

**PREVALENCE AND FACTORS ASSOCIATED WITH MISSED
OPPORTUNITIES FOR IMMUNIZATION AMONG CHILDREN BELOW
60 MONTHS AT SIAYA COUNTY REFERRAL HOSPITAL.**

BY

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DECLARATION

This dissertation is my original work and has not been presented for the award of a degree in any other university.

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LIST OF ABBREVIATIONS

AIDS	Acquired Immune Deficiency Syndrome
ANC	Antenatal Care
BCG	Bacille Calmette Guerin
DPT	Diphtheria Pertussis Tetanus
DVI	Division of Vaccines and Immunization
EPI	Expanded Programme on Immunization
Hep B	Hepatitis B Vaccine
Hib	Haemophilus influenza type b
KDHS	Kenya Demographic and Health Survey
MOI/MOV	Missed Opportunity for Immunization/Vaccination
PCV	Pneumococcal Conjugate Vaccine
VPD	Vaccine Preventable Disease
WHO	World Health Organization

DEFINITION OF TERMS

Fully Immunized Child:

World Health Organization definition of a full immunization is a child who has received in the first year of life;

- a. Bacille Calmette-Guerin (BCG) vaccination against tuberculosis;
- b. three doses of DPT Vaccine to prevent diphtheria, pertussis, and tetanus (or three doses of pentavalent, which includes DPT and vaccinations against both hepatitis B and haemophilus influenza type B);
- c. at least three doses of polio vaccine;
- d. and one dose of measles vaccine.

The Kenyan Ministry of Health considers a child to be fully vaccinated if the child has received all of the above vaccines plus three doses of pneumococcal vaccine.

Missed opportunity for vaccination (MOV): Any situation in which a child or an adult (pregnant woman) has contact with a health facility and is not administered a vaccine that they are eligible to receive.

ABSTRACT

Background: Immunization is today one of the safest, most cost-effective, and powerful means of preventing deaths and improving lives. Even though immunization currently averts an estimated 2 -3 million deaths every year, an estimated 21.8 million infants worldwide are still missing out on basic vaccines. Missed opportunities for immunization contributes to the low immunization coverage seen worldwide adding to the pool of children who have not been effectively immunized. These pockets of low coverage create a risk for the reintroduction of vaccine-preventable diseases (VPDs) that have been eradicated, eliminated, or are under epidemiological control. The Western region of Kenya has a long history of poor vaccine coverage. The devolution of healthcare to the County provides an opportunity for a more detailed understanding of the challenges and barriers in the local setting. This study was conducted in Siaya, one of the counties in the Western region of Kenya.

Objective: To evaluate the prevalence and factors associated with missed opportunities for immunization among children aged below 60 months at Siaya County referral hospital.

Methodology: This was a hospital based descriptive cross sectional study of children seeking health services at Siaya County referral hospital. The study was conducted between January and February 2016 at the Paediatric inpatient and outpatient departments at the facility. The study groups included eligible parent/guardian-child pairs and eligible health care workers who had consented to participate in the survey. A total of 370 child-parent/guardian pairs were interviewed. Exit interviews of the guardians of children who consented to the study was carried out using the standard WHO tool for missed opportunity surveys. The MCH booklet of the target child was examined to determine whether they were eligible for a vaccine and whether it had been offered, and the reasons for missed opportunities. In addition, a total of 116 Health Care Workers were interviewed to determine their knowledge, attitude and practice regarding childhood immunization. Ethical approval was sought from Kenyatta National Hospital/ University of Nairobi Ethics and Review Committee. Data was entered into SPSS, Version 21.0 and analyzed using descriptive statistics and chi square test. The results are presented in tables, graphs and pie charts.

RESULTS: Three hundred and seventy children aged 0-60 months were included in the survey and 116 health workers interviewed. The prevalence of missed opportunity for immunization in the study was 16.2%. The reasons given for missed opportunity for immunization were mainly vaccine stock outs and children being unwell at the time of immunization.

CONCLUSION AND RECOMMENDATIONS: The prevalence of missed opportunity for immunization at Siaya County referral hospital is 16.2%. Missed opportunities for immunization can be reduced by strengthening of immunization services through identification of reasons for vaccine stock outs and educating health workers on immunization practices to improve knowledge on routine immunization practices.

CHAPTER 1: INTRODUCTION

Immunization describes the whole process of delivering a vaccine and the immunity it generates in an individual and population (UNICEF 2009). It remains the most cost effective and important public health strategy for disease prevention. Vaccine preventable infectious diseases such as tuberculosis, poliomyelitis, diphtheria, tetanus and measles are the main causes of morbidity and mortality in children especially in developing countries. [1]

The World Health Organization (WHO) established the Expanded Program on Immunization to ensure that all children have access to routinely recommended vaccines. [1]. Since then, global coverage with the four core vaccines BCG, DPT, polio vaccine, and measles vaccine has increased from <5% to 84%, and additional vaccines have been added to the recommended schedule [1]. A child is considered to have received all basic vaccinations if he or she has received: BCG, three doses of pentavalent and pneumococcal vaccine, two doses of rotavirus vaccine and at least three doses of polio vaccine and one dose of measles vaccine. These should be received during the first year of life. [1]

Coverage with the third dose of DTP vaccine (DTP3) by age 12 months is a key indicator of immunization program performance. Other vaccines that are assessed include the third dose of polio vaccine and the first dose of measles-containing vaccine. Estimated global DTP3 coverage among children aged <12 months in 2013 was 84%, ranging from 75% in the WHO African Region to 96% in the Western Pacific and European region. [9] Coverage with Bacille Calmette-Guérin vaccine, the third dose of polio vaccine, and the first dose of measles-containing vaccine were 90%, 84%, and 84%, respectively. Additional vaccines are increasingly being introduced into national immunization programs. By 2013, rotavirus vaccine was introduced in 52 (27%) countries, and pneumococcal conjugate vaccine (PCV) was introduced in 103 (53%) countries. [9] Coverage with the completed rotavirus vaccination series was 14% globally. [1]

Overall, 68 percent of children aged 12-23 months are fully vaccinated with BCG, measles, pentavalent, polio, and pneumococcal vaccines; 71 percent have received

all basic vaccinations, and 2 percent of children have not received any vaccines. Regarding coverage for specific vaccines, 97 percent of children have received the BCG vaccine, 98 percent received the first pentavalent dose, 97 percent received the first polio dose (polio 1), and 94 percent received the first dose of pneumococcal vaccine. For series vaccinations, coverage declines with subsequent doses. Ninety percent of children receive the recommended three doses of pentavalent, 81 percent receive all three doses of polio, and 85 percent receive all the three doses of pneumococcal vaccine. The decline in coverage levels reflects dropout rates of 8 percent for pentavalent, 17 percent for polio, and 9 percent for pneumococcal vaccine. The dropout rate represents the proportion of children who receive the first dose of a vaccine but do not go on to get the third dose. The proportion of children vaccinated against measles is 87 percent. Levels show that the proportions of children fully vaccinated in North Eastern and Nairobi regions are low compared with other regions, with only 42 percent and 60 percent of the children fully immunized respectively compared with the national average of 68 percent. (KDHS 2014).

Missed opportunities for immunization are an obstacle to raising immunization coverage among children and women of childbearing age. Protocols for the assessment of “missed opportunities” were developed in 1984 and 1988 and widely distributed. Many missed opportunity assessments were conducted throughout the 1980s and 1990s. Missed opportunities for immunization contribute significantly to under immunization of children. This predisposes such children to increased risks of vaccine preventable diseases especially poliomyelitis, diphtheria, tetanus, pertussis and from the complications of measles particularly malnutrition and pneumonia. Partial immunization coverage against vaccine preventable diseases is a significant public health problem. This reduces the herd immunity and increases the pool of children who are vulnerable (vaccine ‘did not take’ or the child was not immunized at all). Eliminating missed opportunities can potentially increase the proportion of fully vaccinated children.

In Siaya County in 2014 approximately 72.5 percent of the eligible children were fully immunized. There are no published data from this region on missed opportunities for immunization and hence the challenges and barriers are unknown. The only available data on MOI are from studies in the city of Nairobi.

CHAPTER 2: LITERATURE REVIEW

2.1 Overview of Immunization in Kenya

Together with its partners, UNICEF has outlined a clear goal for expanding immunization coverage; reaching 90% of children under the age of one nationwide with routine immunization, and at least 80% coverage for every country district by the year 2020.[23]The vaccines under the current routine immunization programs protect children against a wide range of common childhood illnesses including tuberculosis (BCG1, diphtheria, pertussis (whooping cough) and tetanus (jointly referred to as DPT), polio, measles, hepatitis B (Hep B) and meningitis (Hib).[23] The immunization schedule in Kenya includes BCG, three doses of DPT and Pneumococcal vaccines, four doses of OPV, two doses of Rota virus Vaccine, yellow fever vaccine in endemic areas and Measles.

In recent years, new vaccines have been introduced to Kenya (and other developing countries) to protect children from pneumonia and diarrhoeal disease, major contributors of child mortality. These include the pneumococcal vaccine (2011) and the rotavirus vaccine (2013).[23] This is outlined in table 2.1.

A key indicator of the millennium development goal 4 in reduction of child mortality is the proportion of children less than a year old immunized against measles. This is currently 87% countrywide. [19] The basic vaccination coverage has declined since 2008-2009, from 77 percent of children with all basic vaccinations to 71 percent in 2014. Proportions of children fully vaccinated in North Eastern and Nairobi regions are low compared with other regions. 71 percent of children were found to have received all basic vaccinations, and 2 percent of children have not received any vaccines. Only 68 percent of the children in Kenya were found to be fully vaccinated (Siaya county 72.5 percent). [19]

Figure 2.3 summarizes the immunization trends over the years. [KDHS 2014]

TABLE 2.1: CURRENT CHILDHOOD IMMUNISATION SCHEDULE IN KENYA

CONTACT	AGE OF CHILD	VACCINE
1	Birth or First contact after birth	BCG Birth Polio
2	6 Weeks or First contact after 6 weeks	OPV I Pentavalent I Pneumococcal I Rotavirus I
3	10 weeks or four weeks after OPV I, Pneumococcal vaccine I, Pentavalent I and Rotavirus I	OPV II Pentavalent II Pneumococcal II Rotavirus II
4	14 Weeks or four weeks after OPV II, Pentavalent II, Pneumococcal II	OPV III Pentavalent III Pneumococcal III
5	9 Months or first contact after 9 months	Measles vaccine
6	9 months or first contact after 9 months	Yellow fever vaccine(in endemic areas)
7	18 months	Measles vaccine (booster dose) MR (Measles,Rubella)...to be rolled out in 2017.

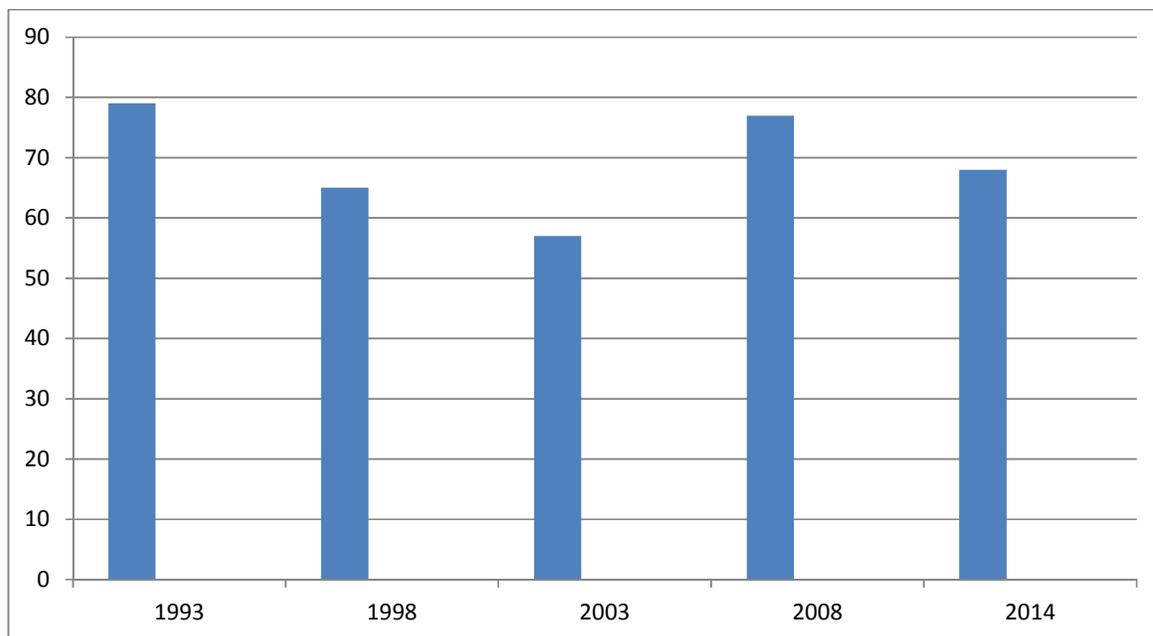


Figure 2.2 IMMUNIZATION COVERAGE IN KENYA OVER THE YEARS. [Source: KDHS 1993-2014]

2.2 Missed Opportunities for Immunization

2.21 Definition

After the Global Advisory Group of the World Health Organization recommended the strategy of immunizing at every opportunity in 1983, protocols were developed for evaluating the magnitude and risk factors for missed opportunities for immunization. It is defined as an occasion when a person eligible for immunization and with no valid contraindication visits a health service facility and does not receive all recommended vaccines. [20]

2.22 Magnitude of missed opportunities for immunization

Missed opportunities for immunization are an obstacle to raising immunization coverage among children and women of child bearing age. Reducing MOI is the easiest and immediate remedy to improve vaccine coverage at no extra cost by employing available resources. In 1993 WHO released its first report on missed opportunities globally, which identified mean prevalence of 41percent (0-99 percent) in developing countries. The analysis found that a large proportion (44percent) of the

reasons for under-vaccination were factors related to the Immunization System including: Access and vaccine service availability; Use of all opportunities; Cost and service quality; and Health worker knowledge. In order to address these issues, there was renewed interest in missed opportunities assessments as a simple tool for the management of immunization programs, providing practical data for decision-making to improve immunization coverage. [15]

Missed opportunities vary from region to region with some as low as 3 percent to high levels of almost 100 percent. Despite the varying reasons given for the trends, some similar factors have been established across all regions. These include low level of formal education of the mother or primary caregiver, lack of accessibility to health facilities (costs and physical distance) and illness of the child at the time of immunization.

The prevalence of MOI varies amongst regions as summarized in the following table (Table 2.2)

Table 2.2: Prevalence of Missed opportunities for Immunization

a) Western studies

Author, year	Country/ Setting	Age(months)	No.of patients	% MOI	Top reasons for missed immunization
Hutchins S.S. et al, 1993	45 countries (both industrialized and developing countries)		59 studies-developing countries 20 studies-industrialized countries	32% (for all the countries) 41% in developing countries 15% in developed countries	-False contraindications -Health worker practices -Logistical problems
Djibo DA. et al, 2011	San Diego	6-60 months Adults older than 50 years	1136 children 1329 adults	30.2% in children 44.9% in adults	-Season related -Age
Gentile A. et al, 2013	Argentina	Parents to 6-24 months olds	1350	97%	-Ill child -Lack of knowledge -False contraindications
Shruti Sridhar.etal.,2013	Middle and low income countries	Children 0-18 months,Women in the child bearing age	41,310	32.2% in children 46.9% in women	-Healthcare practice, Falsecontraindications -Logistical reasons
Sridhar S et al, 2014	Low and middle income countries	-Children -women of child bearing age	41,310	32.2% in Children 46.9% in women of child bearing age.	-Low maternal education -Religion -Distance from the health facility

b) African studies

Author, year	Country/ Setting	Age (months)	No. of patients	% MOI	Reasons for MOI
Wainaina L.M., et al 1996	Kenya, Urban	0-24	380 inpatients 387 outpatients	57.5% in the in-patients 100% in the outpatients	-low level of maternal education -children born to single mothers Unemployment
Jagrati V .Jani et al., 2001	Mozambique, rural	0-24	668	25.7%	-Poor accessibility -Maternal education -Home delivery
Tugumisirize F. et al., 2002	Uganda, rural	12-23	408	59.6%	-Lack of knowledge -Rude health workers -Low formal education
Borus PK. et al.,2004	Nairobi, urban		6 health centres	3%	-Health care practices
Abdulraheem I.S. et al.,2008	Nigeria, rural	0-12	685	33.4%	-Ill child -maternal level of education -long walking distance to the health facility
Gwer B.O.et al., 2010	Nairobi, urban	0-24 months	12 health centres	23.8%	-Home delivery -Distance to the health facility -Lack of information
Ubajaka F.C.etal.,2010	Nigeria, sub- urban	0-12	307	16.9%	-Ill child -Health facility related practices -Distance
Adut C.M.et al, 2012	Juba, Southern Sudan	0-23	448	56.5%	-Home delivery -Lack of ANC attendance -Lack of knowledge

2.23FACTORS ASSOCIATED WITH MISSED OPPORTUNITIES FOR IMMUNIZATION.

Various authors have documented multiple factors associated with missed opportunities for immunization. These include socio-demographic factors, economic factors and health system related factors. Some of these factors are discussed as follows:

a) Socio demographic factors

Studies describing socio demographic factors associated with MOIs have been described in Africa and include gender, education level of the care givers, family size, marital status of the parents and distance from health facilities. Even though some reasons for missed opportunities for immunization were more common than others none accounted for more than 25% of the total. [26]

Maternal level of formal education: Low level of maternal or primary caregiver's formal education has been associated with inappropriate abstinence from vaccination. Various studies in Africa and India show that mothers of young children were aware of vaccination and its benefits, but majority do not know the immunization schedule and therefore are not able to be pro-active about ensuring completion of the immunization schedule. [2, 3, 18, 22 , 28] In Mozambique, Nigeria, India and Kenya, children of women with higher level of basic or post basic education are more likely to be fully immunized than their counterparts whose mothers had a lower level of education.

Distance from health facilities: Children from remote areas are more likely to miss immunization because of the costs and distance associated with accessing such health facilities .In rural Mozambique, the average walking time to the nearest health facility was one hour (range 3-4hours). A study in India found that children living near town (Delhi) were found to have missed less vaccinations compared to those from far. In rural Nigeria mothers cited the long walking distance to the health facility as a reason for missed immunization. [15,18,22,27]

Place of delivery: Children delivered at home are more likely to have missed immunizations compared to those delivered in health care facilities. This has been linked to lack of or poor antenatal attendance. In Nairobi, a survey showed that mothers who delivered at home delayed to take their children for routine immunizations. [3, 4,17}

Maternal characteristics of marital status and wage employment have been associated with MOI in Nairobi studies. Children of single mothers were found to have an increased likelihood for inappropriate immunization compared to children of married women. In the same population, children of urban and rural housewives had a significant risk of inappropriate immunization compared to women in wage employment. {2,3]

Children with **concurrent illness** were more likely to have missed immunizations. The presence of any illness especially associated with fever was perceived as a contraindication to immunization. Most studies describe illness in a child as among the leading reasons for missed opportunities for immunization. Some health care workers lacked knowledge on the contraindications for immunization and perceived illnesses associated with fever as a contraindication.[2,3,18, 22, 27,29]

A male child was more likely to be fully immunized compared to a female child. In some areas like rural India and Turkey, male children were found to be fully immunized compared to the female group. [18, 29] No differences in the gender of the children were noted in the other studies.

a) Health Care related factors

Lack of information by mothers or guardians on the scheduled visits and dosing, side effects have had a significant contribution to MOI. Most of them had some knowledge on the benefits of immunization though but lacked the other information related to the immunization schedule.

In rural Nigeria and India, most caregivers cited lack of vaccine on the appointment day and absence of personnel responsible for immunization as the reason for missed immunization. This seems to be replicated in other African regions like Mozambique where mothers cited long waiting time, lack of personnel at the health

facility, no vaccines available on the immunization day, no information about the day for vaccination and no vaccination given due to the child's illness. [18,22 ,26,27]

Inadequate knowledge of health care workers on immunization practices is associated with a high prevalence of missed opportunities for immunization. Some health workers have been found to lack appropriate knowledge on the current immunization schedule, immunizable diseases, immunization techniques or the definition of missed opportunities for immunization. The national policy on Expanded Program for Immunization of immunizing children at every contact with the health care system was not being implemented in both the inpatient and outpatient departments. [2]

A variety of studies have focused on helping health care workers to better understand and support parents of children who have incomplete or no vaccinations. In rural Uganda, some of the caretaker constraints was the fear of 'rude' health workers. [2, 28] An essential element for informing this understanding is the gaining of insight into people's perceptions. A variety of studies support identifying and addressing system/provider and consumer barriers such as health staff attitudes and practices, reliability of services, false contraindications, parents' beliefs and knowledge, fear of side effects, and conflicting priorities.[30]

Vaccine-preventable diseases (VPDs) still lead in cause of deaths in children younger than 5 years of age. Vaccines against common causes of pneumonia and diarrheal diseases are still not widely accessed by developing countries. Children in the lowest wealth quintiles are still the least likely to receive immunizations. [37]

2.3 STUDY JUSTIFICATION

Nyanza region ranks poorly in child immunization coverage having 67% of the children fully vaccinated. [19] Priority needs to be given to strengthening routine vaccination to curb mortality resulting from vaccine preventable diseases. Particular efforts needed to reach the under-served in remote areas.

With the devolution of health to the counties there is need to have local data to support county planning. Currently, there exists no data that describes the missed opportunity for immunization at Siaya County Referral Hospital. The survey evaluated the current rate of missed opportunity for immunization and factors

associated with it. It was therefore hoped that the study could be used to inform future immunization policies at the hospital/county or as baseline data to continually evaluate the immunization practice at the hospital/county.

2.4 STUDY UTILITY

This study has provided information on the factors affecting childhood immunization from both the caregiver and health care workers' perspective. This will help to assess the need for continuing education of caregivers and health care workers on the benefits of adhering to the childhood immunization schedule in promoting better health outcomes.

The baseline information will also help planners and policy makers to focus on priority areas that need to be improved in the current immunization guidelines. Results may then be used to inform policy on potential areas of improvement for future local and regional childhood immunization guidelines.

2.5 STUDY OBJECTIVES

2.5.1 Primary Objective:

To determine the prevalence of missed opportunities for Immunization among children under 60 months of age at Siaya County Referral Hospital.

2.5.2 Secondary Objectives:

- To establish the reasons for missed opportunities for immunization.
- To assess the knowledge and practice of Health Care Workers at Siaya County Hospital as regards immunization.

CHAPTER 3: METHODOLOGY

3.1 Study Design:

This was a hospital based cross-sectional descriptive study.

3.2 Study Population:

The Study Population included:

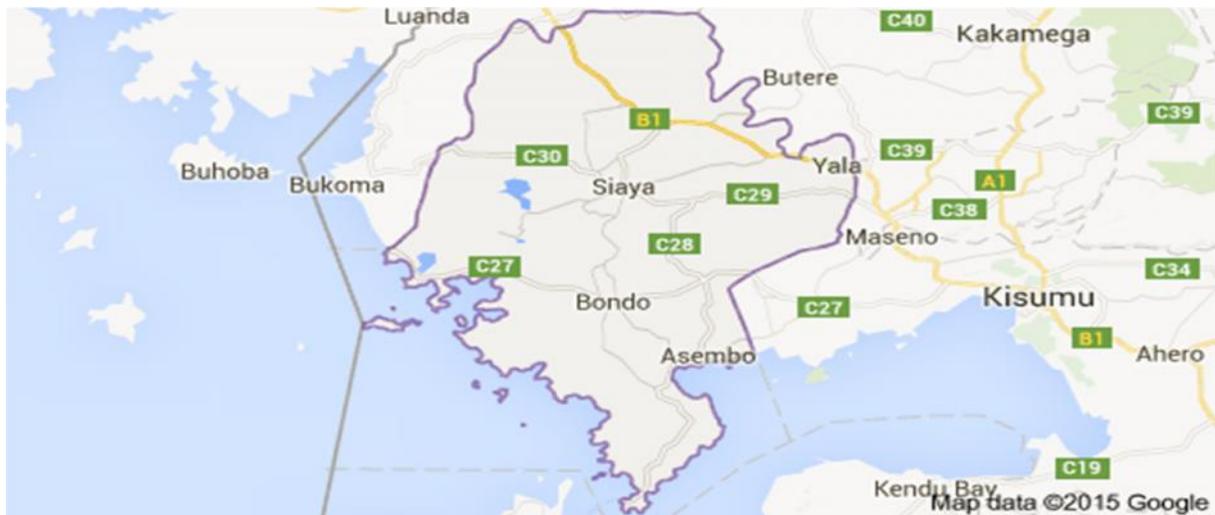
- The guardians of children aged less than 60 months seeking healthcare services at Siaya County Hospital (Both inpatient and outpatient services)

- Healthcare workers in the respective Paedatric outpatient and in patient departments at the hospital.

3.3 Study Location:

The research was conducted at Siaya county referral hospital situated in Siaya county, in the former Nyanza province. It serves a population of approximately 842,304 people. The hospital is situated in the south west part of Kenya. It is bordered by Busia County to the north, Kakamega and Vihiga counties to the north east and Kisumu County to the south east. There are six constituencies in this county namely: Ugunja, Ugenya, Alego, Gem, Bondo and Rarieda. Most people living in the region are from the Luo ethnic group, whose main occupation is small scale farming, livestock keeping and fishing.

Siaya County referral hospital is a high volume hospital that provides both inpatient and outpatient services for both children and adults. It has a daily patient turnover of 180 half of whom are children. Patients were recruited in the paediatric out-patient clinics, outpatient departments of the hospital and the paediatric inpatient facilities including the postnatal wards. The paediatric department ward has a bed capacity of seventy. The total number of children aged less than five years seen at Siaya county hospital are approximately sixty. The vaccines are administered in the mother and child health clinic by the nurses and they are free of charge.



MAP OF SIAYA COUNTY

3.4 Study Period:

The Study was carried out between January and February 2016.

3.5 Eligibility criteria

3.5.1 Inclusion Criteria:

Each of the children recruited met the following criteria to be included into the study:

- Patients aged less than 60 months whose care givers gave consent to the study.
- Health care workers in the different Paediatric wards, outpatient clinics and postnatal wards who gave informed consent.

3.5.2 Exclusion Criteria:

Children aged over 60 months

Non consenting parents/ guardians/health care workers.

3.6 Sample Size Determination

For finite population in the case of this study, the following formula was used:

$$n = \frac{DE \times z^2 N p(1 - p)}{d^2(N - 1) + p(1 - p)}$$

- n = Sample Size
- DE = Design Effect
- N = Population Size
- z = Normal Standard Deviation taken with a 95% Confidence Interval; set at 1.96.
- p = 16.9% Expected Prevalence of missed opportunity for immunization as per Ubajaka F.C. et al. in Nigeria 2010;
- d = Study Precision taken as 5%.
- N = 370 patients

Reference: Schaeffer RL, Mendenhall W, Ott L. Elementary Survey Sampling, Fourth Edition. Duxbury Press, Belmont, California 1990

3.7 Patient Recruitment Procedure:

Potential Study Participants were identified by visits to the outpatient and inpatient departments of the hospital to recruit guardians of children aged less than 60 months presenting for health services, upon discharge or exit from the facility. The Principal Investigator identified those patients aged 0 to 60 months who met the eligibility criteria upon their exit from the facility

This means that the respective parents/ guardians were only interviewed at the last service point after getting the required health service they had come to seek in the first place. For those in the outpatient department, this meant after the child had been seen by a health care worker and the necessary treatment or other health services offered. For the inpatients, this was at the point of discharge from the inpatient facilities.

The Investigator then approached the specific patients and their caregivers and explained the purpose and methods of the study allowing the caregiver to provide voluntary informed consent, free from coercion. Questions regarding the study from the parent/guardian were answered at this stage.

A list of every patient who met the inclusion criteria was made and every consecutive child from the list selected until the required sample size was reached. Similarly, health care workers who gave consent to the study were interviewed using a standard WHO tool consisting of both closed and open questions.

The interviews with the parents/ guardians were conducted daily (including weekends) from 8.00am-8.00pm. Data was collected by the principal investigator assisted by trained research assistants.

3.8 Data collection procedure:

Data was collected using a structured interviewer administered questionnaire; this was administered to both caregivers and health care workers at Siaya County Referral Hospital who had given informed consent.

For the caregivers, this was administered at the end of service provision. Immunization data was abstracted from the Immunization card and hospital records. The data collection was conducted by trained research assistants supervised by the

principal investigator. The data collected was entered in SPSS (Statistical Package for Social Sciences) version 21.1

3.9 Study Variables

The main study variables were the prevalence of missed opportunity for immunization and the reasons for MOI.

3.10 Data Management and Analysis:

The Data analysis was conducted as per the analysis plan to achieve the objectives set out at the outset. Descriptive statistics were used to summarize the data on respondent characteristics utilizing narrations, tables, graphs and charts. To test associations between the outcome variable (Missed Opportunities for Immunization) and the independent variables/factors (caretaker's demographic, socio-economic, knowledge, attitude and practices characteristics, and the health care worker and health system characteristics) the chi-square test and the logistic regression model analysis were used. This was to determine the presence of an association, the strength and the direction. The level of significance for all the statistical tests was set at $\alpha=0.05$

3.11 Confidentiality of Data and Health records issues

For the entered data there was no identifying information such as names. The identifiable data was encrypted and stored in a separate file to engender utmost confidentiality This file would later be used and accessed by authorized personnel to link the data for logistical and management purposes. The data collected was stored securely within lockable facilities.

3.12 Control of errors and biases:

The following measures were taken to reduce different forms of bias and errors:

1. The questionnaire used were a standardized WHO tool that allows comparability across studies.
2. A copy of the study definitions and terminologies were used by each interviewer administering a questionnaire to ensure uniformity in interpretation of terms.
3. The responses given to the questionnaire were assessed daily by the Principal investigator to ensure validity of collected data.

4. The survey was conducted in the local dialect for those who did not understand English/Swahili language, to improve communication.

3.13 Study limitations:

The following study limitations were experienced:

1. Recall bias especially the care givers who lacked the child's immunization booklet at the time of the interview.
2. The study was dependent on the willingness of the Caregiver to participate in the Study during exit from the health facility.
3. This being a hospital based survey, there may have been a selection bias and reports from the health care workers and parents reports may just be socially correct.

3.14 Ethical considerations:

1. Permission was sought from the Kenyatta Hospital Ethics Research Committee to collect and analyze data collected in the study as part of the Thesis Dissertation.
2. Administrative approval from Siaya County referral Hospital Management Board and the hospital Medical Superintendent to collect data from the facility.
3. The caregivers were appraised on the importance of the study and they were to give an informed consent before the interview. No gifts or any form of persuasive coercion was offered.
4. Children found to have missed immunizations during the interview were referred for immunization at the facility.
5. Strict Confidentiality was observed throughout the entire study period. No Information concerning the individual study findings was released to any unauthorized third party without prior written approval of the study institution or the Ethics Research Committee.
6. The findings of the study will be availed to the health facility to improve the immunization services offered of children. The study findings will also be presented to the University of Nairobi (UON) Department of Pediatrics and Child Health Academic Staff and Students in fulfillment of the requirements of the M.Med Program.

CHAPTER 4: RESULTS

4.1 Socio-demographic characteristics of the children

This study involved interviews of 370 caregivers of children less than 60 months of age with a median of 5 months (IQR 3 to 9 months); majority (60.3 percent) were less than 6 months old. Almost two-thirds (61.4 percent) were out-patients and 53 percent of the children were males.

Majority of their mothers (89.7 percent) had attended antenatal care clinics and this is lower than the national average of 96 percent according to the 2014 Kenya Demographic and Health Survey.

Most children (91.9 percent) were delivered in a health facility, showing improved numbers of mothers delivering at a health facility (national average 61% ; KDHS 2014).

Table 4.1: Socio-demographic characteristics of the children

Variable	n=370	Frequency (%)
Category of patients		
Out-patients	227	61.4
In-patients	143	38.6
Age of the child in months		
Median (IQR)	5	3-9
Range	Less than 60 months	
Categories, n (%)		
0-6 months	223	60.3
7-12 months	101	27.3
13-24 months	42	11.4
25-36 months	3	0.8
>36 months	1	0.3
Sex		
Male	196	53.0
Female	174	47.0
Antenatal care		
Yes	332	89.7
No	38	10.3
Place of delivery		
Home	30	8.1
Health facility	340	91.9

4.2 Socio-demographic characteristics of the caregivers

The mean age of the caregivers was 26.1 years (SD 5.6 years) ranging from 15 to 45 years. Majority (93.5percent) were the mothers of the children, 87.6 percent were married. Half of them were literate, having attained at least a primary level of education (51.9 percent).More than a half (57.3 percent) of the caregivers were unemployed.

Table 4.2: Socio-demographic characteristics of the caregivers

Variable	n=370	Frequency (%)
Age of primary caregivers in years, mean (SD)	26.1	5.6
Range	15-45	15-45
Relationship of primary caregiver to child		
Mother	346	93.5
Father	7	1.9
Aunt/Uncle	2	0.5
Both parents	15	4.1
Marital status of primary caregiver		
Married	324	87.6
Not married	46	12.4
Education status of primary caregiver		
Never had formal education	8	2.2
Primary	192	51.9
Secondary	136	36.8
Tertiary education	34	9.2
Employment status of primary caregiver		
Unemployed	212	57.3
Self-employed	131	35.4
Formal employment	27	7.3

4.3 Missed opportunities of immunization

Prevalence of missed opportunities of immunization was 16.2% (95% CI 12.4-20.3%) in children studied at the health facility (Figure 1). As shown in Table 4a) below, 89.7 percent of the children had ever been immunized and only 75.3 percent had immunization cards on the day of the clinic visit. Those who had cards had 94.8 percent of them having an up-to-date immunization as per KEPI schedule. Majority(92.7%) of the children seen in the clinic were due for immunization and 10.8 percent missed the opportunity on the day. Vaccination was reported to have been received mainly from government facilities. Tetanus toxoid injection during

pregnancy was reported among 86.2 percent of the women and 33.8 percent of the women had received at least two doses of the toxoid vaccine in the last pregnancy.

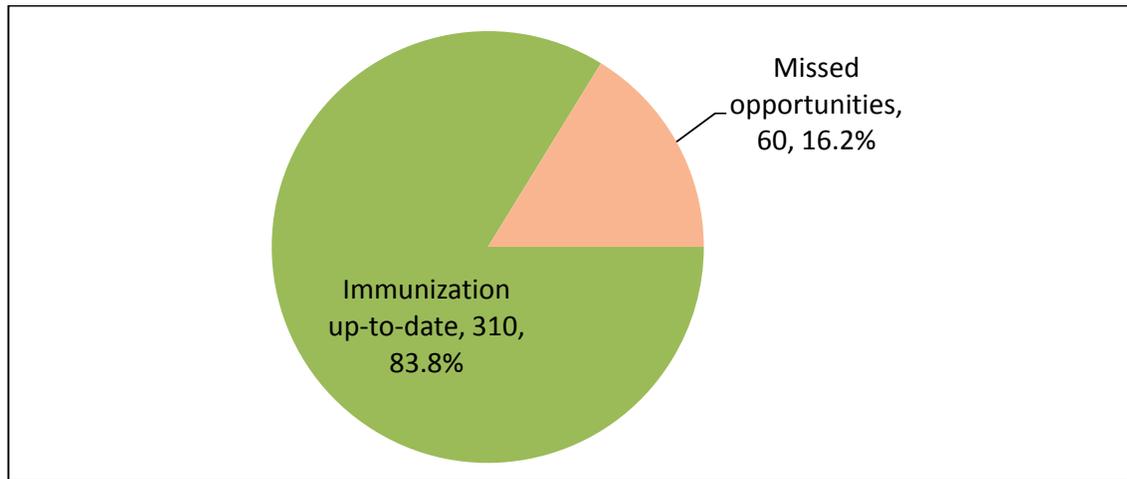


Figure 4.1: Prevalence of missed opportunities

Table 4.3 a): Further information of children who had ever been immunised

Variable	Frequency (%)
Child ever been vaccinated	
Yes	332 (89.7)
No	38 (10.3)
Child had immunization card (n=332)	250 (75.3)
Immunization up-to-date as per KEPI schedule (n=250)	
Yes	237 (94.8)
No	13 (5.2)
Place where vaccination of the child was done	
Government health facility	364 (98.4)
Private health facility	6 (1.6)
Mother ever received TT injection during last pregnancy	319 (86.2)
Number of times mother received TT injection in the last pregnancy	
1	93 (25.1)
2	125 (33.8)
3	72 (19.5)
4	30 (8.1)
5	26 (7.0)
Cannot remember	24 (6.5)

Booster measles vaccine administered at the age of eighteen months had the highest missed opportunity for immunization prevalence at 78.2 percent.

Table 4.3b): Missed opportunity for Immunization per vaccine

Vaccine	n=370	MOI (%)
BCG (n=370)	46	12.4%
OPV0 (n=370)	35	9.5%
Pentavalent 1 (n= 316)	28	8.9 %
Pneumococcal 1(n=316)	24	7.6%
OPV1 (n= 316)	32	10.1%
Rotavirus 1 (n=316)	58	18.4%
Pentavalent 2 (n=284)	29	10.2%
Pneumococcal 2(n=284)	34	12%
Rotavirus 2(n=284)	36	12.7%
OPV2 (n=284)	17	6%
Pentavalent 3 (n=239)	15	6.3%
Pneumococcal 3 (n=239)	17	9.6%
OPV3 (n=239)	41	17.2%
Measles (147)	36	24.5%
Measles booster (46)	36	78.2%

4.4 Barriers to uptake of immunization

About a third (33.2 percent) of the caregivers thought that the cost of travelling to health facility was high, 29.5 percent said the time taken was too long and 37.3 percent thought the facility was too far. The means of transport used to access the health facility was mainly walking (41.6 percent) and motorbikes (39.2 percent).

Majority of the care givers (89.2 percent) knew the schedule of immunization at the facility. Very few caregivers mentioned that they incurred charges on immunization cards (1.4 percent) and services (0.5 percent).

Table 4.4: Barriers of accessibility of immunization

Variable	n=370	Frequency (%)
Cost of travelling to the health facility from home is high	123	33.2
Time taken to travel to the health facility is too long	109	29.5
Distance from the health facility is too far	138	37.3
Means of travel used to get to facility		
Walking	202	54.6
Motorbike	145	39.2
Public vehicles	23	6.2
Do you know what immunization days and times are in your facility?		
Yes	330	89.2
No	40	10.8
Time schedule for immunization services acceptable (n=330)	323	97.9
Charged for immunization card		
Yes	5	1.4
No	365	98.6
Charged for immunization services		
Yes	2	0.5
No	368	99.5

4.5 Availability of vaccination services in the facility

The services sought by the caregivers for their children were mainly growth monitoring (65.1%) and vaccination (30.8%). Children who were vaccinated on the same day of the hospital visit were 42.3% and 77.6% were told when the next vaccination was due. Most care givers (77.3%) were given information on the possible side effects of the vaccine the child received and the interventions to take in case of side effects. In the overall, 88.4% of the caregivers were satisfied with the vaccination services. However, 17.8% reported ever seeking vaccination services for their children but never receiving them. The reasons that the caregivers stated to be related to never receiving the vaccination included mainly vaccines stock-outs (65.2%) and the child being unwell (13.6%). Other reasons reported included absence of health worker and loss of card.

Table 4.5: Availability of vaccination services in the facility

Variable	n=370	Frequency (%)
Services sought in the facility during the visit		
Growth monitoring	241	65.1
Vaccination	114	30.8
Curative	15	4.1
Child received vaccination on the clinic visit day	159	42.3
Caregiver given information on next vaccination due date	287	77.6
Received information on the possible side effects of the vaccine (n=159)	123	77.3
Caregiver satisfied with the vaccination services	327	88.4
Sought but did not receive immunization	66	17.8
Reasons given for not receiving vaccination (n=66)		
Vaccine stock-out	43	65.2
Health worker absent	2	3.0
Was not day of vaccination	4	6.1
Lost immunization card	2	3.0
Baby sick decided to treat first	9	13.6

4.6 Knowledge of the caregiver

Health workers were cited as the main sources of information according to 39.7% of the caregivers. Also, community health workers and radio played a major role as mentioned by 19.7% and 21.1% of the caregivers. Majority (93.8%) of the mothers knew that vaccination prevented childhood diseases and 93% believed all children should receive vaccination.

Mothers were reported by 71.1% of the caregivers as the main decision-makers for child vaccinations in their household. In addition, caregivers identified measles (71.6%) and tuberculosis (71.9%) among the EPI diseases than polio (55.1%) and whooping cough (47.3%). A smaller proportion of caregivers were able to identify tetanus (11.4%) and diphtheria (5.4%).

Table 4.6: Caretaker knowledge

Variable	Frequency (%)
Source of information about vaccinations	
Health worker at the facility	147 (39.7)
Community health worker	73 (19.7)
Radio	78 (21.1)
Friends/Relatives	5 (1.4)
Nationwide/outreach campaigns	33 (8.9)
Television	34 (9.2)
Vaccination prevents childhood diseases	347 (93.8)
Believe that all children should be vaccinated	344 (93.0)
Household decision-maker on child vaccinations	
Mother	263 (71.1)
Both father and mother	76 (20.5)
Father	5 (1.4)
Mother-in law	4 (1.1)
Do not know	22 (5.9)
Identification of EPI diseases	
Measles	265 (71.6)
Polio	204 (55.1)
Whooping cough	175 (47.3)
Tetanus	42 (11.4)
Diphtheria	20 (5.4)
Tuberculosis	266 (71.9)

4.7 Factors associated with missed opportunities of immunization

Attendance of antenatal care was significantly associated with missed opportunity for immunization in children. The children whose mothers sought antenatal care were less likely to miss immunization than those who did not attend ANC (95% CI 0.0-0.2), $p < 0.001$. The place of delivery was significantly associated with missed opportunity for immunization with those who delivered at home more likely to miss immunization (95% CI 1.3-7.1), $p = 0.008$. In addition, lower level of education was significantly associated with missed opportunities; caregivers with primary level of education were more likely to miss immunizations (95% CI 1.0-57.5), $p = 0.049$ compared to those with tertiary level of education. Other factors such as the age of the child, marital status of the caregiver, employment status of the caregiver and the caregiver's age were not significantly associated with missed opportunities for immunization.

Table 4.7a: Factors associated with missed opportunities of immunization

Variable	Missed immunization (n=60) n (%)	Immunization up-to-date (n=310) n (%)	OR (95% CI)	P value
Child's age				
0-6 months	33 (14.8)	190 (85.2)	0.8 (0.4-1.9)	0.656
7-12 months	19 (18.8)	82 (81.2)	1.1 (0.4-2.7)	0.837
13-60 months	8 (17.4)	38 (82.6)	1.0	
Antenatal care				
Yes	37 (11.1)	289 (88.9)	0.1 (0.0-0.2)	<0.001
No	23 (60.5)	15 (39.5)	1.0	
Place of delivery				
Home	11 (36.7)	19 (63.3)	3.4 (1.5-7.7)	0.004
Health facility	49 (14.4)	291 (85.6)	1.0	
Caregiver's marital status				
Married	20 (16.0)	272 (84.0)	0.9 (0.4-2.1)	0.817
Not married	2 (17.4)	38 (82.6)	1.0	
Caregiver's education status				
Primary	36 (18.8)	156 (81.3)	7.6 (1.0-57.5)	0.049
Secondary	23 (16.0)	121 (84.0)	6.3 (0.8-48.2)	0.078
Higher education	1 (2.9)	33 (97.1)	1.0	
Caregiver's employment status				
Unemployed	31 (14.6)	181 (85.4)	1.0	
Self-employed	29 (22.1)	102 (77.9)	1.7 (0.9-2.9)	0.077
Formal employment	0 (0.0)	27 (100.0)	-	0.998
Caregiver's age in years, mean (SD)	27.3 (5.9)	25.9 (5.5)	-	0.080

However, on adjusting for confounding education was not significantly associated with missed opportunity for immunization as shown in table 4.7b

Table 4.7b: Adjusted Predictors of missed opportunities of immunization (MOI)

Variable	OR (95% CI)	P value
Antenatal care		
Yes	0.1 (0.0-0.2)	<0.001
No	1.0	
Place of delivery		
Home	3.1 (1.3-7.1)	0.008
Health facility	1.0	
Caregiver's education status		
Primary	6.2 (0.8-47.3)	0.078
Secondary	6.1 (0.8-46.7)	0.083
Higher education	1.0	

4.8 Knowledge and practices of healthcare workers (HCWs) in immunization of children

4.8.1 Background characteristics of healthcare workers

This study also involved interviews among 116 healthcare workers (HCWs) with a mean age of 29.8 years (SD 6.5 years). 55.2% of them were males. Nurses comprised 41.8% of the HCWs and the mean post-training experience of 4.3 years. Majority (42.2%) worked in the paediatric outpatient department and child welfare clinic. HCWs trained on vaccination or vaccine-preventable disease made up 37.9% out of whom 38.6% were trained less than 1 year ago and 34.1% in the last 1 to 2 years.

Table 4.8: Background characteristics of healthcare workers

Variable	n=116	Frequency (%)
Mean age in years (SD)	29.8	6.5
Sex		
Male	64	55.2
Female	52	44.8)
Professional training		
Doctors	6	5.2
Nurses	48	41.4
Clinical officers	10	8.6
Nursing students	52	44.8
Mean years in post training (SD)	4.3	
Area of work		
Paediatric casualty department	49	42.2
Paeditric inpatient wards and post natal wards	26	22.4
Child welfare clinic	41	35.3
Ever been trained on vaccination or vaccine-preventable diseases	44	37.9
Duration since last training (n=44)		
<1 year ago	17	38.6
1-2 years ago	15	34.1
2-3 years ago	7	15.9
>4 years ago	5	11.4

4.8.2 Knowledge on vaccination

There was a high level of awareness on the required vaccines for healthy children that included Polio, Pneumococcal and diphtheria reported by 100%, 94.8% and 96.6% of the HCWs respectively. HCWs mentioned but with a lesser extent the hepatitis (48.3%) and tetanus (37.1%) vaccines.

Most of the health workers knew accurately the diseases that the pentavalent vaccine prevents in children except hepatitis B(49.1%). 34.5% of the health care workers thought that seizures and previous adverse effect to a vaccine were general contraindications to immunization. The main contraindications for vaccines mentioned by the HCWs included local reaction to previous dose (34.5%), seizures under medical treatment (34.5%) and light fever (27.6%). 13.8% did not think any of the listed factors were contraindications for immunization.

60.3% of the HCWs believed that a person who has been vaccinated against a certain disease could still contract the disease years later.

Table 4.9: Knowledge of vaccination

Variable	n=116	Frequency (%)
Vaccines (antigens) that healthy children should receive		
BCG	106	91.4
Measles	106	91.4
Hepatitis	56	48.3
Tetanus	43	37.1
Rotavirus	101	87.1
Polio	116	100
Diphtheria	112	96.6
Pertussis	98	84.5
Pneumococcal	110	94.8
Tetanus	85	73.3
Hemophilus influenza	102	87.9
Diseases prevented by immunization		
Tuberculosis	98	84.5
Polio	114	98.3
Tetanus	86	74.1
Pneumonia	103	88.8
Diarrhoea	116	100
Measles	116	100
Hepatitis B	57	49.1
Perussis	79	68.1
Diphtheria	82	70.7
General Contraindications for vaccination		
Local reaction to previous dose	40	34.5
fever	32	27.6
Seizures under medical treatment	40	34.5
Pneumonia or other serious diseases	17	14.7
None of the above	16	13.8
Believe that in some situations a person vaccinated against a certain disease could contract that disease years later	70	60.3

4.8.3 Attitude towards immunization

More than a half (54.3%) of the HCWs thought nurses in-charge of immunizations was responsible for checking vaccination status of the children daily. According to 56% of the HCWs, status of vaccination for the children should be inquire during child's wellness visits while 24% thought it should be done during consultation for any illness.

Parents' negative beliefs related to vaccination were mentioned by 81% of the HCWs as the main reason for not having complete vaccination schedule. 69.8% of the HCWs did not believe vaccines administered in private practice vary in quality from those provided by the Ministry of Health while 25% believed so.

A small proportion of HCWs (19.8%) thought the knowledge they had on vaccination was outdated. 6.9% of the HCWs thought completing nominal registries delays timely vaccination of children.

Table 4.10: Attitude towards immunization

Variable	n=116	Frequency (%)
Who should evaluate the vaccination status of children, review vaccination cards, and ensure that children's schedules are up to date, on a daily basis		
The child's parents	17	14.7
The nurse responsible for immunization	63	54.3
Physicians in external consultations, inpatient services, and emergency rooms	3	2.6
	7	6.0
All of the above are true	21	18.1
Only options 1 and 2 are correct	5	4.3
No response		
Situations you should inquire about the doses that children should have received and those they are missing according to their age		
Child's wellness visit	65	56.0
Consultation for any illness	28	24.1
When a child is accompanying a woman during a prenatal check-up	3	2.6
	3	2.6
When a child is accompanying a woman visiting a health care facility for any reason	11	9.5
All of the above are true	6	5.2
No response		
Why do you think that some children do not have complete vaccination schedules		
Parents' negative beliefs related to vaccination	94	81.0
Hours of vaccination incompatible with schedule of parents	3	2.6
	1	0.9
False contraindications for vaccination by health workers	5	4.3
Distance from vaccination site	7	6.0
All of the above	6	5.2
No response		
Believe that the vaccines administered in private practice vary in quality from those provided by the Ministry of Health		
Yes	29	25.0
No	81	69.8
Don't know	6	5.2
My knowledge of vaccination is insufficient or outdated		
Agree	23	19.8
Disagree	90	77.6
Not sure	3	2.6
Completing nominal registries (books/notebooks) delays the timely vaccination of children		
Agree	8	6.9
Disagree	102	87.9
Not sure	6	65.2

CHAPTER 5: DISCUSSION

Missed opportunities for immunization (MOI) was identified in 16.2% of children attending Siaya County Referral Hospital. This was despite the fact that there was an opportunity to offer the services to the children in their current hospital visit. The MOI found was comparable to, though slightly lower than 23.8% reported in Nairobi (Gwer et al, 2010) and 16.9% in Nigeria (Ubajaka et al, 2010). This was far lower than MOI in Juba that was reported at 56.5% (Adut et al, 2012). The coverage of immunization in the population of children studied was 83.8% and this was higher than the basic vaccinations coverage of 71% in 2014 countrywide, with Siaya County reporting 72.5% full immunization among eligible children (KDHS, 2014). 1 in 10 of the children who attended the health facility and had an immunization card missed the opportunity to receive the due vaccination. This is likely to be attributed to the healthcare workers lack of keenness when reviewing the immunization status of the children. About a half of the healthcare workers (54.3 percent) who were interviewed for the purpose of assessing their knowledge of and attitudes towards immunization did not think that they were responsible for evaluating vaccination status of the children rather that of the nurse responsible for immunizing the child.

Lack of maternal antenatal care services and home delivery were associated significantly with missed opportunity for immunization in the children. These findings were consistent with other studies in which home deliveries and lack of antenatal care increased chances of children missing the opportunities to receive immunization (Jani et al, 2001, Gwer et al 2010, Adut et al, 2012). Also, studies have shown that lack of knowledge and lower level of education among caregivers was associated missed opportunities of immunization (Wainaina et al, 1996, Abdulraheem et al, 2008, Adut et al, 2012). However, education was not independently associated with

MOI in this study. Majority of the mothers interviewed had attended ANC clinics (89.7 percent) and delivered in health facilities (91.9 percent). These can be important opportunities to reinforce information on childhood immunization-benefits, schedule, side effects and their management.

This study furthermore identified barriers that hinder uptake of immunization in children that included the accessibility in relation to the cost of transport and distance and lack of awareness of the immunization schedule. A study in Mozambique outlined long waiting time, lack of personnel at the health facility, no vaccines available on the immunization day and no information about the day for vaccination to be hindrances to uptake of immunization (17). WHO made similar observations in a report on MOI in developing countries that outlined some of the reasons including lack of access and vaccine service availability, cost and service quality and healthcare worker knowledge (15). In this study, vaccine stock-outs stood out from the caregivers' reports as an important reason that the children did not receive vaccination.

This study revealed knowledge deficiencies among healthcare workers in relation to immunization in children. For instance, only 37.1 percent and 48.3 percent of the health care workers listed Hepatitis B vaccine and Tetanus vaccine respectively amongst antigens that children should receive. Almost half (49.1) of the health care workers did not know that hepatitis B is amongst the childhood illnesses preventable by immunization. Majority of the health care workers believed that it is the parents'/caregivers' negative attitude to immunization that contributed to some children having incomplete immunization schedules. However, most disagreed that their knowledge of vaccination was insufficient or outdated. Knowledge gaps among healthcare workers have been reported in previous studies to be associated with

missed opportunities for immunization. Studies have shown that HCWs do not have appropriate knowledge on the immunization schedule and even the immunisable diseases. Missed opportunities for immunization in these studies have been attributed to false contraindications to vaccines and poor attitudes of the health care workers. (24)

CHAPTER 6: CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusions

- The prevalence of missed opportunities for immunization among children seeking health services at Siaya County Referral hospital was found to be 16.2%.
- The reasons given by the care givers as reasons for missed immunization were mainly vaccine stock outs and ill children
- The main factors that were found to be associated with MOI were home delivery and ANC attendance.
- The health care workers lacked adequate knowledge on immunizable diseases and contraindications for immunization.

6.2 Recommendations

- Strengthening of routine refresher courses of the health care workers on basic immunization with regular updates.
- Community advocacies to improve ANC attendance and deliveries at health facilities.
- Advocacy in the community is needed to increase awareness on routine immunization among caregivers of the children.

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APPENDICES

APPENDIX 1: INFORMED CONSENT FORM FOR PARENTS/GUARDIANS OF CHILDREN LESS THAN 60 MONTHS

Study title: Missed Opportunities for Immunization among 0-60 months at Siaya County Referral Hospital.

Patient Study Identification Number:

Date:

Dear Sir or Madam:

Introduction/purpose:

In collaboration with the University of Nairobi, we are administering a survey on vaccination to adults accompanied by children aged <5 years who leave health facilities. The survey aims to identify the causes of missed opportunities for vaccination (MOVs). To this end, we kindly ask for your participation in helping us complete a questionnaire on immunization.

Study procedure:

If you decide to participate, we will ask you questions regarding your purpose in visiting this health facility. Specifically, you will be asked if your child received a vaccine during your visit to the health facility and if you are satisfied with the service received. The interview will last approximately 15 minutes.

Compensation:

You will receive no compensation for participating in this study. However, your participation allows for the design and implementation of interventions to improve the supply and demand of immunization services.

Confidentiality:

The information you provide is anonymous and strictly confidential. We will assign a registration number to your questionnaire, and only the person responsible for this study will have access to your personal information.

Potential risks: Questions included in this survey do not present any foreseeable risk. Nevertheless, you may choose to not answer any question that makes you uncomfortable.

Voluntary participation/withdrawal from study: Your participation is entirely voluntary, and you are free to discontinue the interview at any time. Refusing to participate will not affect your ability to continue using this health care facility.

Person to contact:

If you have any questions or concerns regarding the interview, we are leaving you the contact information of the coordinator of this study.

Dr Patricia Ojwang

Telephone Number: 0720 487 325

Dr Lucy Wainaina Mungai

Tel: 0724 654 135

Professor Ruth Nduati

Tel: 0722 235 323

Kenyatta National Hospital Ethics and Research Committee/ University of

Nairobi

P.O. BOX 20723-00202,

NAIROBI.

Telephone: 7263009

Extension: 44355

Signature of Parent/Guardian Date

Signature of Interviewer..... Date

Thank you for your participation!

**Appendix 2: Translated consent form : FOMU YA IDHINI YA WAZAZI / WALEZI
WA WATOTO WENYE UMRI WA MIEZI 0-60**

Kichwa Utafiti: Fursa ya ukosefu wa chanjo miongoni mwa mwa watoto wa miezi 0-60 katika Hospitali ya Kaunti ya Siaya.

Nambari ya Mgonjwa : Tarehe:
.....

Mheshimiwa mzazi/mlezi

Kwa kushirikiana na Chuo Kikuu cha Nairobi, sisi tunaendesha utafiti juu ya ukosefu wa chanjo kwa watoto wenye umri chini ya miaka tano ambao wametembelea kituo hiki cha afya. Utafiti unalenga kubaini sababu ya ukosefu wa chanjo. Tunaomba ushirikiano wenu kwa muda huu. Ukiamua kushiriki, tutakuuliza maswali kuhusu lengo lako katika kutembelea kituo hiki afya na kuridhika kwako kwa huduma uliyoyapokea. Mahojiano yatachukua dakika kumi na mitano.

Hautapokea fidia kwa kushiriki katika utafiti huu. Hata hivyo, kushiriki kwako kutatusaidia kwa kubuni na utekelezaji wa miradi ya kuboresha ugavi na mahitaji ya huduma za chanjo.

Habari utakayotupa kutoa itatunzwa kwa siri. Hata hivyo, unaweza kuchagua kutojibu swali lolote usilofahamu au kutokubaliana nalo.

Kushiriki kwako ni kwa hiari kabisa, na una uhuru wa kuacha mahojiano wakati wowote. Kukataa kushiriki hakuta athiri uwezo wako wa kuendelea kutumia hiki kituo cha afya.

Ukiwa na maswali yoyote au wasiwasi kuhusu mahojiano, tuko tayari kukusaidia ukitumia nambari uliyopewa hapa chini.

Daktari Patricia Ojwang Nambari ya simu: 0720 487 325

Daktari Lucy Wainaina- Mungai Nambari ya simu: 0724 654 135

Profesa Ruth Nduati Nambari ya simu: 0722 235 323

Kenyatta National Hospital Ethics and Research Committee/ University of

Nairobi

P.O. BOX 20723-00202,

NAIROBI.

Nambari ya simu: 7263009 Extension: 44355

Sahihi ya mzazi /mlezi Tarehe

Sahihi ya Anayehoji Tarehe

Appendix 3: INFORMED CONSENT LETTER FOR HEALTH CARE
PROFESSIONALS

Study Number:

Date of interview:

Dear health care professional:

Introduction/purpose:

In collaboration with the University of Nairobi, we are administering a survey on vaccination to health care professionals. To this end, we kindly ask that you complete the attached questionnaire. This study aims to identify the knowledge, attitudes, and practices of health workers as it concerns the timely vaccination of users of our nation's health care system.

Study procedure:

If you decide to participate, please answer the questions in the survey, which concern indications and contraindications of vaccines in the national vaccination schedule, opinions about services delivered to users, and vaccination practices in your workplace. Completing the survey will take approximately 15 minutes. Please do not leave any questions blank.

Compensation:

You will receive no compensation for participating in this study. However, your participation allows training programs to be designed to increase the knowledge and ability of health care professionals to provide high-quality immunization services.

Confidentiality:

The information you provide in this questionnaire is strictly confidential. The survey is anonymous and will not serve as the basis for any professional evaluation of your abilities. As such, we do not ask for your name. Instead, we assign a registration number to your questionnaire, and only the person responsible for the administration of this study will have access to your responses.

Potential risks:

Questions in this questionnaire present no foreseeable risk of any kind (psychological, emotional, or work-related).

Voluntary participation/withdrawal from study Completing this questionnaire is entirely voluntary. You are free to decline participation or to stop answering questions at any time. Refusal to participate in this study will in no way affect your rights as a health care professional in this establishment that are guaranteed to you by law.

Person to contact:

Should you have any questions or concerns regarding the interview, we are leaving you the following contacts of the individuals who will assist you.

Dr Patricia Ojwang Telephone Number: 0720 487 325

Dr Lucy Wainaina- Mungai Telephone: 0724 654 135

Professor Ruth Nduati Telephone: 0722 235 323

Kenyatta National Hospital Ethics and Research Committee/ University of Nairobi

P.O. BOX 20723-00202,

NAIROBI.

Telephone: 7263009

Extension: 4435

Signature of Health careworker Date.....

Signature of InterviewerDate.....

Thank you for your participation!

APPENDIX 4: QUESTIONNAIRE FOR CARETAKER EXIT INTERVIEW

STUDY TITLE: MISSED OPPORTUNITIES FOR IMMUNIZATION IN CHILDREN 0-60 MONTHS AT SIAYA COUNTY REFERRAL HOSPITAL.

Instruction: Kindly fill the information in the spaces provided. Ensure that the parent/guardian understands the question(s) asked.

DATE

Study Identification Number

.....

DEMOGRAPHIC DATA

1. Date of interview:
2. Study ID:
3. Date of birth:
4. Age of child:
5. Sex
6. Weight:
7. Height:
8. Ethnicity/Tribe:
9. Where was the child delivered?
 - A) Home (unassisted)
 - B) Home assisted by a traditional birth attendant
 - C) Home assisted by a trained midwife
 - D) Health facility
 - C) Other (specify)

10. Relationship of primary caregiver to child

A) Mother B) Father C) Aunt/uncle D) Grandparent E) Sibling F) Other
(specify)

12. Age of primary caregiver (in years):

13. Marital status of primary caregiver

A) Married monogamous

B) Married polygamous

C) Single

D) Divorced/separated

E) Widowed

14. Education status of primary caregiver

A) No formal education

B) Primary incomplete

C) Primary complete

D) Secondary incomplete

E) Secondary complete

F) Tertiary education

Indicate number of completed years of formal education of caregiver

15. Employment status of caregiver

A) Unemployed/Housewife

B) Self employed/Hawker/Trader

C) Casual laborer

D) Formal employment

E) Farmer/ Pastoralist

F) Other (specify)

16. Religion A) Christian B) Muslim C) Other

IMMUNIZATION DATA

1. Has the child ever been vaccinated? (Injection of thigh, arm, left forearm, oral drops)

A) Yes B) No C) Don't know

2. If yes, do you have the immunization card?

3. From the card, is immunization up-to-date as per KEPI schedule?

A) Yes (If yes, proceed to Q4)

B) No (If no, go to table below)

Examine the card and record the information below.

Antigen	Eligible (Y/N)	Received (Y/N)	Vaccine given today (Y/N)
BCG			
OPV 0			
OPV 1			
PENTAVALENT 1			
PNEUMOCOCCAL 1			
ROTAVIRUS 1			
OPV 2			
PENTAVALENT 2			
PNEUMOCOCCAL 2			
ROTAVIRUS 2			
OPV 3			
PENTAVALENT 3			
PNEUMOCOCCAL 3			
MEASLES			
MEASLES (BOOSTER)			

4. Review from the chart above and determine whether the child is due for any vaccination today and they did not receive it. A) Yes B) No

If yes, were you told why? (ask the care giver) Specify reason...

5. Where was the child vaccinated?

A) Government health facility

B) Private health facility/clinic

C) Other (Specify)

Indicate name of any facility/facilities where vaccination was received.....

6. To be answered by biological mother

i) Had you ever received TT injection before your last pregnancy?

ii) How many times did you receive TT injection in your last pregnancy?

(Corroborate from the card if available)

iii) State the immunization status of the child at birth

A) Protected against tetanus

B) Not protected

BARRIERS

For questions 1-3, assess response to the statements on a scale of 1-5

1. The cost of travelling to the health facility from your home is high

1. Strongly agree 2. Agree 3. Neutral 4. Disagree 5. Strongly disagree

2. The time taken to travel to the health facility is too long

1. Strongly agree 2. Agree 3. Neutral 4. Disagree 5. Strongly disagree

3. The distance from the health facility is too far

1. Strongly agree 2. Agree 3. Neutral 4. Disagree 5. Strongly disagree

4. What means of travel did you use to get to this facility?

A) Walking B) Bicycle C) matatu /bus D) Motorbike E) Other
specify

5. When does your facility provide immunization?

6. These times acceptable to you for the immunization services? (on a scale of 1-5),

1. Strongly agree 2. Agree 3. Neutral 4. Disagree 5. Strongly disagree

7. What times are preferable to you for immunization services?

Specify

8. Are you charged for the immunization card? A) Yes B) No

If yes, how much?

9. Are you charged for immunization services ? A) Yes B) No

If yes, how much?

What is your opinion on the cost of these services?

If no, how much would you be willing to pay for this service?

SERVICES AT THE FACILITY

1. What service did you come for today?

A) Curative

B) Vaccination

C) Growth monitoring

C) Other (Specify)

2. What services did you receive? A) Curative B) Vaccination C) Other
(Specify)

3. Was the child vaccinated today?

A) Yes if yes, which vaccines?

B) No

4. Have you been told when the child is due for the next vaccination?

A) Yes (Corroborate from the card) If yes when?

B) No

5. Were you told of the possible side effects of the vaccine?

A) Yes If yes, list some examples...

B) No

6. What will you do if the side effects appear?

7. Were you satisfied with the vaccination services provided?

A) Yes, If yes, what did you like about the services? List

B) No, If no, what didn't you like about the services? List

9. Have you ever brought your child for vaccination and did not receive the vaccine?

A) Yes

B) No

10. If yes, what reason were you given?

A) Vaccine stock-out

B) Health worker absent

C) Was not the day of vaccination

D) Lost immunization card

E) Was in a hurry, queue too long

D) Other (specify)

CARETAKER KNOWLEDGE, ATTITUDES AND PRACTICES

1. Where did you hear about vaccinations?

A) Health worker

B) Community health worker

C) Radio

D) Friends/ relatives

E) Nationwide/outreach campaigns

F) Television

2. What do you think are the benefits of vaccination to your child? Free list

3. What do you think are the negative effects of vaccination to your child? Free list

4. Do you believe that vaccination prevents childhood diseases?

1. Strongly agree 2. Agree 3. Neutral 4. Disagree 5. Strongly disagree

5. Do you believe all children should be vaccinated?

A) Yes

B) No

6. In your household, who decides when and if the child should go for vaccination?

A) Mother

B) Father

C) Mother-in-law

D) Other

7. What are the common diseases affecting children in your area? List

8. Which diseases can be prevented by vaccines? List

Note down in the table below if the interviewee was able to identify any of the EPI diseases

Disease	Local name	Known by respondent
Measles		A) Yes B) No
Polio		A) Yes B) No
Whooping cough		A) Yes B) No
Tetanus		A) Yes B) No
Diphtheria		A) Yes B) No
Tuberculosis		A) Yes B) No
Hepatitis		A) Yes B) No
Pneumonia		A) Yes B) No
Diarrhoea		A)Yes B)No

9. If you missed a vaccination day, what would you do?

APPENDIX 5: HEALTH CARE WORKER QUESTIONNAIRE

I. BACKGROUND INFORMATION

Check the correct answer.

1. **Sex** 1. Male 2. Female

2. **Age** |_|_| years

3. **Professional training:**

3.1 Medical officer

3.2 Qualified nurse

3.3 Student nurse

3.4 Clinical officer

3.5 Other

Specify

4. **Area in which you work:**

4.1 Paediatric casualty

4.2 Paediatric inpatient

4.3 Child welfare clinic

5. **Time in post** |_|_| years |_|_| months

6. **Have you received training or participated in courses on vaccination or vaccine-preventable diseases?**

1. Yes 2. No

7. **If so, when were you last trained?**

1. <1 year ago .

2. 1-2 years ago .

3. 2-3 years ago .

4. >4 years ago

8. **Are clinical or academic sessions held in your hospital ?**

1. Yes 2. No

9. **If so, has a topic related to vaccination been presented in the last year?**
YES NO

II. KNOWLEDGE OF VACCINATION

10. **Vaccines (antigens) that healthy children should receive, please list.**
11. **Diseases prevented by immunization include? Please list.**
12. **General contraindications for immunization include:**
1. Local reaction to previous dose .
 2. Light fever
 3. Seizures under medical treatment
 4. Pneumonia or other serious diseases
 5. None of the above
13. **Do you believe that in some situations a person vaccinated against a certain disease could contract that disease years later?**
1. Yes
 2. No .

III. ATTITUDES

PLEASE MARK ONLY ONE CORRECT ANSWER.

14. On a daily basis, who should evaluate the vaccination status of children, review vaccination cards, and ensure that children's schedules are up to date?

1. The child's parents
2. The nurse responsible for immunization
3. Physicians in external consultations, inpatient services, and emergency rooms
4. All of the above
5. Only options 1 and 2 are correct

15. In which of the following situations should you inquire about the doses that children should have received and those they are missing according to their age?

1. Child's wellness visit
2. Consultation for any illness
3. When a child is accompanying a woman during a prenatal check-up
4. When a child is accompanying a woman visiting a health care facility for any reason
5. All of the above

16. Why do you think that some children do not have complete vaccination schedules?

1. Parents' negative beliefs related to vaccination
2. Hours of vaccination incompatible with schedule of parents
3. Physicians, nurses, and health workers do not ask parents about children's vaccination schedules
4. Physicians, nurses, and health workers do not review children's vaccination cards
5. False contraindications for vaccination by health workers
6. Distance from vaccination site
7. All of the above

17. Do you believe that the vaccines administered in private practice vary in quality from those provided by the Ministry of Health?

1. Yes 2. No 3. Don't know

18. My knowledge of vaccination is insufficient or outdated.

2. Agree 2. Disagree

19. The knowledge I have about vaccination and the Expanded Program on Immunization (EPI) is sufficient to meet the needs of the institution.

1. Agree 2. Disagree

20. I fear adverse reactions from vaccines. 1. Agree 2. Disagree

21. Completing nominal registries (books/notebooks) delays the timely vaccination of children.

2. Agree 2. Disagree