DETERMINANTS OF FULL VACCINATION AMONG CHILDREN AGED 12-23 MONTHS IN KATHEKA KAI LOCATION, MACHAKOS COUNTY

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Determinants of full vaccination among children aged 12-23 months in Katheka Kai location, Machakos County, Kenya

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A thesis submitted in partial fulfillment for the degree of Master of Science in Public Health in the Jomo Kenyatta University of Agriculture and Technology

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DECLARATION

This thesis is my original work and has not been presented for a degree in any other University.

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This thesis has been submitted with our approval as supervisors;

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DEDICATION

This work is dedicated to my wife Grace, my children, the residents of Katheka Kai Location and my supervisors whose support and encouragement has made it possible for me to accomplish my study goals at the University.

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I would like first to thank the Almighty for giving me good health and financial ability to undertake this study. Secondly, I would wish to offer my gratitude to the KEMRI teaching staff for their dedication and selfless sacrifices in preparing me during coursework through to the research work. My special thanks go to my supervisors Prof. Mohamed Karama (KEMRI) and Prof. Zipporah Ng'ang'a, (JKUAT) for technical guidance and invaluable inputs throughout my research work. I would want to acknowledge the data collection team and respondents from Katheka Kai Location, Machakos County for their willingness and dedication to deliver credible data for use in the study.

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ABBREVIATIONS AND ACRONYMS

BCG	Bacillus Calmette Guerin
DPT	Diphtheria Tetanus Pertussis
DVI	Division of Vaccine and Immunization
DHS	Demographic Health Survey
EPI	Expanded Programme on Immunization
HepB	Hepatitis B
HF	Health facility
GIVS	Global Immunization Vision and Strategy
GVAP	The Global Vaccine Action Plan
KEPI	Kenya Expanded Programme on Immunization
KEMRI	Kenya Medical and Research Institute
KNBS	Kenya National Bureau of Statistics
KDHS	Kenya Demographic and Health Survey
MCH	Maternal and Child Health.
MDGs	Millennium Development Goals
OPV	Oral Polio Vaccine
TT	Tetanus Toxoid
UNICEF	United Nations Children's Fund
USD	United States Dollar
WHO	World Health Organization

DEFINITION OF OPERATIONAL TERMS

Full vaccination: This is considered achieved when a child has received all recommended vaccines under the Kenya Expanded Programme on Immunization (KEPI), including one dose of Bacillus Calmette Guerin (BCG), three doses of Diphtheria Pertussis Tetanus (DPT), Haemophilus Influenza (HIB), 4 doses of Oral Polio Virus (OPV), Hepatitis B (HEP B), Pneumococcal and Rotavirus vaccines and one dose of measles and Yellow Fever by the age of 23 months (under the KEPI schedule).

Household: For the purpose of this study was defined as a nuclear family unit. Sons and daughters from that family unit who had children were not considered as households as long as they stayed and ate together in their parents' house.

Knowledge about vaccination: If the mother or caretaker was aware of at least three childhood vaccines and three diseases which can be prevented through immunization (in the KEPI schedule).

Mothers and care givers: These are people who attended to the needs of children on a day to day basis and could be the children's mothers or somebody else.

Partial vaccination: This is considered when a child has missed at least one of the recommended vaccines or doses under the KEPI schedule

ABSTRACT

Since inception of the Expanded Programme on Immunization (EPI) by WHO in 1974, immunization coverage has been steadily increasing and currently stands at 86% globally. Consequently, this has led to a significant reduction in child mortality and morbidity. It is estimated that two to three million deaths from polio, diphtheria, tuberculosis, pertussis, measles, and tetanus are averted through EPI. According to the Kenya Demographic and Health Survey (KDHS 2014), 75% of children aged 12-23 months were fully vaccinated with BCG, measles, Diphtheria, Pertussis, Tetanus, Haemophilus Influenza type B, Hepatitis B and polio vaccines under the Kenta Program (KEPI). As a result, millions of lives of children have been saved over the years. Despite these obvious benefits, vaccination coverage remains low especially in developing countries. This cross sectional study was undertaken to determine vaccination coverage and to determine vaccination coverage and its determinants among children aged 12 – 23 months in Katheka Kai Location Machakos County. A total of 384 households with children aged 12- 23 months were sampled using simple random sampling for interviews. Respondents were mothers/caretakers of the children in those households. Random sampling was used to identify households for inclusion in the study and then mothers or caregivers in the identified households interviewed. Data was collected using an interviewer administered questionnaire and an immunization checklist. Data was coded and input into SPSS version 19 for analysis. Slightly more than half of the respondents 230 (59.9%) had at least secondary education and above and 276 (71.9%) of the households earned a monthly income of KES 5000 and above. More than half of the households 217 (56.5%) dwelt less than four kilometers to the nearest health facility. The study found that 83% of the children were fully vaccinated. Knowledge on immunization was high , 360 (93.8%) knew the reasons why children get vaccination and slightly more than half 212, (55.4%) knew at least three correct vaccines that are administered to children, while almost an proportion (58.1%), knew at least three vaccine preventable childhood diseases. Factors associated with full immunization were education level of respondents (χ^2=82.178, P < 0.001), knowledge on routine childhood vaccinations (χ^2 = 119.275, P<0.001) and vaccine preventable diseases among children, (χ^2 = 17.579, P = 0.004), mothers antenatal clinic (ANC) attendance (χ^2 = 115.52, P<0.001) and distance from the respondents' home to the health facility (χ^2= 45.332, P<0.000). Other factors were place of birth of child (χ^2=204.714, P<0.001) and household income (χ^2= 84.178, P<0.000). Predictors of full immunization were level of education of mother/caretaker, place of delivery for the child and number of ANC visits. The vaccination coverage for the Sub Location (83%) was below the County's coverage (90%) and below the national target of 90%. Efforts need to be stepped up to reach the children who are no fully immunized so as to reach the national target. Strategies to increase health facility deliveries should be implemented as this significantly leads to increased vaccination coverage. Since inception of the Expanded Programme on Immunization (EPI) by WHO in 1974, immunization coverage has been steadily increasing and currently stands at 86% globally. Consequently, this has led to a

significant reduction in child mortality and morbidity. It is estimated that two to three million deaths from polio, diphtheria, tuberculosis, pertussis, measles, and tetanus are averted through EPI. According to the Kenya Demographic and Health Survey (KDHS 2014), 75% of children aged 12-23 months were fully vaccinated with BCG, measles, Diphtheria, Pertussis, Tetanus, Haemophilus Influenza type B, Hepatitis B and polio vaccines under the Kenya Program (KEPI). As a result, millions of lives of children have been saved over the years. Despite these obvious benefits, vaccination coverage remains low especially in developing countries. This cross sectional study was undertaken to determine vaccination coverage and to determine vaccination coverage and its determinants among children aged 12 – 23 months in Katheka Kai Location Machakos County. A total of 384 households with children aged 12- 23 months were sampled using simple random sampling for interviews. Random sampling was used to identify households for inclusion in the study and then mothers or caregivers in the identified households interviewed. Data was collected using an interviewer administered questionnaire and an immunization checklist. Data was coded and input into SPSS version 19 for analysis. Slightly more than half of the respondents 230 (59.9%) had at least secondary education and above and 276 (71.9%) of the households earned a monthly income of KES 5000 and above. More than half of the households 217 (56.5%) dwelt less than four kilometers to the nearest health facility. The study found that 83% of the children were fully vaccinated. Knowledge on immunization was high, 360 (93.8%) knew the reasons why children get vaccination and slightly more than half 212, (55.4%) knew at least three correct vaccines that are administered to children, while almost an equal proportion (58.1%), knew at least three vaccine preventable childhood diseases. Factors associated with full immunization were education level of respondents (χ^2=82.178, P < 0.001), knowledge on routine childhood vaccinations (χ^2 = 119.275, P<0.001) and vaccine preventable diseases among children, (χ^2 = 17.579, P = 0.004), mothers antenatal clinic (ANC) attendance (χ^2 = 115.52, P<0.001) and distance from the respondents' home to the health facility (χ^2= 45.332, P<0.000). Other factors were place of birth of child (χ^2=204.714, P<0.001) and household income (χ^2= 84.178, P<0.0001). Predictors of full immunization were level of education of mother/caretaker, place of delivery for the child and number of ANC visits. The vaccination coverage for the Sub Location (83%) was below the County's coverage (90%) and below the national target of 90%. Efforts need to be stepped up to reach the children who are no fully immunized so as to reach the national target. Strategies to increase health facility deliveries should be implemented as this significantly leads to increased vaccination coverage.

CHAPTER ONE

INTRODUCTION

1.1 Background information

Globally, immunization has made significant contribution towards reduction of childhood diseases and deaths including eradication of smallpox and near elimination of poliomyelitis. As a result, immunization against preventable childhood illnesses has been made an essential part of programmes and strategies for improving the health and well-being of children. WHO estimates that as many as 2.5 million deaths among under-5 children worldwide are averted annually by immunization against diphtheria, tetanus, pertussis, and measles (WHO & UNICEF, 2008. Deaths from measles, a major child killer, declined by 78% worldwide and by 92% in sub-Saharan Africa between 2000 and 2008 (Dabbag et al., 2009). Besides immunization has greatly reduced the number of deaths from measles from an estimated 733,000 in 2000 to 164,000 in 2008 (UNICEF, 2010). In Africa, there was a reduction of 92 percent of measles death over the same period (UNICEF, 2010)

In 1974, the World Health Organization launched Expanded Programme on Immunization (EPI) to streamline immunization programmes among countries in order to reduce prevalence of the six vaccine preventable diseases among children. In addition, in 2005, the 58th World Health Assembly, welcomed the Global Immunization Vision and Strategy (GIVS) 2006-2015 developed by WHO and UNICEF as a framework for strengthening national immunization programmes (Bilous et al., 2006). Subsequently in 2012, the World Health Assembly through its 194 member states endorsed The Global Vaccine Action Plan (GVAP) which is a framework to prevent millions of deaths by 2020 through more equitable access to existing vaccines for people in all communities. The mission of the GVAP was to improve health by extending by 2020 and beyond the full benefits of immunization to all people, regardless of where they are born, who they are, or where they live (WHO, 2013). There was a dramatic improvements in coverage

in the 1980s along with an increase in coverage with the third dose of DTP vaccine (DTP3) from 20% in 1980 to 75% coverage in 1990 (Burton et al., 2009). The number of countries reaching 90% or more immunization coverage with three doses of diphtheria-tetanus-pertussis (DTP3) in 2006 increased to 114 countries compared to 112 in 2005 (WHO & UNICEF, 2008).

The average coverage with three doses of diphtheria-tetanus-pertussis-containing vaccine and with measles-containing vaccine in low-income countries was 16% and 15% below that of high-income countries in 2010, respectively (WHO 2013). Of the total low-income country birth cohort, 98% lived in countries that did not have pneumococcal conjugate vaccines in their schedules (WHO, 2013). UNICEF reports that, in 2012, out of the 14.3 million children under the age of one covered under routine immunization in all 21 East and Southern African countries, 13%, or 1.8 million, were left unprotected and most of them were from rural and remote areas, as well as from urban slums (UNICEF, 2016).

The Ministry of Health in Kenya established The Kenya Expanded Programme on immunization (KEPI) in 1980 with the main aim of promoting immunization against six killer diseases of childhood, namely tuberculosis, polio, diphtheria, whooping cough, tetanus and measles to all children in the country before their first birthday. Kenya has shown considerable gains in full immunization coverage as indicated by the Demographic and Health Surveys (DHS), which have shown that full coverage among children aged 12–23 months increased nationally from about 44.0% in 1989 to 77.4% in 2008 (KDHS, 2008). The proportion of children who have not received any of the recommended immunizations has also declined from 7 percent in the 2003 KDHS to 3 percent in the 2008-09 KDHS. Immunization coverage in Kenya is currently at 79% (KDHS, 2014) which is below the global target of 90% for all eligible children. There are in addition significant coverage disparities among counties and between urban and rural areas. Kenya Demographic and Health Survey found out that basic immunization coverage was slightly higher in urban than rural areas (83% versus 77%). Several factors have been documented to influence vaccination coverage. The Kenya Demographic and

Health Survey conducted in 2008 found out that education of the mother was associated with higher chances of their children having been fully vaccinated; 87% of children whose mothers had at least some secondary education were fully vaccinated compared with 67% of children whose mothers had no schooling. In addition, there was a steady increase in the proportion of children fully immunized by wealth quintile, from 66 % in the lowest quintile to 85 in the highest quintile (KDHS, 2008). These findings can be generalized, however, there still exists unique factors in specific geographic regions which require further studies to isolate and determine the specific factors influencing coverages in those particular areas. The site was chosen because of it is rural nature and the fact that health facilities from where vaccination services were provided were very far from the location. The nearest was Machakos level five hospital which was close to kilometers way. Besides, the area is typically rural in nature. This study sought to determine vaccination coverage and factors associated with it among children aged between 12-23 months in Katheka Kai Location. The age bracket of between 12 -23 months was chosen as it is the WHO recommended age for estimating the vaccination coverage for children if the final primary vaccination is at 9 months of age (this study focused on estimating the vaccination coverage for the six primary vaccines whose schedule ends at 9 months). The study therefore sampled children who were between the age group mentioned to determine the proportion that had received all the recommend number of dosages for tuberculosis, polio, diphtheria, whooping cough, tetanus and measles.

1.2 Statement of the problem

Child immunization is an important public health intervention in promotion of child survival. It is estimated that if all the vaccines now available against childhood diseases were widely adopted, and if countries could raise vaccine coverage to a global average of 90%, an additional two million deaths a year could be prevented among children under five years old (WHO, UNICEF & World Bank 2009). In Kenya, childhood mortality continues to decline and in 2014, the under-five mortality rate decreased to 52 deaths per 1,000 live births from 74 in 2008-09 (KDHS 2014). This is partly attributed

to increased immunization for children over the years. Despite these efforts, many countries in developing countries remain off track in realizing global targets for immunization. Coverage gaps persist between countries, as well as within countries. A WHO report indicates that, the measles vaccine coverage rate for the richest fifth of the population in some countries is up to 58% higher than for the poorest fifth. In addition, the report highlights that coverage can also be very low in settlements of the urban poor, especially in cities with transitory migrant populations, and in indigenous communities (WHO, 2013). As per KDHS 2014 results, almost 8 in 10 children (79%) age 12-23 months have received all basic immunizations (BCG, measles, and three doses each of coverage DPT and polio vaccine However this coverage is still below the World Health Assembly of 90% for all vaccines by 2015. Although according to the Kenya Demographic and Health Survey (2014) immunization coverage for Machakos County for children aged 12 – 23 months was 90.0%, studies have documented that there exists regional disparities in coverage between in various localities within the same County. Differences in coverage have also been documented between urban and rural areas. In Kenya coverage for rural areas was 77.4% compared to 83.0% for urban areas (KDHS, 2014). The counties are not homogeneous in terms of social economic characteristics and therefore these dynamics would influence the level of vaccination coverage across the counties and both in the rural areas and urban areas within the counties.

Demand and supply factors are cited as challenges facing the uptake of immunization services in the country by the multiyear plan for 2011–2015 (MOH, 2012). Some of the specific barriers cited include accessibility because of distance and poor health-seeking behavior, lack of a government public health communication strategy, missed opportunities at health facilities, inadequate numbers of heath facility staff, stock outs, securing financing for vaccines, and transportation/cold chain issues. Presence of health facilities and nearness of such facilities to households has been found to promote and increase uptake of vaccination services among children. Studies have not been conducted to document immunization coverage for rural areas in Machakos County. In addition, no study has been conducted to determine the social economic factors affecting

vaccination coverage in rural Machakos County. Addressing the hindrances to full vaccination for children will promote their survival and provide opportunity for them to realize full potential in their growth and development.

1.3 Justification of the study

Katheka Kai location was purposefully chosen for the study because, there were no existing health facilities in the location hence limiting access to vaccination services. Mothers or caregivers had to travel considerable distances outside the location to access the services. In addition, it represented a rural setting where typically immunization coverage has been found to be lower compared to urban or peri-urban areas (KDHS, 2014). Mothers or caregivers had to travel considerable distances outside the location to access the services. The nearest health facility where vaccination services were accessed was Machakos Level 5 hospital which is about 10 kilometers away. Mothers who opted to take children for vaccination in Machakos level 5 hospital had to pay about two USD round trip for transport. Occasionally the county Government of Machakos organized monthly outreaches in the location where maternal and child health including vaccination for children services were provided. The outreaches did not happen always as scheduled due to logistical challenges including shortage of vaccines. There was a chance therefore that not all children who were due for vaccination got an opportunity to get vaccinated owing to these challenges. Besides, Katheka Kai represents a rural setting where typically vaccination coverage has been found to be lower compared to urban or peri-urban areas (KDHS, 2014). The study therefore helped in establishing the vaccination coverage of a rural set up in Machakos County. It also helped in understanding the extent of vaccination coverage in Katheka Kai Location vis-à-vis the national target. The study provided an opportunity to analyze and understand context specific factors influencing uptake and utilization of children vaccination services. It helped in determining the extent to which social economic factors like level of mothers/ caretakers' education, household income, knowledge, practice and attitude on child immunization and place of child delivery influenced children vaccination status. Results of the study provided a basis for gauging progress towards achievement of national goals

and targets. In addition, it helped in documentation of the underlying specific social-economic factors influencing the vaccination coverage. The results of the study provided important data for use in formulating relevant and evidence based interventions to increase vaccination coverage.

1.4 Research questions

1) What is the vaccination coverage of children aged between 12 -23 months within Katheka Kai location?
2) What factors are associated with the vaccination coverage of children aged between 12 -23 months within the target location?

1.5 General Objective

To determine the vaccination coverage of children aged 12 – 23 months and it associated

1.5.1 Specific objectives

a) To establish the vaccination coverage of children aged 12-23 months within Katheka Kai location.
b) To determine the factors associated with full vaccination coverage of children aged 12-23 months within Katheka Kai location.

CHAPTER TWO

LITERATURE REVIEW

2.1. Global coverage and gains from immunization

Immunization is the most effective means of combating diseases, particularly infectious diseases. Globally, immunization of children, has led to a significant reduction in morbidity and mortality from different diseases, thereby lowering the infant mortality rate (UNICEF, 2005). In realization of the critical role of immunization in child survival, WHO initiated Expanded Programme on Immunization in 1974 to be able to increase the immunization coverage and reserve the trends on child mortality. The target of the programme was to specifically increase immunization coverage of children aged less than two years with vaccines against six childhood killer diseases, namely measles, diphtheria, tetanus, polio, tuberculosis (Bacille Calmette-Guerin (BCG), and pertussis to 80% globally by 1990. Over time, the programme has substantially increased immunization coverage in many countries throughout the world. For example, the global coverage of one-year-old children with measles vaccine is estimated to have increased from just 13% in 1983 to 80% in 1990, (UNICEF, 1993b). Since 1990 to 2014, global coverage of DPT3 has increased from 76% to 86%, polio from 76% to 86% and measles from 73% to 85%. This has led to decrease in child deaths. It is estimated that currently, immunization averts an estimated two to three million deaths every year in all age groups from diphtheria, tetanus, pertussis (whooping cough), and measles (WHO, 2014).

Despite the enormous impact of Expanded Programme on Immunization (EPI) in reduction of child mortality, the burden imposed by vaccine preventable diseases among children still remains high (Liu et al., 2012). Many children remain unimmunized and vaccine preventable diseases continue to kill large numbers of young children each year. In 2012, World Health Organization (WHO) estimated that around 1.5 million children worldwide died from Vaccine–preventable diseases. WHO also reported further that

about 22.6 million children under the age of one worldwide did not receive Diphtheria-Pertussis-Tetanus Vaccine Three (DTP3) vaccine.

In Kenya, millions of lives of children have been saved since the launch of the Kenya Expanded Programme on Immunization (KEPI) in 1974. The Kenya Expanded Programme on Immunization aims at ensuring that all children are fully immunized by their first birthday. According to the KDHS (2014), 75% of children age12-23 months were fully vaccinated with BCG, measles, Diphtheria, Pertussis, Tetanus, Haemophilus Influenza type B, Hepatitis B and polio vaccines. On coverage for specific vaccines, 97% of children had received the BCG vaccine, 98% received the first DPT dose and 97% received the first polio dose (polio 1). Ninety percent of children received the recommended three doses of DPT and 81% receive all three doses of polio. The proportion of children vaccinated against measles was 87%. Urban areas in Kenya had a relatively higher coverage than rural areas (83.0% and 77.4%) respectively, (KDHS, 2014). The coverage is however below the World Health Assembly target of 90% for all vaccines.

2.2 Determinants of immunization coverage

2.2.1 Maternal level of education

Numerous studies around the world over have demonstrated strong relationships between various social economic factors and immunization coverage. Some of the factors are shown in Figure 2.0. For example, having an education equips mothers and caregivers with knowledge and skills on basic healthcare services and enhances the opportunities to cultivate behavior and practices which promote health and well-being. An educated mother or caregiver is more likely to seek for health services for the child including making sure a child gets all the recommended vaccines and the right times. A study in an urban slum of Delhi India showed a significant association between the coverage levels of immunization of the children with mother's level of education ($P<0.005$), (Imteyaz, Pal, Akram, Ahmad & Shah, 2008). Further, it was found out in the

study that in those children, whose mothers were educated to primary levels or less, 43.6% were fully immunized, and 47.1 % partially immunized, while 9.3% were not immunized at all. Of the children whose mothers were educated to the high school level, 59.0% were fully immunized, 36.0% were partially immunized, and 4.9% were not immunized. The children whose mothers were educated above high school levels, 100% of children were fully immunized (Imteyaz et al., 2008). Additionally, a study undertaken in Korogocho and Viwandani slums of Nairobi Kenya showed that, maternal level of education was a significant determinant of full immunization when OPV-0 was included, with children of mothers who had completed primary education having close to one and a half times higher odds of being vaccinated compared to those of mothers with no education, (Mutua, Murage & Ettarh, 2011). Similar findings were found in a study in Mathare slums were the level of education of mothers was significantly associated with immunization coverage. In that study, for mothers who had no formal education, only 40% had their children fully immunized compared to 57.8% of those with primary school education, 82.8% for those with secondary education and 100% for those with tertiary education. (Kamau & Esamai 2001).

2.2.2 Economic status of households

Economic status has been shown to greatly affect immunization coverage for children. This is a more pronounced challenge in developing countries. In 2007, over 10% of children under one year old in developing countries were not receiving even one dose of DTP vaccine, compared with 2% in industrialized countries, (Himes, 1995). Studies have shown that higher economic status increases chances of children immunization, (Mutua *et al.,* 2011). A family's' disposable income level is an important factor in prioritizing of needs to be met. Low disposable income prevents families from meeting all their needs which might include costs related to immunization of children like transportation to immunization centers in cases where the centers are far away from the homesteads. Some families may therefore not be able to take children for immunization on time or may fail to take them at all. A study conducted in Ethiopia found that there was a 40 % more likelihood in receiving full immunization among children born to

mothers of rich wealth index group compared with children from women of poor wealth index group (Lakew *et al.,* 2015). In a study in Delhi India, significant associations between the coverage levels of immunization of the children with occupational status of head of the family (P<0.005) was observed, (Imteyaz *et al.,* 2008). A multivariate study on factors associated with low childhood immunization coverage in Sub-Saharan Africa found out that children from the poorest households were more likely to be unimmunized than their counterparts from the richest households (Wiysonge *et al.,* 2012). The same study found out that children whose mothers were unemployed were more likely to be unimmunized than those whose mothers were employed.

2.2.3 Knowledge on immunization among mothers and caregivers

Mothers or caretakers knowledge on immunization has been found to be a predictor of immunization coverage for children. Increased knowledge on the vaccines given to children and the immunization schedule is a pointer that mothers or caretakers are recipients of health information and are likely to have better health seeking behavior including children immunization. A study in Ethiopia considering the effect of awareness creation through mass media on uptake of immunization showed that knowledge of mothers or children caretakers about schedule of vaccines had a significant association with completion of immunization, (Tadesse *et al.,* 2009). It also found out that 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. Besides, it was also shown that the proportion of fully vaccinated children increased from 54% to 65% and the proportion of children aged 9-11 months who completed all immunizations increased from 32 to 56%. Understanding the health benefits of immunization is a motivator for mothers who will make sacrifices to make sure that their children get vaccinated. Mothers or immediate care takers 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 (Tadesse *et al.,* 2009).

2.2.4 Distance from homestead to health facilities

Utilization of health services might be affected by accessibility of health facilities by the population. Trekking for long distances especially in areas not covered by motorized roads discourages people from visiting health facilities. This becomes more challenging when one has to carry a child along. In areas where there exists vehicular transport, the fares sometimes might be too high for the poor households to afford which again might lead to delay or not taking a child for immunization at all. A study undertaken to identify factors influencing low immunization coverage among children between 12 - 23 months in East Pokot, Baringo Country, Kenya found out that mothers in close proximity to the health facility are 18 times more likely to have their children fully vaccinated than those who walk for more than an hour (Kiptoo et al., 2015).

2.2.5 Place of delivery of child

A study to compare immunization coverage of children born in health units and those born at home in Jinja Hospital Uganda showed that a child born at a health unit was significantly more likely to have had BCG scar than a child born at home (Odiit & Amuge, 2003). Children born at a health facility were more likely to be fully vaccinated when this included OPV-0 compared with those born at home (Mutua et al., 2011). It has been hypothesized severally that there is a possible link between delivery of children in health facilities and better immunization outcome for the child.

In a study in India, it was found that children being delivered at home or children with several siblings had a higher risk of incomplete and untimely immunization (Fadnes et al., 2011). On the other hand, a study in Uganda found out that, delivery at the health facility predicts better timely immunizations as has been reported from other study settings. It is possible that mothers who deliver at health facilities may be more frequent users of health facilities and services including immunization for children (Babirye et al., 2012). Any contact that a health worker has with a child or mother at a health facility

is also an opportunity to check immunization coverage and, if need be, to administer vaccines (WHO, UNICEF & World Bank, 2009).

2.2.6. Distance from household to the nearest health facility.

Children immunization requires several visits to a health facility. At each visit the mother is given appointment dates (written on the child's registration card) for the next immunization. Due to multiple dosages required and the timelines to be met, it is often likely that accessibility to the health facilities whether far or near the households and availability of transportation means can affect the ability of mothers to take children for immunization. In a study done in Burkina Faso to assess factors associated with complete immunization coverage, there was a significant difference between the distance from the child's village to the health center and immunization uptake (χ^2 = 12.298, df = 4; p = 0.015). In addition, it was showed that showed the immunization status of the children was significantly higher where the distance of the health center was <2 km compared with those residing in remote inaccessible areas with a distance of >5 km to the health center (p = 0.018), (Sanou et al., 2009). The Kenya Division of Vaccines and Immunization (DVI) in its multiyear plan for 2011–2015 cited both demand- and supply-side challenges for increasing immunization uptake among which was accessibility of health facilities due to distances.

Timely immunization is important to induce adequate immunity. Delayed immunization is a risk factor for pertussis, measles and Haemophilus influenza type B disease (Grant *et al.*, 2003). Late administration of the Bacillus Calmette-Guérin (BCG) vaccine is also associated with reduced child survival (Breiman *et al.*, 2004).

2.3 Conceptual framework

Determinants of immunization coverage vary across countries, locations and among different social groups. Coverage is influenced by mothers or caretakers' social demographic characteristics, family economic status and infrastructural variable of the target area.

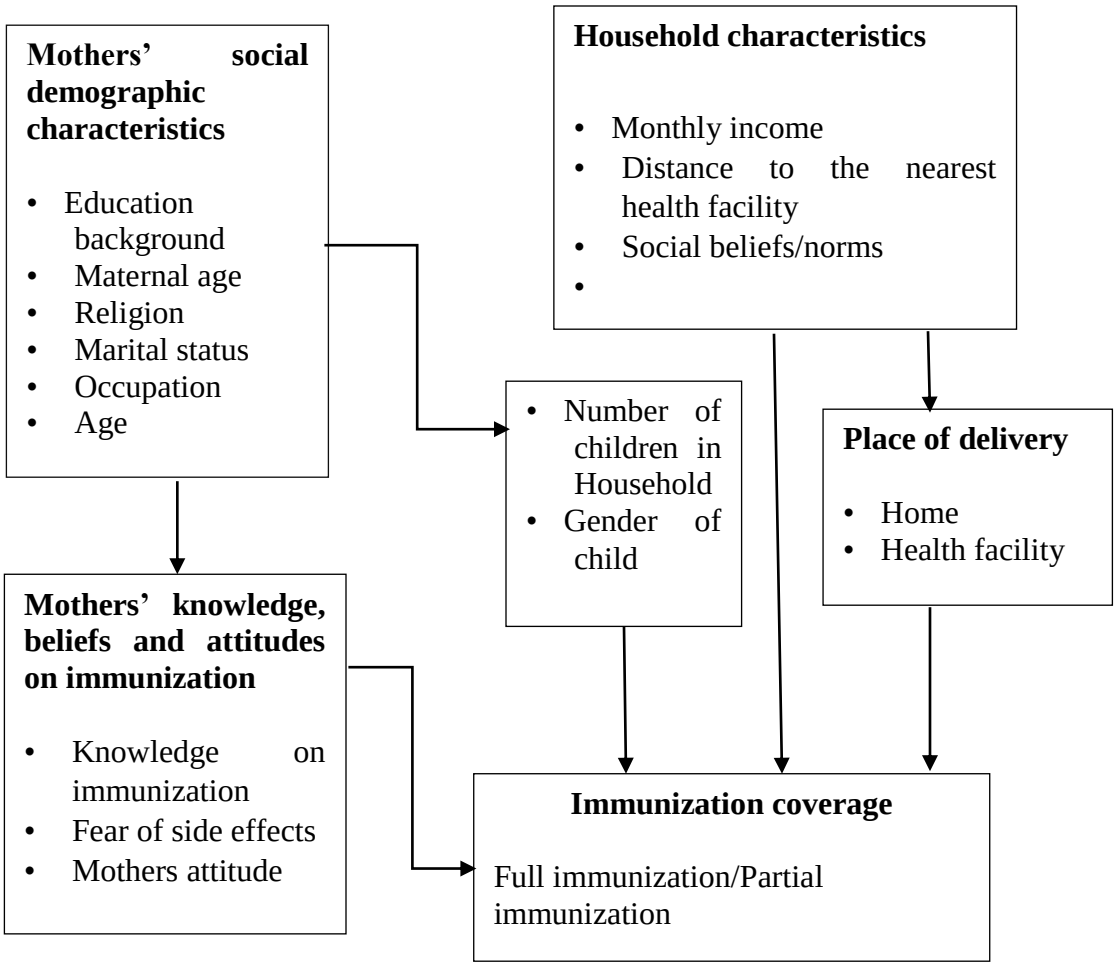

Figure 2.1: Conceptual Framework

Source: Author

CHAPTER THREE

MATERIALS AND METHODS

3.1 Study Area

The study was conducted in Katheka Kai location in Mua Ward which is in Machakos Central Sub County of Machakos County. Machakos town Sub County is one of the eight sub counties in Machakos County. The Sub County borders Sub Counties of Mavoko to the West, Mwala and Kathiani to the East and Kangundo to the North. Katheka Kai location is in Mua Ward in Machakos Central Sub County. Katheka Kai Location has four sub locations (Mikuyu, Katelembo, Kitanga and Katheka Kai) and 36 villages. The shaded area in Figure 3.1 represents Katheka Kai Location. The Location has a total population of 17,820 people and 4,087 households. Majority of the people in the location are small-scale subsistence farmers. There is no health facility in the Location and therefore mothers seeking vaccination services for their children had to seek services from other facilities outside the Location. The nearest facility is Machakos Level five hospital which is about ten kilometers away. Occasionally the County Health department organized outreaches to provide basic healthcare services including children vaccination. Mothers and caregivers would take children to the outreaches for health service provision including vaccination.

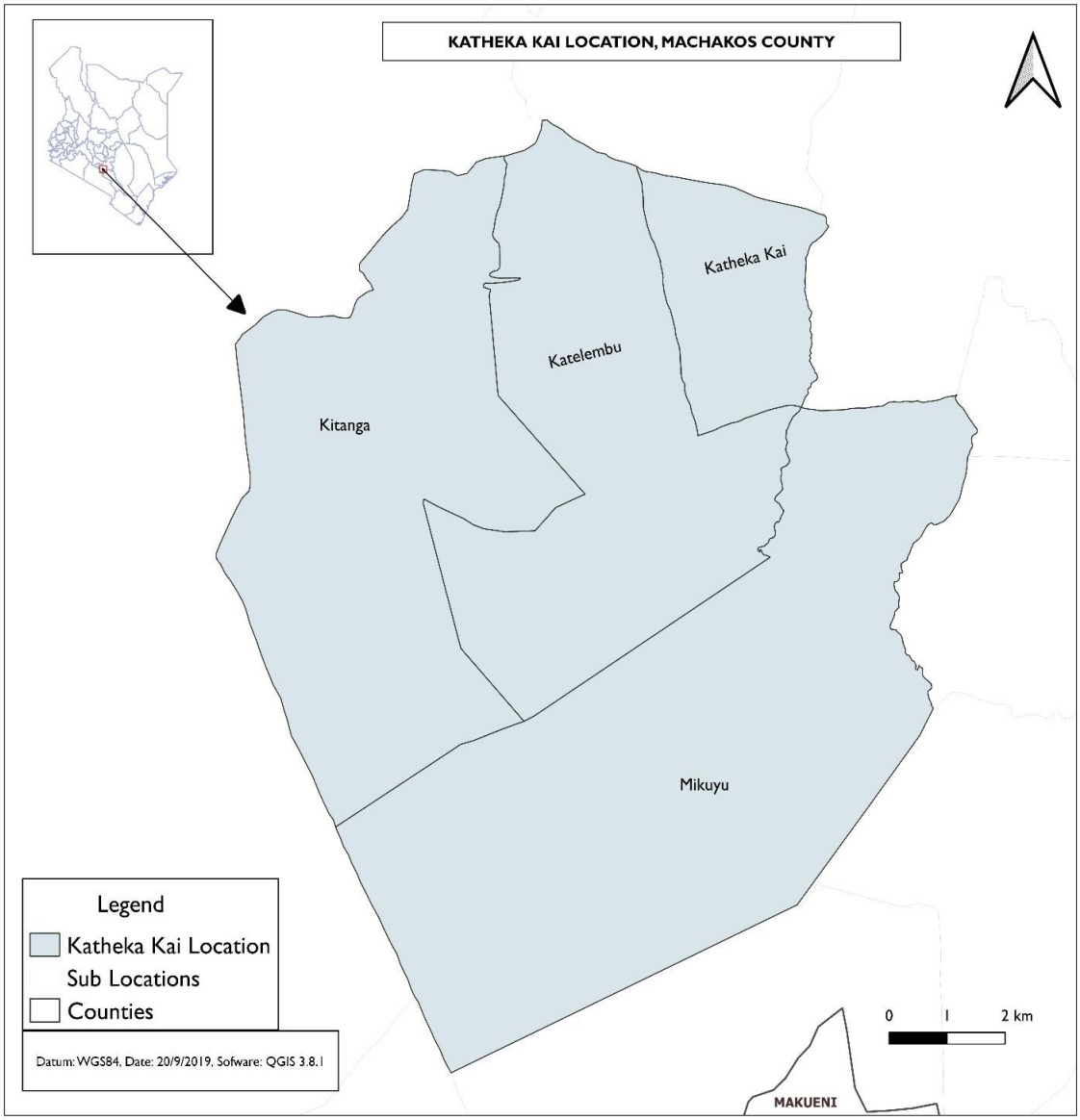

Figure 3.1: Map of Machakos County

3.2 Study design

The study design was a community-based cross sectional descriptive survey. Children immunization status was ascertained from the immunization cards. The cards provided details individual vaccines given to the children.

3.3 Study population

The study population were households with children between 12 – 23 months. Children within this age bracket were chosen because it is the WHO recommended age bracket for estimating the vaccination coverage for children if the final primary vaccination is at 9 months of age. All the children outside this age bracket were excluded from the study. Mothers or caregivers of the targeted children were interviewed to get information to answer the study questions.

3.4 Sampling

3.4.1 Sample size determination

The sample size for the study was derived using Fisher's method (Fisher *et al*, 1991) of sample size determination with a 95% confidence interval and a sampling error of 5%.

$$N = \frac{(z^2pq)}{d^2}$$

Where

N = Minimum sample size

Z = statistic for 95% level of confidence and its value is 1.96

P = Estimated immunization coverage of children aged 12 -23 months in rural areas of Machakos County, (50%).

d = Absolute precision at 5% Level of Significance i.e. 0.05

$$Q = 1-p$$

$$N = \frac{(1.96)^2 \times .0.5 \times .0.5}{(0.05)^2}$$

N = 384 Households

3.4.2 Sampling procedure

Katheka Kai location was purposefully chosen for the study because, there were no existing health facilities in the location hence limiting access to vaccination services. The Location has a total population of 17,820 people. The respective populations and number of households for the four sub locations were; (Mikuyu, 4,093 people and 1,450 households, Katelembo, 6,414 people and 2,276 households, Kitanga 4,225 people and 1,498 households and Katheka Kai 3,088 people and 1,071 households, (KNBS, 2009). All the four sub-locations were all purposefully included in the study. The unit of sampling was the household and the sampling frame was 6,295 households in the location. Proportionate to size of the number of households per sub location was used to allocate number of households to be sampled for each sub location (Table 3.1).

Table 3.1: Number of households selected per sub location

Sub location	Total Number of households	Proportion of Households in each Location	Total number of Households sampled per location
Mikuyu	1,450	23%	88
Katheka Kai	1,071	17%	67
Kitanga	1,498	24%	91
Katelembo	2,276	36%	138
Total	6,295	100%	384

Lists of all the households in each of the four Sub locations with children between 12-23 months old were drawn with support of the local Chief and the Community Health workers registers. The details recorded were the household number and the name of the household head. The listing was transferred into an excel file and random function used to generate random numbers of households for the sub-location. The generated lists were then used to pick the households to be interviewed starting from the first one on the list to the last one which corresponds to the number of households identified in that sub location as shown in Table 3.0. In case there was no body in the sampled household or for some any other reason the interview could not be conducted, the interviewer moved to the immediate next household.

A household for the purpose of this study was defined as a nuclear family unit. In case of an extended family living in one compound only one household with the youngest child was considered. In addition, if a sampled household did not have an eligible child, the immediate household in the list was selected for the study. In case a household had more than one eligible children, the youngest was sampled and included in the study.

3.5 Data collection and data collection tools

Prior to conducting the study, visits were made to the County Public Health Officer and the area administrator to brief them about the study and to seek permission to undertake data collection. Data was collected using an interviewer administered structured questionnaire (Appendix iv). The questionnaire was pre-tested first to make sure that the questions were culturally and contextually appropriate and that they were framed appropriately to bring out the required information. Interviewers were trained on how to administer the questionnaire to mothers and caretakers of children. Part of the questionnaire was a table which sought to gather information on children immunization coverage as captured in the immunization cards. The interviewer recorded the immunization dates directly onto the questionnaire. Vaccines received outside KEPI schedule such as during National Immunization Days and outreaches were also included. The questionnaire included questions on social economic and demographic attribute of

the respondents and the study site. Other information obtained included place of child's delivery, date of birth, and where applicable, availability and utilization of immunization services. Other information gathered were knowledge on immunization schedule, knowledge about vaccine-preventable diseases, history of vaccines received by the child and reasons for non-immunization. At the end of the interviews, the interviewer re-enforced the mother's or caretaker's knowledge about immunization and answered any health related questions in case the interviewees asked.

3.6 Data Management and Analysis

At the end of each day a review of all the questionnaires was done to ensure that all the required information was correctly recorded for data quality assurance. All the data was entered into SPSS Version 22.0 (SPSS, Inc., Chicago, IL) for descriptive analysis. Data with quantitative variables was expressed as frequencies and percentages. Analysis of contingency tables was done using Chi-square to test for association between predictor and outcome variables. The association between the dependent and independent variables was considered significant at $p < 0.05$. Simple and multiple logistic regression were used to determine the strength of the associations between the dependent and independent variables with odds ratios and confidence intervals tabulated. Significance was set at $P<0.05$). Data was presented using tables and charts.

3.7. Ethical considerations

Ethical clearance for the study was obtained from the National Ethical Review Committee of KEMRI (Appendix v). Consent to execute the study was obtained from Machakos County Ministry of health. Explanation of the aim of the study was done and thereafter informed consent and written consent sought and obtained from all the study respondents before administration of the questionnaire. Assurance was given that the information obtained from the respondents would be treated with utmost confidentiality, and was to be used for the purpose of the study. Where necessary, respondents received appropriate advice on importance of immunization for children.

CHAPTER FOUR

RESULTS

4.1 Social-demographic characteristics of respondents

The social-demographic characteristics of the respondents are as shown in **Table 4.1** A total of 384 children aged of 12-23 months were targeted for assessment of immunization coverage among residents of Katheka Kai Location, Machakos County. Among the children sampled, the proportion of boys and girls was nearly equal (48.7% male, 51.3% female). Majority of the respondents were youthful with (359) 93.5% of them being below 35 years of age with a mean age of 26.8 (±4.9 years). Only 25 (6.5%) of the respondents were above 36 years.

Majority of the respondents 259 (67.4%), were either single, divorced or separated while only 125 (32.6%) were married. Most of the respondents 382 (99.5%) were of a Christian faith. Only one (0.3%) were Muslim and one (0.3%) had no religion. Majority of the respondents had secondary education and above, 230, (59.9%), while 145 (40.1%) had primary or no education. Majority of the respondents 276 (71.9%), earned an average monthly income of KES 5000 and above while 108 (28.1%) earned less than KES 5000 per month. Only 13 (3.4%) of the respondents were engaged in formal employment. The rest were engaged in other forms of employment including casual labor, self-employment and peasant farming. Over half of the respondents (56.6%) lived less than four kilometers from the nearest health facility. In addition, 67 (17.4%) travelled more between five to ten kilometer to the nearest health facility while 100 (26.0%) travelled more than ten kilometers to the nearest health facility. Majority of the households 361 (94.0%) between 1- 2 children below five years of age (Table 4.1).

Table 4.1: Social demographic characteristics of the respondents

Variable	Frequency	Percentage
Gender of the child		
Male	186	48.7
Female	198	51.3
Marital status of respondent		
Married	125	32.6
Single/Divorced/separated	259	67.4
Age group of respondent		
<20 years	20	5.2
22 – 35 years	339	88.3
36-44 years	109	6.5
Education of Mother/caregiver		
Primary of no education	154	40.1
Secondary and above	230	59.9
Education of husband		
Primary of no education	247	64.5
Secondary and above	137	35.5
Religion of respondent		
No religion	1	0.3
Muslim	1	0.3
Anglican	18	4.7
Protestant	316	82.3
Catholic	48	12.5
Occupation of respondent		
No formal employment	311	81.0
Formal employment	13	3.4
Casual labourer	12	3.1
Self employed	33	8.6
Peasant farmer	15	3.9
Average monthly income	108	28.1
≤ 5000 KES		
>5000 KES	276	71.9
Distance from household to the nearest health facility		
<4 kilometers	217	56.5
5 – 10 kilometers	67	17.4
>10 kilometers	100	26.0
Birth order of child		
First and second born	283	73.3
Third born and above	101	26.7

4.2 Immunization coverage of children

Out of the 384 sampled children, 320 (83%) were fully vaccinated meaning that they had received all the mandatory vaccination by their twenty third month of birth. The rest 64 (17%) had not received all the requisite vaccination (Figure 4.1).

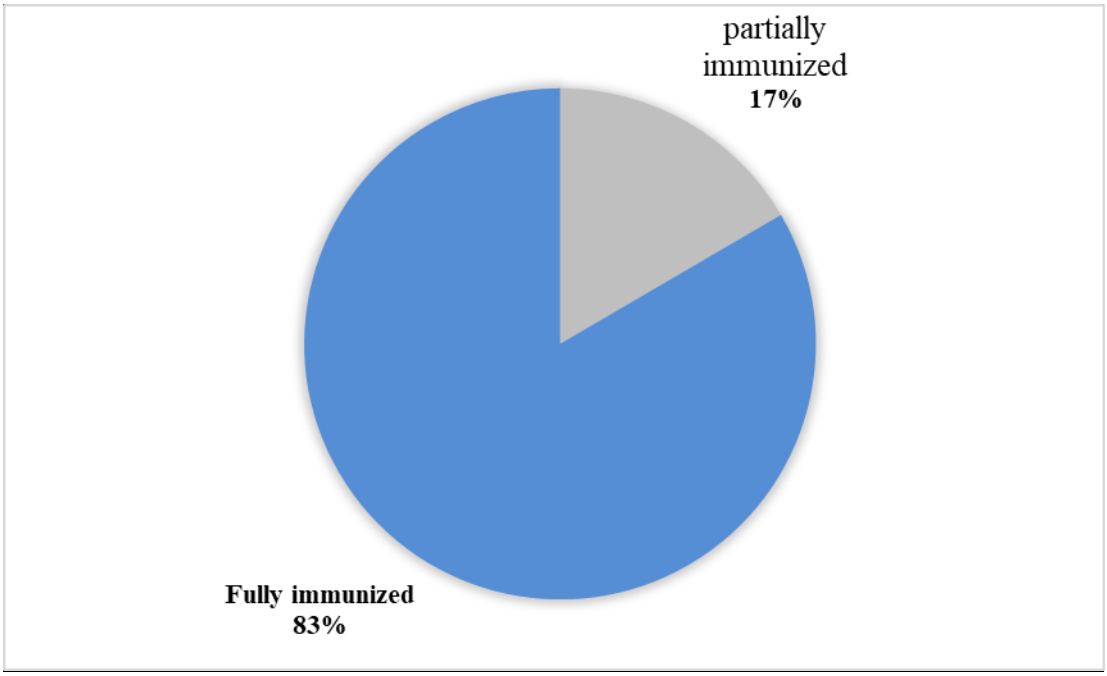

Figure 4.1: Immunization coverage of children in Katheka Kai Location

4.3 Mothers and caretaker knowledge, attitude and practice on children immunization

Mothers and caretakers' knowledge, attitude and practice on childhood immunization were assessed by asking a set of questions related to their knowledge, attitude and practice on children immunization.

4.3.1 Child immunization related knowledge among mothers/caretakers.

Majority of the respondents could mention the correct reason why children get vaccinated, 360 (93.8%). Out of those interviewed, majority 198, (51.0%) could

mention three vaccines administered to children for prevention of diseases. In addition, 124 (32.3%) of the respondents could mention between one and two vaccines while 16 (4.2%) could mention four vaccines. Only 48 (12.5%) could not mention any vaccines. Polio was the most mentioned vaccine with 259 (76.7%) cases followed by BCG and Measles with 233 (66.0%) cases and 222 (65.7%) cases respectively.

Respondents who could mention 1-3 childhood diseases which could be prevented through vaccination were 320 (83.3%). Only a small number 16 (4.2%) mentioned four diseases and above while 48 (12.5%) could not mention any correct diseases. In addition, 48 (12.5%) did not know any childhood diseases prevented through vaccination. Majority of the respondents heard about vaccination information for health workers, 243 (63.0%), from relative 108 (28.0%) and others from radio and relatives. **(Table 4.2**). Knowledge of the mothers/caregivers was considered unsatisfactory if they gave less than three correct answers to the two questions on childhood vaccines and childhood diseases prevented through vaccination. Close to half 168 (43.8%) could tell the correct reason why women require vaccination during pregnancy and majority, 328 (85.5%) could mention the correct vaccine given to pregnant women as Tetanus. This relates to mothers/caretakers general knowledge on vaccination as an intervention to prevent diseases.

Table 4.2: Mothers and caretakers knowledge on children immunization

Variable	Frequency	Percentage
Knows immunization is important during pregnancy		
No	27	7.5
Yes	357	92.5
Reason why women are vaccinated during pregnancy		
Prevent diseases	168	43.8
Don't know	216	56.3
Name of vaccine given to women during pregnancy		
Tetanus Toxoid	328	85.5
Others	56	13.5
Reason why children get vaccinated		
Prevent diseases	360	93.8
Don't know	24	14.6
Knows vaccines given to children		
Yes	336	87.6
No	48	12.4
Childhood vaccines known		
Polio	259	76.7
Measles	222	65.7
DPT	174	51.5
BCG	223	66
Knows vaccine preventable diseases in children		
Yes	337	87.8
No	48	12.5
Knowledge of childhood vaccine preventable diseases	48	12.5
None		
Between 1 – 3 diseases	320	83.3
Four diseases and above	16	4.2
Source of information of child vaccination		
Health workers	243	63.0
Relatives and friend	108	28.0
Radio and media	33	9.0

4.3.2 Child immunization related practices among mothers/caretakers

Out of the mothers interviewed, 320 (83%) took their children for vaccination for all the recommended vaccines (children between the ages of 12- 23 months). A majority 354 (92.2%) of the mothers interviewed attended antenatal clinic during their last delivery. Only 30 (7.8%) never attended antenatal clinic during their last pregnancy. For those who ever attended ANC, 279 (72.7%) attended ANC clinic between one to three times. In addition, 21 (5.5%) attended four times while 84 (21.9%) attended more than four times **(Table 4.3).**

Table 4.3: Mothers and caretakers practices on children immunization

Variable	Frequency	Percentage
Fully vaccinated children	320	83
Partially vaccinated children	64	17
Attendance of ANC clinic during last delivery		
No	30	7.8
Yes	354	92.2
ANC attendance during previous pregnancy		
Once	146	38.0
Twice	12	3.1
Thrice	121	31.5
Four times	21	5.5
More than four times	84	21.9
Place of delivery of last child		
Home	81	21.0
Health facility	303	79.0

4.3.3 Child immunization related attitudes among mothers/caretakers

Majority of the respondents 375 (97.7%) believed that it was important for children to get vaccinated. In addition, majority of the respondents did not believe vaccines had side effects 331 (85.8%). Again, majority of the respondents 374 (97.7%), reported that their last child did not experience any side effects from being vaccinated. Those who mentioned that vaccinating children had side effects mentioned raising a child's

temperature, swelling of legs and causing disability as some of the side effects. **(Table 4.4).**

Table 4.4: Mothers and caretakers attitude towards children immunization

Variable	Frequency	Percentage
Do believe vaccines have side effects?		
Yes	53	14.2
No	331	85.8
Did your last child have vaccine side effects?		
Yes	10	2.3
No	374	97.7
Do you believe is it important for children to be vaccinated?		
Yes	375	97.7
No	9	2.3

4.4 Bivariate analysis

4.4.5 Factors associated with immunization of children

Chi squire test of association was used to determine association of vaccination status with demographic characteristics, level of knowledge, attitudes and practices on vaccination by the respondents. The following factors were significantly associated with vaccination status of children: Mothers' level of education, (χ^2 = 82.335, p<0.001), average monthly household income (χ^2 = 84.178, p<0.001), marital status (χ^2 = 14.157, p<0.001), distance from the household to the nearest health facility (χ^2 = 45.332, p <0.001), attendance of ANC clinic by mothers during last pregnancy (χ^2 = 115.52, p<0.001), frequency of ANC attendance by mothers during last pregnancy (χ^2 = 57.442, p<0.001), knowledge of the vaccines given to children for prevention of diseases (χ^2 = 119.275, p<0.001), and place of delivery of child (χ^2= 204.71, p<0.001). Knowledge of childhood diseases prevented through vaccination (χ^2 = 4.235, p = 0.120), age of respondent, (χ^2 = 3.158, p =0.206), gender of the child (χ^2= 0.677, p = 0.411), and knowledge on why women require vaccination during pregnancy (χ^2 = 6.114, p = 0.011) were not significantly associated with vaccination coverage **(Table 4.5).**

Table 4.5: Bivariate analysis of social demographic characteristics of respondents and immunization status of children

Variable		Childs immunization coverage		Total	Pearson Chi Square	P value
		Fully immunized	Partially immunized			
Gender of the child	Male	159 (49.4)	28 (43.8)	187	0.677	0.411
	Female	162 (50.6)	35 (56.2)	197		
Age of respondent	<20 years	16 (5.0)	4(6.3)	20	3.158	0.206
	21 – 35 years	282 (87.6)	59(92.2)	339		
	36 – 44 years	24(7.5)	1 (1.6)	25		
Education level of respondent	Primary or no education	96 (29.8)	58 (90.6)	154	82.335	0.000*
	Secondary education and above	226 (70.2)	6 (9.4)	230		
Household income	<KES 5000	60 (18.6)	48 (75.0)	108	84.178	0.000*
	>KES 5000	16(25)	262 (81.4)	276		
Marital status	Married	118 (36.6)	8 (12.5)	126	14.157	0.000*
	Single/divorced/Separated	204 (63.4)	56 (87.5)	278		
Distance from Household to Health facility	<4 Km	207 (64.3%)	12 (18.8%)	217	45.332	0.000*
	5 – 10 Km	45 (14.0%)	22 (34.4%)	67		
	>10 Km	70 (21.7%)	30 (46.9%)	100		
Why women get immunization in pregnancy	Prevent diseases	150 (46.9%)	18(29.7%)	168	6.114	0.011
	Do not know	171 (53.1%)	45(70.3%)	216		
Knowledge on the vaccine given to pregnant women	Tetanus	269 (85.3)	59 (90.5)	328	1.177	0.278
	Others	48 (14.7)	8 (9.5)	56		
Attendance of ANC clinic during previous pregnancy	Yes	317 (89.3)	37 (10.7)	354	115.522	0.000*
	No	4 (13.3)	26 (86.7)	30		
Frequency of ANC attendance during previous pregnancy	Once	130 (40.7)	16(26.6)	146	57.442	0.000*
	Twice	2 (0.6)	10 (15.6)	12		
	Thrice	99 (30.7)	22 (34.4)	121		
	Four times	13 (4.0)	8 (12.5)	21		
	>Four times	77 (23.9)	7 (10.9)	84		
Number of childhood vaccines mentioned	One vaccine	12 (4.3)	16 (27.6)	28	119.275	0.000*
	Two vaccines	63 (22.5)	33 (56.9)	96		
	Three vaccines	189 (67.5)	9 (15.5)	198		
	Four vaccines	16 (5.7)	0 (0.0)	16		
	Do not know any vaccine	24 (6.2)	24 (6.4)	48		
Number of Childhood vaccine preventable diseases mentioned out of eight	None	42 (13.0)	6 (9.4)	48	4.235	0.120
	Between 1-3 diseases	262 (82.0)	58 (90.6)	320		
	Four disease and above	16 (5.0)	0 (0.00)	16		
Place of delivery of the last child	Health Facility	296 (92.2)	7 (12.5)	303	204.714	0.000*
	Home	25 (7.8)	56 (87.5)	81		

***Significance (P<0.05)**

Logistic regression was done to test the strength of association between the independent variables. Odds ratio (OR) and 95% confidence Interval (CI) were used to test the strength of the association between independent variable and the depended variable.

The more educated the respondents were, the higher the likelihood that their children would be fully vaccinated. Those respondents with secondary education and above were more likely to have fully vaccinated children compared to their counterparts with primary or no formal education (OR 3.66, CI 1.08 – 12.43, p = 0.04.). The respondents were 3 times more likely to have fully vaccinated children compared to those with primary or no formal education. Household income was found to have a positive correlation with vaccination coverage. Those earning an average monthly income of KES 5000 were 3 times more likely to have fully vaccinated children compared to those earning average monthly income of KES 5000 and below (OR 2.58, CI 0.83 – 8.02, p = 0.001). Respondents who were single/divorced/separated were less likely to have fully vaccinated children compared to those who were married (OR 0.98, CI 0.29 – 3.23, p = 0.97) though the results were not significant. It was found that respondents who attended ANC clinics during their last pregnancy were more likely to have fully vaccinated children than those who never attended. The likelihood hood of having fully vaccinated children increased as the number of ANC attendance increased. Those who attended antenatal the clinics the most times (four times and above) had the higher likelihood of having fully vaccinated children compared to those who only attended 2- 3 times (OR 25.25, CI 5.87 -108.57, p = 0.001, OR 6.97, CI 1.76 – 27.54, p = 0.01 respectively). Similarly, distance from the household of the respondents to the nearest health facility had a negative correlation to vaccination status. Those respondents living nearer to health facilities between 5 – 10 kilometers were more likely to have fully vaccinated children compared to those that lived more than 10 kilometers away from health facilities (OR 0.39, CI 0.12 – 1.32, p = 0.13 and OR 0.71, CI 0.21 – 2.4, p = 0.58 respectively).The results were however not significant . Mothers who had delivered in the health facility in their last delivery were more likely to have fully vaccinated children than those who delivered at home. They were 16 times more likely to have fully

vaccinated children than those who delivered at home (OR 16.63, CI 5.18 – 53.4, p = 0.001) **Table 4.6.**

Table 4.6: Univariate logistic regression of social demographic characteristics of respondents and immunization coverage of children

Variable		OR	95% CI	p-value
Marital status	Married	1	-	-
	Single/Separated/Divorced	0.98	0.29-3.23	0.97
Level of education	Primary or no education	1	-	-
	Secondary and above	3.66	1.08-12.43	0.04*
Distance to health facility	Below 4 km	1	-	-
	5 - 10 km	0.71	0.21-2.4	0.58
	Over 10 km	0.39	0.12-1.32	0.13
Monthly household income	Below KES 5000	1	-	-
	KES 5000 and above	2.58	0.83-8.02	0.00*
Place of birth of child	Home	1	-	-
	Health facility	16.63	5.18-53.4	0.00*
Number of ANC visits	None or 1 ANC visit	1	-	-
	2 to 3 visits	6.97	1.76-27.54	0.01*
	4 and more visits	25.25	5.87-108.57	<0.001*
Reason for vaccination	Other reasons	1.00	-	
	Prevent diseases	0.51	0.19-1.38	0.19

***Significance (p<0.05)**

OR = odds ratio; CI = confidence interval

Multiple logistic regression was conducted taking into account all the independent variables found to be significantly associated with immunization status at bivariate analysis. This was to identify eventual predictors of child immunization among the independent variables after adjusting for confounders. Adjusted Odds ratios at 95% Confident Intervals were used to estimate the strength of the predictors. The education level of respondents was found to predict vaccination status. Those respondents with secondary education and above (OR 4.1, CI 1.26 – 13.4, p = 0.02), were 4 times likely to have fully vaccinated children that their counterpart with primary or no education after controlling for other independent variables. ANC attendance, place of birth and household monthly income level. The other predictor was place of delivery with delivery in a health facility being a predictor of immunization (OR 23.171, p <0.001) after controlling for the other independent variables. In addition, respondents whose children were born in a health facility were 15 times more likely to have fully vaccinated children that respondents whose children were delivered at home after controlling for the other independent variables. The same applies to ANC attendance where the more times a mother attendants ANC clinic, the higher the likely hood of having a fully vaccinated child after controlling for the other factors. Level of education, place of delivery for a child and ANC visits were found to be predictors of full vaccination.

Table 4.7: Multivariate logistic regression of social demographic predictors of immunization coverage of children

Variable		OR	95% CI	p-value
Level of education	Primary or no education	1		
	Secondary and above	4.10	1.26-13.40	0.02*
Monthly household income	Below KES 5000	1		
	KES 5000 and above	2.78	0.91-8.44	0.07
Place of birth of child	Home	1		
	Health facility	14.70	5.06-42.59	< 0.001*
Number of ANC visits	None or 1 ANC visit	1		
	2 to 3 visits	7.86	2.07-29.86	< 0.001*
	4 and more visits	37.76	9.37-152.11	< 0.001*

CHAPTER FIVE

DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS

5.1 Discussion

This study was conducted in a predominantly rural area of Machakos County. It sought to determine the immunization coverage and associated factors for children aged between 12 -23 months in Katheka Kai Location. The study established that the immunization coverage in the Location was 83%. That means that eight in every ten children in the Location within the target age bracket were fully vaccinated (i.e. the children had completed all the requisite doses of immunizations by the 24th month of their ages. This was slightly lower than the Machakos County immunization coverage for children in the same age group which was 90.0% (KDHS, 2014).

The lower coverage could be explained by the fact that the study area was predominantly rural and as similar previous studies have shown, rural areas typically have lower immunization coverage compared to urban areas. In Kenya, the KDHS, 2014 study found out that basic immunization coverage was slightly higher in urban areas than rural areas (83% versus 77%). Another study conducted in Jigjig Ethiopia found out that among fully vaccinated children in the study, 47.6% were from the urban areas compared to 25.7% who were from rural areas (Mohamud et al., 2014). Gender dynamics in child survival have been extensively documented with many instances where male children are usually given preference over the female children in provision of essential social economic services including healthcare. A study conducted in India showed that in respect of immunizations, the likelihood of girls being fully vaccinated, after controlling for other variables, was 5 percentage points lower than that for boys (Borooah, 2004). However, in this study, there was no significant difference in immunization coverage by gender of the children. The findings of this study coincided with the KDHS 2014 study which shown no significant difference in the coverage rates between male and female children.

Knowledge on immunization related issues was found be satisfactory among the respondents as slightly more than half could mention at least three childhood vaccines and more and at least three and more childhood diseases prevented through immunization. In additional, majority of respondents knew the correct reasons why children require immunization. Having knowledge and information regarding children immunization acts as a motivator for mothers to vaccinate their children. This fact could have led more mothers/caretakers to seek immunization services for their children. As was found out in the study, respondents who could mention the correct reasons why children require immunization had a higher likelihood of having fully vaccinated children than those who could not. In addition, knowledge of at least three childhood vaccines and three childhood vaccine preventable diseases were more likely to have fully vaccinated children than their counterparts who could not mention any childhood vaccines or childhood vaccine preventable diseases. Majority of the respondents could mention correctly why women require immunization during pregnancy and the vaccine which is normally given. In addition, slightly more than half could mention three vaccines given to children with polio and measles being the most known vaccines. Having this knowledge could have led mothers to seek antenatal services as required during pregnancy and subsequently transfer the same benefit to their infants by ensuring they get the immunizations required. It is also likely that these mothers had a relatively higher level education and positive attitudes towards children immunization therefore in a better position to comprehend health issues regarding their children. These findings agree with similar studies conducted elsewhere. For example, a study conducted in Mathare slums Nairobi found out that maternal knowledge and attitude contributed to increased children immunization, (Kamau & Esamai, 2001). In addition, a study done in Ethiopia found that, knowledge of mothers or children caretakers about schedule of vaccines has been found to have a significant association with completion of vaccination. Mothers who knew the schedules of vaccine were 3 times more likely to vaccinate their children fully than mother who didn't know vaccine schedule. Moreover, the study found that, mothers or immediate caretaker who did not know the benefits of

vaccination in preventing the occurrence of epidemic were 6.4 times more likely to have defaulter children than mother who knew the benefits (Tadesse et al., 2009).

There was a high number of mothers utilizing antenatal care services with majority of them (92.2%) having attended ANC clinic during their previous pregnancy out of which more than half (60.2%) attended four times and above. ANC attendance was significantly associated with full vaccination (57.442, $p<0.001$) with increased frequency of attendance increasing likelihood of full immunization. During ANC visits, women are given health information regarding immunization for themselves and the unborn children e.g. the recommended schedules and dates for immunization and health benefits of ensuring all dosages are received. The more the times mother attend ANC, the more they are constantly educated and reminded about child health issues and therefore they are more likely to remember them and practice. Mothers who have this health seeking behaviour and already have all the relevant information regarding immunization will likely ensure their children are taken for immunization and at the required periods and fully receive all required dosages. This then explains why mothers with high frequency of ANC attendance were more likely to have fully vaccinated children compared to those who attended less times or never attended at all. This finding concurs with a study conducted in Ambo Woreda in Ethiopia showed that among factors significantly associated with complete immunization was antenatal care follow up (adjusted odds ratio (AOR = 2.4, 95% CI: 1.2- 4.9) Etana and Deressa, (2012).

The study also established that the respondents had positive attitudes towards child immunization with majority 377 (97.7%) mentioning that they believed that it was important for children to be vaccinated. Majority also believed that children vaccines had no side effects. There was a positive correlation between knowledge on immunization for children and positive attitude towards immunization and full immunization of children. Positive attitude towards a behaviour acts as a motivator to practice it and therefore respondents who had a positive attitude towards children immunization were more likely to have fully vaccinated children than those who had a negative attitude.

Previously, maternal level of education has been found to be significantly associated with immunization coverage where increased level of education was found to increase likelihood of full immunization for children. In Kenya, a KDHS study done in 2014 found out that immunization coverage increased with increasing mother's education; more than three-quarters of children whose mothers had completed primary or higher education were fully immunized, as compared with 55 percent of children whose mothers have no education (KDHS, 2014). This study had similar findings whereby mothers or caretakers with a higher education level were found to have higher likelihood of having fully vaccinated children than those less educated. In this study, the proportion of mothers with children who were fully vaccinated and had secondary education and above was higher (59.9%) compared to those who had primary or no education (40.1%). Education level was found to be significantly associated with full immunization after controlling for other independent variables. Basic education gives one the ability to comprehend health information better through channels like reading of health related literature or through awareness sessions in public forums. It is likely that the mothers will be aware of the importance of protecting health of their children including adopting healthy practices like immunization. This fact can be argued on the basis that the study established that 94% of the respondents had at least primary level education and above. Similar findings were found in a study conducted across three South African State which found that children whose caretakers had at least five years of formal education, (55% had completed their immunization schedule compared to only 37% of the children whose caretakers had less than five years of formal education (Fadnes *et al.*, 2002). Similarly, in Uganda, Odiit, & Amuge (2003), found that children of parents with higher formal education were more likely to be up to date for immunization compared with children of parents with either low or no education. A study in Tanzania also established that children of parents with less than primary school education were consistently less likely to complete immunization, (Semali, 2010).

Distance from the respondents' home to the health facility was found to positively influence children immunization. Households which were relatively closer to a health facility were more likely to have fully vaccinated children compared to those further away. Since the study site was largely rural, and like many rural areas in, Kenya, people walk to health facilities due to lack of reliable means of transport. The road network sometimes prohibits movement of people and vehicles therefore discouraging mothers or caretakers from taking children for immunization leading to sometimes children receiving immunizations long after the due dates or missing on appointment for immunization all together. Similar findings were found in a study conducted in Burkina Faso where there was a significant difference between the distance from the child's village to the health center and immunization uptake. In addition a study in India showed the immunization status of the children was significantly higher where the distance of the health center was <2 km compared with those residing in remote inaccessible areas with a distance of >5 km to the health center ($p = 0.018$), (Phukan et al., 2009).

Household wealth is considered to have a positive correlation with full immunization of children. Numerous studies have shown that in rural areas, children in the highest economic quartile have a higher immunization coverage and are more likely to be vaccinated. This is more evident in situations where costs like transportation are incurred in the process of accessing immunization services. This study found out that, average monthly household income was significantly associated with immunization coverage. The higher the average monthly household income, the higher the likelihood of having fully vaccinated children. It can be argued that, increase in wealth is related to higher education level and as this study found, increasing education levels increase likelihood of full immunization for children.

Delivery in a health facility was found to be a predictor of full immunization. Delivery in health facilities gives the mothers the opportunity to receive immediate care have a better chance for their children to receive immediate immunizations and also guidance on subsequent immunizations. In Kenya, as a matter of policy, delivery in government health facilities, all children delivered are supposed to be given the first immunizations

of BCG and OPV0 and mothers are given health education about benefits of immunization. The study established that children who were born in health facilities were 16 times more likely to be fully immunized than their counterparts who were born at home. This finding is similar to the finding in a study conducted in Uganda which found out that, a child born in a health unit was significantly more likely to have a BCG scar, and to be up to date with their immunization, compared to a child born at home (Odiit & Amuge, 2003). In addition, a study conducted in Nairobi Kenya demonstrated that, children born at a health facility were more likely to be fully vaccinated when this included OPV-0 compared with those born at home, (Martin, et al., 2001).

5.2 Conclusions

In conclusion, it is evident from the findings that immunization level for children between 12 – 23 months in Katheka Kai Location is high, at 83% although still less than the county coverage which stands at 90.0%. It is also below the country's target of reaching 90% coverage.

Level of education of the mother/caretaker, average monthly income, distance from household to health facility, place of deliver and ANC attendance were all found to be significantly associated with immunization status of children. Education level of mothers and place of delivery for the child were found to be predictors of immunization for children after controlling for all other independent variables. Religion, family size and gender of the child were not associated with immunization status of children.

Delivery at a health facility was a strong predictor of full immunization for children. Delivery at a health facility provided an opportunity for initiation of immunization and for mothers to get appropriate advice.

5.3 Recommendations

1. There is need to initiate programmes which promote increase of vaccination coverage so as to reach the proportion of children who are still not fully immunized in the location.
2. There is need to formulate strategies to address areas which have been found to hinder increase in vaccination coverage like construction of construction of health facilities closer to households, increasing mother education levels and increasing families disposable incomes.
3. There is need to promote health facility deliveries by mothers which will provide an opportunity for children to be vaccination and increase mothers' awareness on the importance of child vaccination.

5.4 Study limitations and potential bias

5.4.1 Recall bias by mothers and children caretakers.

To avoid recall bias from information given through recall by mothers and children caretakers who may not have children's immunization cards to confirm children immunization and the immunization dates, mothers or caretakers of children who did not have children immunization cards were not included in the study.

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APPENDICES

Appendix I: The Kenya Child Immunization Schedule

	Age	Antigen	Disease Prevented
1	Birth	BCG	Tuberculosis
		OPV	Polio
		HEP.B	Hepatitis B
2	6 Weeks	DPT	Diphtheria, Pertussis, Tetanus
		HIB	Haemophilus Influenza Type B
		HEP B	Hepatitis B
		OPV	Polio
		Pneumococcal	Pneumonia
		Rota Virus	Rotavirus
3	10 Weeks	DPT	Diphtheria, Pertussis, Tetanus
		HIB	Haemophilus Influenza Type B
		HEP B	Hepatitis B
		OPV	Polio
		Pneumococcal	Pneumonia
		Rota Virus	Rotavirus
4	14 Weeks	DPT	Diphtheria, Pertussis, Tetanus
		HIB	Haemophilus Influenza Type B
		HEP B	Hepatitis B
		OPV	Polio
		Pneumococcal	Pneumonia
		Rota Virus	Rotavirus
5	9 Months	Measles	Measles
		Yellow Fever	Yellow fever

Source: KEPI, 2012.

Appendix II: Consent Form

Title of the study: determining immunization coverage of children between 12-23 months born in health facilities and at home in Katheka Kai location Machakos County.

Principal investigator: Titus Kioko

Contacts: +254(0)724-528604

E-Mail: hnkioko@yahoo.com

Objectives of study:

To determine whether place of delivery is associated with immunization coverage.

Purpose and Procedures:

This study is intended to assess the immunization coverage for children born in health facilities and those born outside health facilities. If you agree to take part in this research, you will be asked questions about immunization coverage of your child, your knowledge on immunization and your child's immunization card will be scrutinized for additional information. The interview will take about 20 minutes.

Voluntariness:

Your participation in this research is voluntary. You may refuse to participate, discontinue participation, or skip any questions you don't wish to answer at any time without penalty.

Risks and Benefits:

There are not risks physical, emotional or psychological which may arise out of this study. Other than receiving some health information regarding immunization you will not receive any direct benefits from participating in this research. However, your

participation will help researchers understand whether place of delivery influences positively immunization coverage.

Compensation:

In return for your participation, you will not receive any compensation.

Confidentiality:

Only the principal researcher will have access to research results associated with your identity. In the event of publication of this research, no personally identifying information will be disclosed. To make sure your participation is confidential, we will not have any personally identifying information on the questionnaires.

Who to contact with questions:

If you have any question about this study, you can contact me on 0724528604. You may also contact The Chairperson/Secretary of the KEMRI Scientific Steering Committee and KEMRI Ethical Review Committee (A group of people who review the research to protect your rights) on Tel: 020-2722541/2713349, 0722-205901, 0733-400003

Respondent's statement

I certify that I have understood the information contained in this form and volunteer to participate in this research study.

_____

Name

_____ Date: _____

Signature

Appendix III: Questionnaire.

Part –I: Socio - demographic characteristics

1. Name of mother _____

2. Age_____

3. Marital status

1. Married
2. Single/separated/divorced

4. Religion

1. Muslim
2. Anglican
3. Protestant
4. Other specify_____

5. Educational level of mother

1. Primary or No formal education
2. Secondary and above

6. Educational level of father

1. Primary or No formal education
2. Secondary and above

7. Occupation of the mother

1. House wife
2. Employed
3. House maid
4. Self- employed
5. Peasant farmer

6. Others (specify) _____

8. Monthly income of the family in KES

1. <5000
2. >5000

9. Who in the family makes the decision to take the child for immunization?

1. Mother
2. Father
3. Both together
4. Relatives
5. Other (specify)_____

10. Number of children under five years in the household----------

11. Number of siblings.....

12. Birth order of child.....

13. Place of birth of child

1. Home
2. Health facility
3. Other places.....

14. If health facility, what is the name of the health facility…….

15. What is the level of the facility?

1. Dispensary
2. Health centre
3. Sub district hospital
4. District hospital

5. Provincial
6. National/referral

16. How far is your place of residence from the nearest health facility?

1. Less than four kilometre
2. Between five to ten kilometres
3. > ten kilometres

17. Did you attend antenatal clinic during your latest delivery?

1. Yes
2. No

18. If yes above, how many times did you attend?

1. One time
2. Two times
3. Three times
4. Four times
5. More than four times.

Part 2: Immunization schedule check-list

Do you have the child's immunization card? 1 Yes…2 No.. if no terminate interview

Birth Date		
Sex (M, F.)		
BCG	Date	
	Source	
DPT1	Date	
	Source	
DPT2	Date	
	Source	
DPT3	Date	
	Source	
OPV1	Date	
	Source	
OPV2	Date	
	Source	
OPV3	Date	
	Source	
Measles	Date	
	Source	
Immunization coverage	Not immunized	
	Partially immunized	
	Fully immunized	

Part 3: Immunization related knowledge

19. (a) Do women need immunization during pregnancy?

1. Yes
2. No…….skip to Q 21
3. Don't know……skip to Q21 21

20(b) If yes above, which immunization?

1. ……
2. Don't know

21(c) Why do they require it?

1. ……..
2. Don't know.

22(d) Do children require immunization?

1. Yes
2. No

23(e) f yes above why?

1. ……..
2. Don't know.

24. (a) Do you know the vaccines given to children below five years?

1. Yes
2. No

25 (b) If yes above, mention three of them.

1. …….
2. ……..
3. ……

4. Don’t know…….

26. Could you mention the five diseases that can be prevented by immunization?

1. ……
2. ……..
3. ……..
4. ……..
5. …….
6. Don’t know……..

27. Do vaccines have side effects?

1. Yes
2. No

28. If yes, mention 3 of them.

1. Fever
2. Pain
3. Weakness

Part 3: Immunization related practices

29. If your child has missed out on a vaccine which was due, why was this?

……

30. Did your child have side effects due to immunization?

1. Yes
2. No

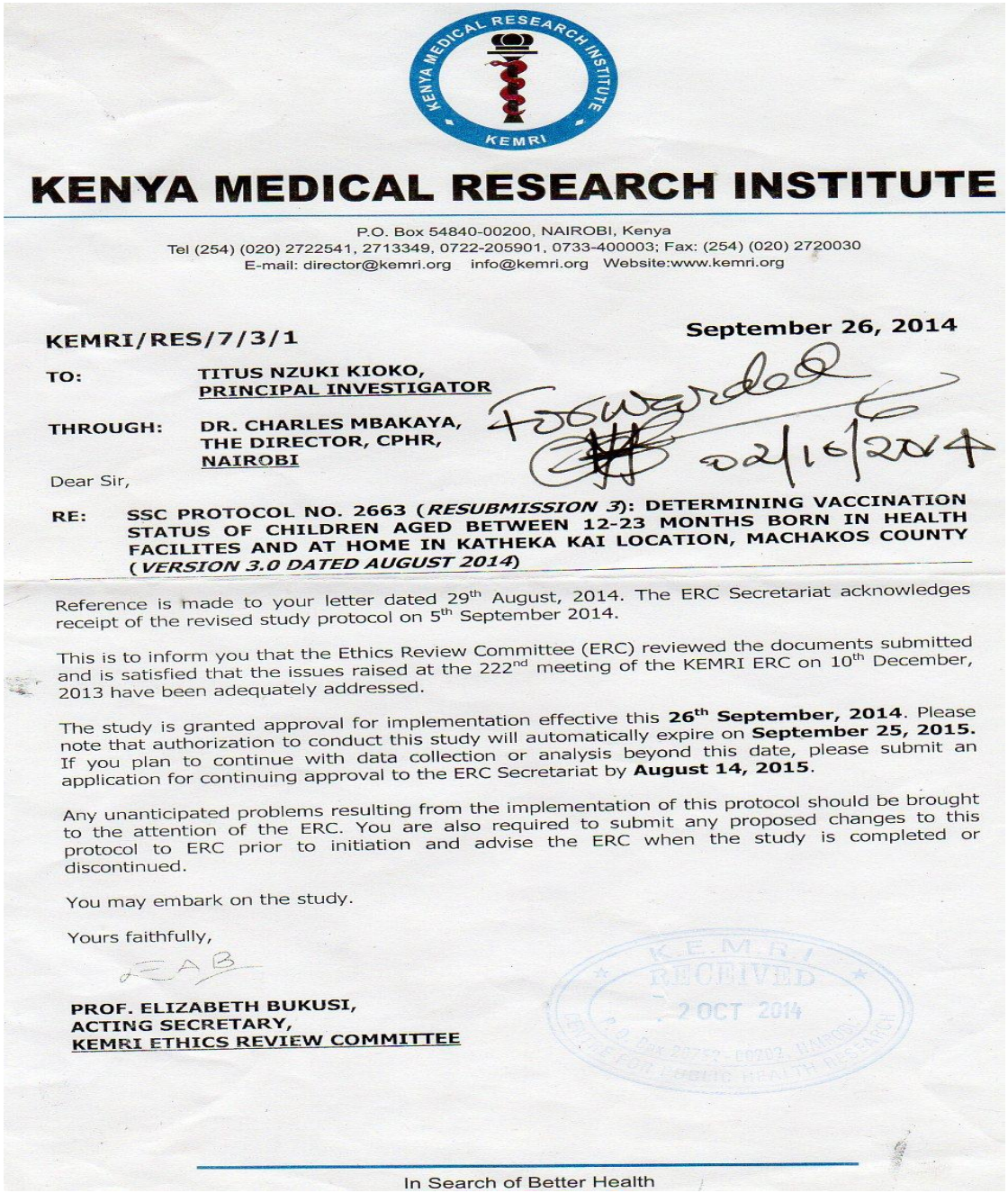
31. Has anybody ever told you the importance of child immunization?

1. Yes
2. No

32. If yes, where did you hear this information?

1. ……..
2. ……
3. ……..
4. Others.

Appendix IV: KEMRI Ethical approval letter



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KEMRI/RES/7/3/1 **September 26, 2014**

TO: **TITUS NZUKI KIOKO,**
PRINCIPAL INVESTIGATOR

THROUGH: **DR. CHARLES MBAKAYA,**
THE DIRECTOR, CPHR,
NAIROBI

Dear Sir,

RE: **SSC PROTOCOL NO. 2663 (*RESUBMISSION 3*): DETERMINING VACCINATION STATUS OF CHILDREN AGED BETWEEN 12-23 MONTHS BORN IN HEALTH FACILITES AND AT HOME IN KATHEKA KAI LOCATION, MACHAKOS COUNTY (*VERSION 3.0 DATED AUGUST 2014*)**

Reference is made to your letter dated 29th August, 2014. The ERC Secretariat acknowledges receipt of the revised study protocol on 5th September 2014.

This is to inform you that the Ethics Review Committee (ERC) reviewed the documents submitted and is satisfied that the issues raised at the 222nd meeting of the KEMRI ERC on 10th December, 2013 have been adequately addressed.

The study is granted approval for implementation effective this **26th September, 2014**. Please note that authorization to conduct this study will automatically expire on **September 25, 2015.** If you plan to continue with data collection or analysis beyond this date, please submit an application for continuing approval to the ERC Secretariat by **August 14, 2015**.

Any unanticipated problems resulting from the implementation of this protocol should be brought to the attention of the ERC. You are also required to submit any proposed changes to this protocol to ERC prior to initiation and advise the ERC when the study is completed or discontinued.

You may embark on the study.

Yours faithfully,

PROF. ELIZABETH BUKUSI,
ACTING SECRETARY,
KEMRI ETHICS REVIEW COMMITTEE

K.E.M.R.I RECEIVED 2 OCT 2014

In Search of Better Health

Appendix V: Inclusion and exclusion criteria

Inclusion criteria

1. Mothers and caretakers of children aged between 12- 23 months in households within Katheka Kai location who had children immunization cards.
2. Mothers and caretakers of children aged between 12 -23 months who consented to participate in the study

Exclusion criteria

1. Mothers and caretakers of children aged between 12-23 months outside Katheka Kai location who did not have children immunization cards.
2. Mothers and caregivers of children aged between 12-23 months who declined to participate in the study

Appendix VI: Ethical considerations

This proposal will be presented to the Scientific Steering Committee at KEMRI and the National Ethical Review Committee for scientific and ethical approvals, respectively.

Voluntary participation:

Respondents' participation in this research will be voluntary. The respondent may refuse to participate, discontinue participation, or skip any questions he/she doesn't wish to answer at any time without penalty. This will clearly be explained to the study participants before start of the interview.

Risks and Benefits:

There are not risks; physical, emotional or psychological which may arise out of this study. Other than receiving some health information regarding immunization, the participants will not receive any direct benefits from participating in this research. However, participants will be informed that their participation will help researchers understand whether place of delivery influences positively immunization coverage.

Compensation:

There will not be any form of compensation for participants for participating in this study.

It will be explained to the participants that, other than receiving some health information regarding immunization they will not receive any direct benefits from participating in this research. They will be made aware of the benefits of the research in helping to understand whether place of delivery influences positively immunization coverage and how this knowledge will help in fighting child illnesses.

Confidentiality:

Only the principal researcher will have access to research results associated with your identity. In the event of publication of this research, no personally identifying information will be disclosed. To make sure that the respondents' participation is confidential, there will not be any personally identifying information on the questionnaires. Additionally, the participants' personal identification details will not be written on the questionnaires. This will also be explained to participants to ensure that they have assurance of their privacy before participating in the study.

All this information will be contained in a consent form which the respondents will sign if they agree to participate in the study.

Appendix VII: Kamba translation of consent form and data collection tools

Consent form: Voomu ya wiw'ano

Kyongo kya uthiani:

Kuthiana maundu ma nzanzo ma syana sya ukuu wa myei 12-23 nthini wa lokeseni ya Katheka Kai Machakos County.

Muthiani munene: Titus Kioko

Namba ya simu: 254 (0) 724-526 604.

E-Mail: hnkioko@yahoo.com

Kitumi kinene kya uthiani

Kitumi kya uthiani uu ni kwenda kuelewa kana vandu vala kana kasyaiwa vena muamba na kusanzwa kana kuema kusanzwa kwa kana.

Mutalatalo wa kuatiiwa

Nthini wa uthiani uu, ningwenda ukulya Makulyo inya kana aei ma syana ila syina ukuu wa miei 12-23. Makulyo aya nimekutonyethya mauvoo mavata mamanyike yiulu wa nzanzo sya syana. Kitumi kya mauneenanyo aya ni kuumaninthya maundu makonanitye na uthiano uu nikenda witwiie kana nukwiyumia withwe ume wa ala meukulywa Makulyo aya. Nutonya ukulya ikulyo yonthe winayo yiulu wa mauneenanyo aya utanamba kutwa kwiyumia kukulwa Makulyo. Kila kindu uukulya nuukusungiwa. Mausungio ala uutunenga nimekuiwa ta sili na mai tavanwa kwa mundu ungi. Maswitwa ma ala meusungia Makulyo maikaandiwa livotini ya uthiani uu. Mauvoo aya metumika kwa uthiani uu woka. Makulyo aya mekua ndatika ta miongo ili tu.

Kwiyumwa kusungia makulyo

Kusungia makulyo aa nikwa kwiyumia na ndwilasimithwa ni mundu. Wina uthasyo wa kulea kusungia kana kusungia makulyo ala ukwenda moka.

Muisyo na vaita

Uthiani uu ndwina maundu mathuku matonya ukukitikia kama mukonyo waku kwa kwiyumia. Mausungio ala uunengane vaa nimeutetheesya muvea wa uiiti na muno muno Mauvoo yiulu wa nzanzo sya syana ni kwenda uima wamwii wa syana utonye kwithwa wi mwailu mbee.

Ndivi

Vaina ndivu kwa nzia imwe kana ingi kwa kwiyumia kusungia makulyo aa.

Kimbithi

Mausungio maku nimekuiwa Kimbithi na maikamanyithanwa kwa andu angi indi metumika kwa uthiani uu woka. Masyitwa ma akulwa ma makulyo maikaandikwa kwa livotini ona imwe katika lovoti ila ikonanitye na uthiani uu. Ona uu wivo lekoti yaku ila ikonetye uthiani uu ikakwatikana sukuluni munene wa (ITROMID, KEMRI) kana JKUAT.

Mokulyo

Ethiwa Wina makulyo ukwenda kusungiwa yiulu wa uthiani uu nuukulwa kwa ndaia ukulywe Mbee wa kwikia saii na kwambiia ukulwa makulyo. Nutonya kuneenanai na na Muthiani munene Titus Kioko kwisila namaba ya simu 254 (0) 724-528604 kana kwisila email address ii: hnkioko@yahoo.com.

Wenda ukwata Mauvoo Mbee iulu wa uthiani uu, noutumie address ii ya isanduku ya valua;

Muungamii,

Sukulu nene ya (ITROMID, KEMRI) kana JKUAT.

SLP 20,752 Nairobi, Kenya.

Simu: 020-725016/7/8

Email address:itromid@nairobi.mimcom.net

Muungamii (JKUAT)

(ITROMID)

SLP 62,000-00,200 Nairobi, Kenya.

Email address: itromid@nairobi.mimcom.net

Utwio wa mukulwa wa makulyo

Ninasoma maelesyo yiulu was uthiani uu na naelewa kieelelo kya w'o. Ninaelewa maundu ala mambaile, undu uthiani uu uundethya, na undu uutethya maundu ma uiiti. Ninakulya makulyo maundu ala ndekueleawa nanasungiwa naelewa.

Saii ya mukulwa wa makulyo.....

Matuku.....

Saii ya Muthiani munene.....

Matuku.....

Immunization card: Kuthiana kwa card ya sivitali

Wina card ya kana ya sivitali**?** Yii 2. Aiee (etha card ya kana ndivo ungamwa interview)

Matuku ma kusyawa ma kana		
Kana kelitu/kamwana (M, F)		
BCG	**Matuku**	
	ilanga : Yivo/Yiivo	
	Vala kana kasanziwe	
DPT1	**Matuku**	
	Vala kana kasanziwe	
DPT2	**Matuku**	
	Vala kana kasanziwe	
DPT3	**Matuku**	
	Vala kana kasanziwe	
OPV1	**Matuku**	
	Vala kana kasanziwe	
OPV2	**Matuku**	
	Vala kana kasanziwe	
OPV3	**Matuku**	
	Vala kana kasanziwe	
Measles	**Matuku**	
	Vala kana kasanziwe	
Kunengwa nzanzo syonthe kwa kana	**Kana kayaasanzwa ona imwe**	
	Kana kayaanengwa nzanzo syonthe	
	Kana nikanengiwe nzanzo syonthe	

Questionnaire: Makulyo.

Part –I: mautwio na mikalo ya kimusyi

1. Isyitwa ya inya/muei wa kana _____

2. Ukuu _____

3. Utwae

a) Nimutwae/nindwaanite
b) Nditwaanite/ndimutwae
c) Nitwataaniisye na muume/muka wakwa
d) Ni ndiwa

4. Ndini

a) Muisalmu
b) Muanglikana
c) Protestant
d) Ndini ingi (weta)_____

5. Kiwango kya masomo kya inya/muei wa kana

a) Ndyaai sukulu
b) Nina kisomo kya musingi
c) Nina masomo ma sekondali
d) Nina kisomo kya college.

6. Kiwango kya masomo kya ithe wa kana

a) Ndyaai sukulu
b) Nina kisomo kya musingi
c) Nina masomo ma sekondali
d) Nina kisomo kya college.

7. Wia wa inya wa kana

a) Ndimuandike
b) Nimuandike
c) Nithukumaa wia wa nyumba
d) Niniyiandikite
e) Ni muimi
f) Mawia angi (weta) _____

8. Ukwati kwa mwai kwa KES

a) <3000
b) 3000-5000
c) 5000 - 10000
d) 10000- 20000
e) >20,0000

9. Nuu ula umasya mioao ya kutwaa syana nzanzoni kwa vamili ii?

a) Inya wa kana
b) Ithe wa kana
c) Ithe na inya wa kana
d) Andu ma musyi
e) Andu angi (weta)_____

10. Kwina syana siana ata vamilini ii ila syi ukuu wa myaka itano na kutheea?----------
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11. Kwi syana siana ata vamilini ii.....

12. Kana kaa tuuneenea nikakeana kusyawa.....

13. Kana kaa kasyaiwe va?

a) Musyi
b) sivitali
c) Kundu kungi.....

14. Ethiwa kasyaiwe sivitali, sivitali yitawa ata?

…….

15. Level ya sivitali isu ni?

a) Dispensary
b) Health centre
c) Sivitali nini ya district
d) Sivitali ya district hospital
e) Sivitali ya province
f) Sivitali ya referral

16. Kuma vaa musyi kwenyu kuthi sivitali ila yi vakuvi nita kilomita siana ata?

1. Itheo wa kilomita kimwe
2. Kati wa kilomita itatu na kilomita itano
3. Kati wa kilomita itano na kilomita ikumi
4. Mbee wa kilomita ikumi

17. Niwaendaa kiliniki kya iveti ila ngito ivinda ya myiso ya kuitava kwaku?

a) Yii
b) Aiee
c) Ikulyo yiiungonia

18. Ethiwa Niwaendaa, waendie mala meana?

1. Ivinda yimwe
2. Mavinda eli
3. Mavinda atatu
4. Mavinda ana

5. Mbee wa mavinda ana

Part 2: Umanyi wa maundu ma nzanzo

19. (a) Ve vata iveti ila ngito Kunengwa nzanzo?

1. Yii
2. Aiee…….Ethiwa aiee enda ikulyo namba 22
3. Ndyisi……etha ndesi enda ikulyo namba Q22

20 (b) Ethiwa ni yii, ni nzanzo yiva?

1. ……
2. Ndyisi

21 (c) Niki iveti syailwe unengwa nzanzo isu?

1. ……..
2. Ndyisi.

22 (d) Syana nini ni syailwe ni kunegwa nzanzo?

1. Yii
2. Aiee

23 (e) Ethiwa ni yii kwa ikulyo namba 22 (d) niki?

1. ……..
2. Ndyisi……..

24. (a) Niwisi nzanzo ila inengawa syana sya itheo wa myaka mitano?

1. Yii
2. Aiee

25 (b) Ethiwa yii ikulyo 24 (a) weta itatu.

1. …….
2. ……..

3. ……
4. Ndyisi …….

26. Weta mauwau atano matonya kusiiwa na nzanzo?

a) ……
b) ……..
c) ……..
d) ……..
e) …….
f) Ndyisi……..

27. Nzanzo niietaa mathina kwa syana?

a) Yii
b) Aiee

28. Ethiwa ni yii, weta amwe ma mo.

a) …….
b) …….
c) ……

Part 3: Meko ala makonanitye na nzanzo

29. Ethiwa kana kayaa nengwa nzanzo ila kathiiwe, ndavye niki?

……

30. Kana kaa nikeethiwe na mathina maumanite na kusanzwa?

a) Yii
b) Aiee

31. Ve mundu waauvundisya mauseo ma nzanzo?

a) Yii

b) Aiee

32. Ethiwa ni yii kwa ikulyo 26, mundu usu aumite va?

……..