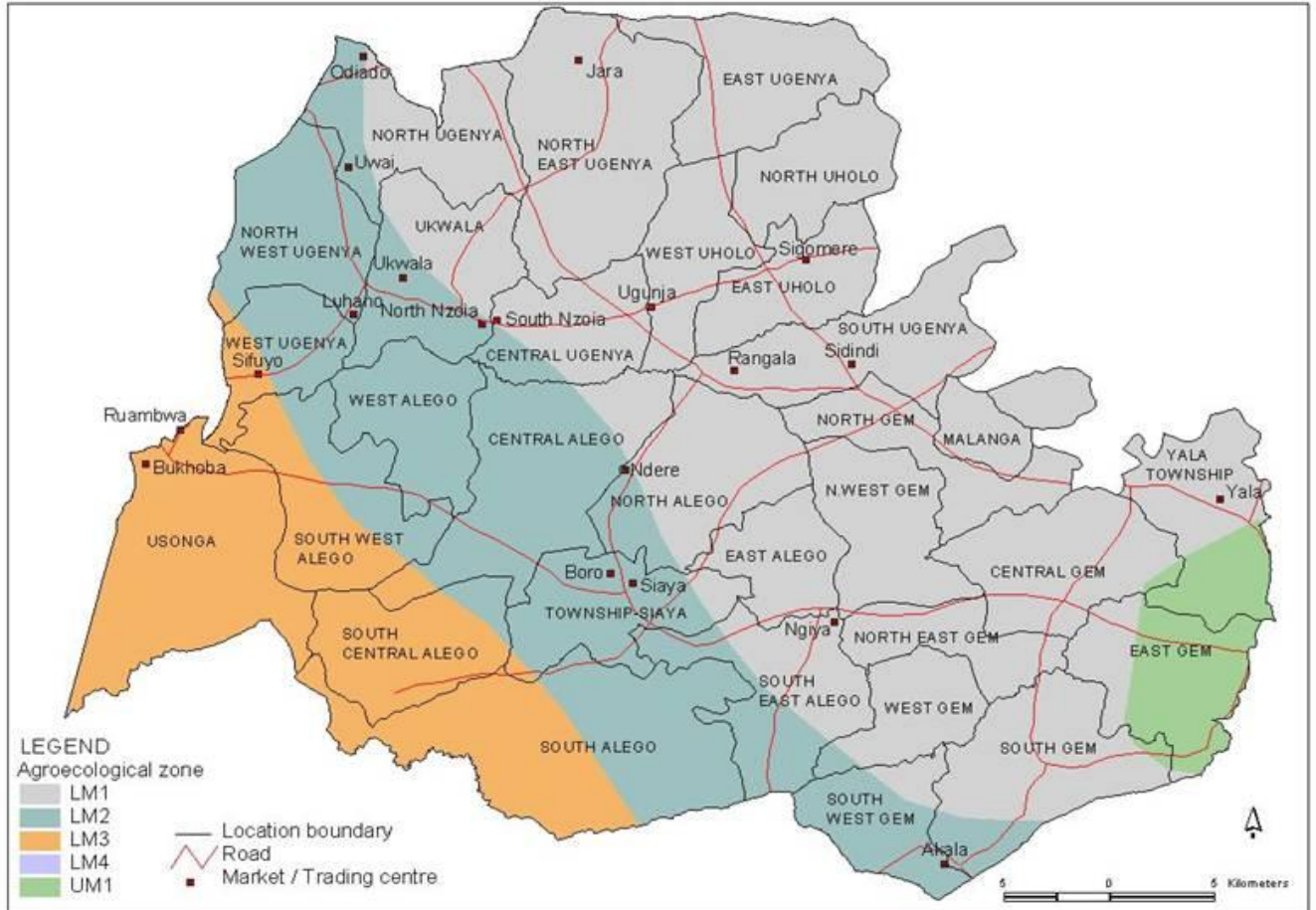
Signature/Thumbprint _____ Date _____

Date of Study personnel taking _____

Signature _____ Date _____

Appendix D: Map Of The Study Area

SIAYA DISTRICT MAP BY ADMINISTRATIVE UNITS- 2007



(Courtesy of Siaya District Development Officer - Source: Siaya District Development Plan 2008 - 2012)

Appendix E: Research Clearance Permit