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Determinants of Missed Opportunities for Immunization Among Under-Five Children attending Nakuru Level-5 Hospital, Kenya.

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Abstract
The aim of this study was to find out determinants of missed opportunity for immunization for children aged between ages 6 weeks to 59 months in Nakuru Level five hospital. The specific objectives included: to determine the socio-demographic factors affecting immunization services, to assess the level of knowledge, attitude and practice of parents towards immunization and to determine health facility factors contributing to missed opportunities for immunization. The study adopted a descriptive cross sectional study design to collect data .The study area was Nakuru Level five hospital. Purposive sampling was used, whereby the researcher used elements that best represent the objectives of the phenomenon being studied. This study used researcher administered open and closed-ended questionnaire because it ensures higher return rate. The data was validated by technical persons and experts who reviewed the questionnaire to ensure its accuracy so that it elicit the genuine results within the stipulated time frame. A pretest was done on a population with similar characteristic using 10% of desired sample size to ascertain reliability. Data collected was cleaned, arranged, coded and checked for completeness and then entered into Statistical Package for Social Science (SPSS version 22 for windows). The researchers checked the data for accuracy and consistency, then it was analyzed using descriptive statistics and was presented in the forms of tables, graphs and charts.

Key Words:
Missed opportunity for immunization, Immunization, under-Five children, determinants.

Abbreviations and Acronyms

BCG	:	Bacterium of Calmette Guerin
MOI	:	Missed Opportunity for Immunization
KEPI	:	Kenya Expanded Programme on Immunization
DTP	:	Diphtheria, Tetanus and Pertussis Vaccine
GIVS	:	Global Immunization Vision and Strategy
KEPH	:	Kenya Essential Package for Health
KDHS	:	Kenya Demographic and Health Survey
MDG	:	Millennium Development Goals
WHO	:	World Health Organization

GIVS	:	Global Immunization Vision and Strategy
HepB	:	Hepatitis B virus
KEMSA	:	Kenya Medical Supplies Agency
MMR	:	Measles Mumps and Rubella vaccine
NIDs	:	National Immunization Days
UNICEF	:	United Nations Children's Fund
W.H.O	:	World Health Organization
DVI	:	Division of Vaccines and Immunization

1. Introduction

1.1: Background

Immunization is the process whereby a person is made immune or resistant to an infectious disease, typically by the administration of a vaccine. Vaccines stimulate the body's own immune system to protect the person against subsequent infection or disease. A missed opportunity for immunization opportunity for immunization refers to any contact with health services by a person (unvaccinated or partially vaccinated and free from vaccine contraindications) which does not result in the individual receiving one or more of the vaccine doses for which he or she is eligible (WHO, 2018).

According to the World Health Organization Immunization guidelines, 2016, children are considered to have received all basic vaccinations when they have received a vaccination against tuberculosis (also known as BCG), three doses each of the DPT-HepB-Hib (also called pentavalent) and polio vaccines, and a vaccination against measles. The BCG vaccine is usually given at birth or at first clinical contact, while the DPT-HepB-Hib and polio vaccines are given at approximately age 6, 10, and 14 weeks. Measles vaccinations should be given at or soon after age 9 months. The Kenyan immunization programme considers a child to be fully vaccinated if the child has received all basic vaccinations and three doses of the pneumococcal vaccine (usually given at age 6, 10, and 14 weeks) (KDHS, 2014).

Global assessment for missed immunization opportunity was conducted throughout the year 1980s and 1990s and summarized in a WHO commissioned global review indicating an estimated 30% of children missed vaccination opportunity. Currently WHO through the department of Immunization Vaccines and Biologicals (IVB) is calling for research proposals from different regions for systematic review of missed opportunity for vaccination from all relevant available data either published or unpublished, (WHO, 2018)

Inadequate immunization is recognized as a major public health concern as it accounts for most preventable deaths globally in children under five. Global vaccination coverage has stalled at 86%, with no significant changes during the past few years. During 2016, about 86% of infants worldwide (116.5 million infants) received 3 doses of diphtheria-tetanus-pertussis (DTP3) vaccine, protecting them against infectious diseases that can cause serious illness and disability or be fatal. About 130 countries had reached at least 90% coverage of DTP3 vaccine. An estimated 19.5 million infants worldwide were not reached with routine immunization services such as DTP3 vaccine. Around 60% of these children live in 10 countries including those in Sub-Saharan Africa such as Ethiopia, Nigeria, and South Africa (WHO, 2016). An additional 1.5 million deaths could be avoided, however, if global vaccination coverage improves. An estimated 19.5 million infants worldwide are still missing out on basic vaccines. Achieving universal vaccination coverage for all is one of the global sustainable development targets aimed at reducing childhood mortality from preventable deaths (WHO 2016).

In Kenya, by 2014 79% of children age 12-23 months received all basic vaccinations, and 75 % were fully vaccinated. Only 2 % of children had not received any vaccinations. 97% of children received the BCG vaccination, 98 % the first dose of DPT-HepB-Hib, 98 % the first dose of polio, and 94 % the first dose of the pneumococcal vaccine. 87% of children received a measles vaccination. Utilization rates decline for subsequent doses, with 90% of children receiving the recommended three doses of DPT-HepB-Hib, 90 % the three doses of polio, and 85 % the three doses of the pneumococcal vaccine. Dropout rates, which represent the proportion of children who receive the first dose of a vaccine but do not go on to get the third dose, were around 8 % for both polio and DPT-HepB-Hib and 9 % for the pneumococcal vaccine (KDHS, 2014).

In Nakuru County by 2011, complete immunization coverage was 76.6%. Coverage for specific antigens was; BCG (99.5%), OPV0 (97.6%), OPV 1(98.7%), OPV2 (96.6%), OPV3 (90.5%), Penta 1(98.9), Penta 2 (96.6%), Pentavalent 3 (90.0%), Measles (77.4%). The drop-out rate between the first and third pentavalent vaccine coverage was 8.9% (Maina et al 2013). Studies in developed countries have shown that missed immunization opportunity have significantly contributed to low immunization coverage. The main reasons being failure to administer simultaneously all vaccines for which a child is eligible; False contraindications to immunization; Health worker practices including not opening a multi- dose vial for a small number of persons to avoid vaccine wastage; Client factors such as forgetfulness, false perception and knowledge on immunization, Logistic problem such as vaccine shortages, poor clinical organization and inefficient clinic scheduling (WHO, 2018). Thus this study will examine the determinants of missed opportunity for immunization among under five children attending Nakuru Level 5 Hospital.

1.2: Problem Statement

Immunization saves millions of lives and is widely recognized as one of the world's most successful and cost-effective health interventions. Every year, more than 10 million children in low- and middle-income countries die before they reach their fifth birthdays. Most die because they do not access effective interventions that would combat common and preventable childhood illnesses. Although global immunization coverage has increased during the past decade to levels of around 78% for diphtheria–tetanus–pertussis-3 (DTP-3), WHO's African Region has consistently fallen behind, reaching only 69% DTP-3 coverage by 2004 (WHO, 2016).

Missed opportunities for vaccination occur in two major setting; (1) During visits for immunization and other preventive health services such as growth and nutritional assessment, (2) During visits for curative services, (WHO 2018). Recent assessments in Africa reported high MOV prevalence, ranging from 43% to 57%, (WHO, 2016). The Global Vaccine Action Plan **(**GVAP) calls on all countries to reach ≥90% national coverage and ≥80% coverage in every district for all vaccines in the country's national immunization schedule by 2020 (WHO 2017).

The gap between the demand for and supply of health services in Kenya continues to widen. The sector has not been able to expand as rapidly as the population to ensure adequate coverage, accessibility and acceptable quality of health services. There is still a good number of children who miss vaccination despite the immunization campaigns carried out throughout the country. Target set by WHO is to eliminate missed opportunities for vaccination so as to raise globally overall immunization coverage through collaboration with governmental and non-governmental organization from different regions of

the world. Strategies for reducing MOV include screening for vaccination status during visits to health facilities for mild illness, ensuring children receive all recommended injectable vaccinations during a single visit, and using facility-based child vaccination registers to help track when individuals are due for vaccination

1.3: Justification

Childhood vaccination prevents 2 million deaths per year worldwide and is widely considered to be 'overwhelmingly good' by the scientific community. However, 2.5 million deaths a year continue to be caused by vaccine-preventable diseases, mainly in Africa and Asia among children less than 5 years old. Vaccination coverage has now reached a plateau in many developing countries, Kenya being one of them, and even where good coverage has been attained, reaching children not yet vaccinated has proved difficult. Thus, there is an urgent need to find ways to increase vaccination coverage and particularly to encourage parents to have their children vaccinated.

In May 2017, Ministers of Health from 194 countries endorsed a new resolution on strengthening immunization to achieve the goals of the GVAP. The main goal of the campaign with the theme #VaccinesWork is to raise awareness about the critical importance of full immunization throughout life, and its role in achieving the Sustainable Development Goals. The GVAP is a roadmap to prevent millions of deaths through more equitable access to vaccines by 2020. To date, progress towards the GVAP targets is off track (WHO 2017). There is low prevalence of immunization coverage with high morbidity and mortality associated with vaccine preventable diseases in Nakuru level 5 county hospital, (Nakuru PGH MCH records, 2018)

1.4: Significance

The finding in this study will enable the caregivers of under five years of age children in Nakuru Central to be aware of the importance of full immunization for their children. It will also aid health care workers in identifying areas to invest more for them to achieve higher/ full immunization cover for the above age range. Through the Ministry of Health, policies can be made based on the findings that will help in reaching out as many children as possible for vaccination. The study also responds to WHO recent call for research on missed opportunity for immunization, (WHO 2018)

1.5: Broad Objective

To determine factors contributing to missed opportunities for immunization among under five children attending Nakuru level 5 hospital

1.6: Specific Objectives

1. To determine the prevalence of missed opportunities for immunization among under five years of age children at Nakuru Level 5 Hospital.
2. To establish the socio-demographic factors associated with missed opportunities for immunization services among under five years of age children at Nakuru Level 5 Hospital.
3. To determine the parents' level of knowledge on immunization among under five years of age children at Nakuru Level 5 Hospital.

4. To determine the parents' attitudes towards immunization among under five years of age children at Nakuru Level 5 Hospital.
5. To find out health facility factors contributing to missed opportunities for immunization services among under five years of age children at Nakuru Level 5 Hospital.

1.7: Research Questions

1. What is the prevalence of missed opportunities for immunization among under-five children at Nakuru Level 5 Hospital?
2. What are the socio-demographic factors associated with missed opportunities for immunization services among under- five children at Nakuru Level 5 Hospital?
3. What is the parents' level of knowledge on immunization among under five children attending Nakuru Level 5 Hospital?
4. What is the parents' attitudes towards immunizations of under five children attending Nakuru Level 5 Hospital?
5. What are the health facility factors contributing to missed opportunities for immunization services among under five children attending Nakuru Level 5 Hospital?

Literature Review

2.1 Prevalence of Missed Opportunities for Immunization

Recent statistics shows that the worldwide DTP3 immunization coverage of infants is 82%, out of this percentage 23.5 million children did not have the opportunity to receive DTP3 vaccine in 2008 (WHO & UNICEF, 2008). Although 120 countries reached 90% DTP3 vaccination coverage in 2008, pockets of under vaccination are reported in parts of sub-Saharan Africa (WHO, 2009). In Kenya, children aged 12-23 months that have received all recommended vaccinations stand at 77.4% (KNBS & ICF Macro, 2009). 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. The United Nations Sustainable Development Goal number four is aimed at reducing by two thirds, child mortality rate. This is in line with the Kenya Vision 2030. One in ten children still remain unreached by immunization programmes worldwide, (WHO/UNICEF coverage estimates 2016). The national coverage of full immunization has been increasing since the year 2000. The main challenge significantly being disparities across various regions. While there have been improvements nationally, regions such as North Eastern and South Rift have higher rates of infant and child mortality, (Kenya MDGs report 2011). This geographical disparity in coverage reflects the discrepancy in persuade of determinants of full vaccination across the different provinces (Mutua et al., 2011).

2.2. Socio-demographic Factors Associated with MOI

2.2.1. Distance and Access of Health Facility

Several studies have documented distance/ access of health care services as a barrier to their exploitation and an important cause of limited or no vaccination. More than a 1/3 of mothers in a six- state survey in Nigeria claimed distance as the biggest impediment assessing immunization services for their children

(Babalola et al, 2005), a great number of the homogeneous rural community members in Southern Mozambique showed that travelling for more than 60 minute to reach the nearest health facility demonstrated strong negative influence in immunization uptake (Jani et al 2008), In rural Burkina Faso, many parents could not afford to take their children for routinely immunization because of cost of long distance travel and during adverse weather conditions, (Louis et al, 2011), Long walking distance contributed to 17.5% for incomplete immunization for children in Rural Nigeria, (Abdulraheem et al, 2011)

2.2.2. Socioeconomic Status

In India, studies have found that poor urban children were 10 times more likely to have no immunizations than the richest children, consequently, poor rural children were less likely to receive full immunization and more likely to have no immunizations than the children from rich families (Pnade et al., 2002). There is a strong feeling for mothers that it is socially unacceptable to appear in public with a sick or weak child (Millimouno et al., 2006). In many cases, such feelings are often armoured when health workers humiliate poor mothers in public. According to Abilla & Munguti, (2008), mothers in Kenya feared attending vaccination lessons if their children had a skin disease.

2.2.3. Parents' Knowledge and Education (Paternal and Maternal)

Lack of knowledge of immunization was among the main reasons responsible for partial or un-immunization in India Urban health Centres (Wadgave et al, 2012). In rural Zimbabwe care givers understood vaccination as merely 'injections', and lacked the confidence to ask health workers about specific vaccines, and hence without the empowering information and knowledge they did not fully understand the risks of missing / skipping vaccines in stipulated in the child health card / vaccination schedule (MOH Zimbabwe/ UNICEF 2016). In Nigeria for instance, people who have received formal education were less likely to immunize their children than those who have not gone to school (Babalola, 2005).

2.2.4. Parental Perception and Ignorance

Parental perceptions requires the appreciation of the essential concept that vaccination is vital for the health of their children (Alconde et al, 2012). Ignorance about immunization of child and revisits for the immunization sessions is stated as a barrier to immunization in India urban health centres (Wadgave et al., 2012)

2.2.5. Fear of Side Effects

Gentle side effects, such as redness, fever or rash, are common and normally clear up on their own. Parents mention fear of side effects as a one of the reasons for not vaccinating their children in many countries like Liberia (Bender et al, 2008). In some cases, if an older sibling had side effects, parents refuse vaccinations for the younger children (Bhanot et al., 2004). Fear for side effects does not only predispose to missed opportunities but also influence the acceptance of immunization (Muhammad et al, 2017)

2.2.6. Religious/ Cultural/ Social Beliefs/ Norms and Rumours

Religion plays an integral part in vaccination of children in many countries, it is reported that parents of non-vaccinated children felt that it was against their religious beliefs to immunize their children (Kabir et al., 2016). The negative perceptions of modern medicines and health services are embedded in the religious views that ascribe their use to lack of faith in God (Gwavuya et al., 2014). The poor and illiterate parents report that they did not vaccinate their children due to instructions from their religious and social leaders (Razum, 2013). In Africa and Asia, some parents have developed a belief that vaccination sterilizes children in order not have families in future (Kabir et al., 2016). Religious and cultural beliefs have long been combated as an obstacle to acceptance of immunization in sub-Saharan Africa (Mohammed et al, 2017)

2.2.7. Lost or Forgotten Health Cards

Health cards are designed to aid the health workers and parents keep a track of individuals' service history. They also assist in serving as a reminder for parents to come back for vital and timely health care services. After some mothers lose their cards, many of them get scared going back in search of services for fear of being yelled at by the health staff, made forced to replace the lost card, and/or asked to return home to recover the forgotten card (Millimouno et al., 2016)

2.2.8. Place of Delivery

In Kenya studies have shown that a child who was delivered in a health facility was 2.26 times more likely to receive full immunization compared to one delivered at home (by self) or by a Traditional Birth Attendant (Lilian et al 2012). In rural Mozambique, home delivery greatly contributed to missed immunization opportunities (Jagrati V .Jani et al.., 2001). In sub-urban Southern Sudan, home delivery was among the major obstacle to child immunization (Adut C.M. et al, 2012)

2.3. Health Facility Factors

2.3.1 Health Staff's Performance and Attitudes

Health staff attitude is one of the most vital issues discouraging immunization of children in many countries. For instance, in Kenya, some mothers described harassment and maltreatment by health workers, as well as practices contrary to KEPI (Kenya EPI) procedures, such as turning away a child who was sick or lacked a child health card (Michael et al 2011). In Ethiopia, there are reported cases of health workers screaming at mothers who forgets the child's card, those who have missed a scheduled vaccination appointment or mothers with poorly dressed or malnourished children. (Blanchet, 2016). Health workers also lack proper language of communication with mothers (Pillsbury, 2000).

2.3.2 Lack of Resources/ Logistics

A Survey carried out in Armenia found that the prime reason for non-immunization was due to lack of vaccine (UNICEF/Armenia, 2006). Vaccine stock outs are caused by deficient in habitual funding, poor ordering, and lack of storage capacity and distribution systems (Africare, 2005). Shortage of vaccines and the unwillingness of health workers to open vaccine vials if there are few children needing the vaccine at a given time have been cited as reasons for MOV (Mutua et al, 2011)

2.3.3. False Contraindications

In many cases, Health workers frequently refuse to immunize children due to various fears and false beliefs. This includes fears like a sick child should not be vaccinated or receive multiple vaccinations on the same visit. Other fears and false beliefs are that, the child is over one years of age and therefore "too old" for measles vaccination, other beliefs are that the underweight children should not be vaccinated due to their weight (WHO, 2009).

2.3.4. Reliability

Vaccination sessions takes place in health facilities, however, there are reported problems of cancelled and truncated sessions in many countries. For instance, it is reported that in many instances outreach sessions in particular are frequently cancelled or postponed due to shortage of vaccine or supplies, lack of a vehicle, or lack of per diem (WHO, 2009). (Abilla & Munguti, 2013) reported that in Kenya, mothers stated that the frequent postponement of immunization days made them to lose faith in the services provided; this made many of them to hesitate even when services resumed. A study done in the Sinana district, southeast Ethiopia, also reported that 52.1 % of mothers returned home without vaccinating their child due to a lack of vaccines in health facilities (Negussie et al, 2016)

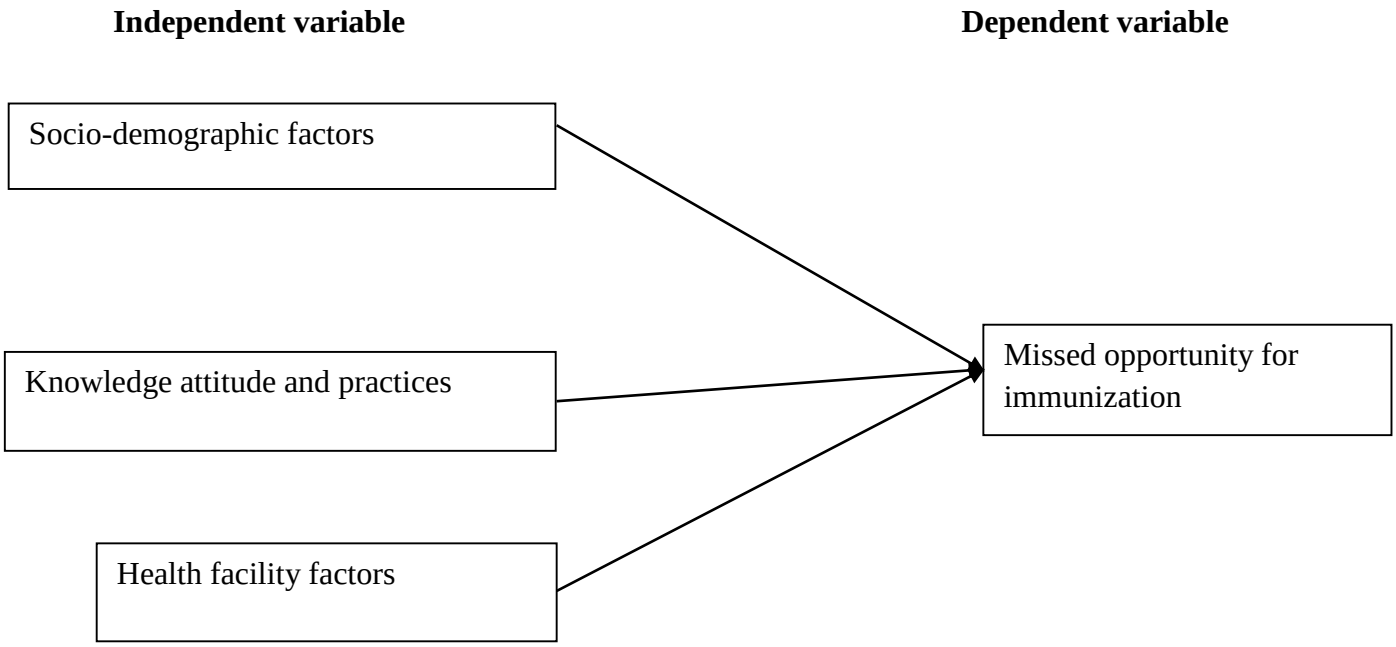
2.3.5. Appropriateness of time/limited day/hours

Immunization services are provided in many public health facilities during only limited days and hours which constitutes an important impediment for some families (PATH-Kenya, 2012). In Somalia, Indonesia and many other countries for instance, these services were only made available in the mornings when a good number of mothers are moving up and down with their day to day activities (Negussie et al., 2016)

2.3.6 Waiting time

Many immunized children receive this service in public health facilities with short staffed work force, poorly organized health care givers, etc. (Department of State of Health-Gambia, 2004). In Kenya and Malawi, approximately 25% of caregivers visiting public facilities reported that waiting time was a major problem, (Olorunsaiye et al, 2014). While mothers in Uganda complained that they waited for long hours to have their child vaccinated but the vaccinator did not come at the end of the day (Africare, 2005).

2.4: Conceptual Framework



Independent variable	Indicator
Sociodemographic	Distance and access of health facility, place of delivery, age, religion, cultural beliefs, occupation
Knowledge, attitude and practice	Parents awareness, perception and utilization of immunization services
Health facility factors	Health worker attitude, logistics, reliability, poor communication

2.5. Reducing Missed opportunity for Immunization

2.5.1. Strategies for reducing Missed Opportunities for Immunization

Strategies for reducing MOI include screening for vaccination status during visits to health facilities for mild illness, ensuring children receive all recommended injectable vaccinations during a single visit, and using facility-based child vaccination registers to help track when individuals are due for vaccination (Velandia-González et al., 2015). Both private and public health sectors could play important roles in implementing MOI reduction strategies. Although MOI have been examined in the public sector, little is known about MOI in the private health sector (Olorunsaiye et al., 2015). WHO, has come up with a guide that is designed to help decision-makers interested in using the MOI policy to advance vaccine uptake and immunization coverage by in order to reduce the big number of missed opportunities (WHO, 2017).

On 27th June 2018, The Government of Kenya prioritized promotion and protection child health by launching the National Rapid Results Initiative on child immunization which will increase the number of children that are immunized against killer diseases. The president also flagged off essential maternal, child health and immunization equipments, vehicles and motorbikes to all counties to facilitate our

vaccination targets. He urged the MOH and the Ministry of Education to work closely with the County Governments to put in place measures to ensure all children are vaccinated by the time they join school. From that day the MOH and all county governments start a "100-day accelerated rapid results initiative" to immunize all children who may have missed their vaccinations in the past. This campaign is to be sustained and repeated if necessary until full immunization coverage target is achieved.

2.5.2 Integrating MOI strategy in Health programmes

The MOI strategy has been from time to time used a participatory research approach to get the obligation and leverage the understanding and experience of users to resolve problems affecting them. There is need for every effort to be put in place in ensuring that the Ministry of Health (MOH) and EPI team incorporate reducing MOIs into their program improvement plans and to use the MOI strategy to optimize health service. The MOI strategy must be included with other ongoing country work plans in improving vaccine coverage and vaccination timeliness and coverage impartiality.

In order to reduce MOIs there is need for investment on repeated monitoring of coverage and helpful supervision from senior health managers. It is also vital to take note of the number of children vaccinated on monthly basis. Standard monitoring charts should also be used by health facilities in helping to track monthly vaccination coverage (WHO, 2017)Monitoring charts that are large enough to be displayed should be displayed clearly and be made visible to all health facility users.

Research Methodology

This chapter discussed the study area, study design, the study population, ethical considerations, sampling technique, data collection entry, cleaning and analysis.

3.1: Research design

The study adopted a descriptive hospital based cross-sectional study design to collect data on determinants of missed opportunities for immunization. It was cheap and focuses on one point. Unlike case-control studies, they were used to describe, not only the odds ratio, but also absolute risks and relative risks from prevalences. They were used to describe some feature of the population, such as prevalence of an illness, or they may support inferences of cause and effect, (Wikipedia)

3.2: Study Variables

A variable is a measurable characteristic that assumes different values among the subjects. It is therefore a logical way of expressing a particular attribute in a subject (Hunger, 2004). An independent variable is a variable that can be controlled so as to determine its effects on another variable while dependent variable is a one that is influenced by another variable. In this Study;

3.3.1 Independent variables are

1. Socio-demographic characteristics of parents
2. Parents' knowledge and attitudes towards Immunization
3. Health facility factors

3.3.2 Dependent variable is
Missed Opportunities for Immunization

3.4: Study area
This study took place in Nakuru Level Five Hospital, Nakuru county.

3.4.1: Description of study area
Nakuru Level Five Hospital is a County teaching and referral Hospital located in NAKURU County, which is one of the 47 counties of the Republic of Kenya provided in the Constitution of Kenya 2010. It has 11 sub-counties; Molo, Nakuru west, Nakuru east, Nakuru North, Njoro, Gilgil, Naivasha, Rongai, Subukia, Kuresoi North and Kuresoi south. The county lies within the Great Rift Valley, covering an area of 7,495.1 Km² and is located between Longitude 35 º 28` and 35º 36` East and Latitude 0 º 13 and 1º 10` south. The hospital serves a population of about 3.6 million in south Rift valley plus patients coming as far as western, Nyanza, North Rift valley and Central part of Kenya. Services offered include Curative outpatient and inpatient services, Immunization, Family planning, antiretroviral therapy, HIV counselling and Testing. Most patient attended to are from Nakuru West, Njoro, Nakuru East and Nakuru North areas

3.5: Study population
The study targeted children under 5 years of age but this population group cannot respond themselves hence their parents were recruited to participate.

3.6: Sampling techniques
This study used both purposive and stratified sampling, Stratified sampling technique divides the population in different homogenous strata (subgroup).

3.7: Delimiting the study

3.7.1 Inclusion criteria
Parents with children between 6 weeks to 59 months of age, residing within the area 18 months prior to the study, with sound mind and who sign informed consent

3.7.2 Exclusion criteria
Parents with children outside the age bracket of 6 weeks to 59 months of age, residing in the area less than18 months prior to the study, parents with unsound mind.

3.8: Sample size determination
Fischer's et al (1998) formula was used to calculate the sample size since the population is less than 10,000**.**

$$n = \frac{z^2 pq}{d^2}$$

Where, n = Desired Sample Size
p = missed opportunity for immunization (28%) according to (MOH Nakuru county, 2015)
Z = Standard normal deviation (1.96, which corresponds to the 95% confidence interval)
d = Magnitude of error on p (0.05)

q=The population without characteristic (1 - 0.28)

$$n = \frac{1.96^2\, p(1-p)}{d^2}$$

Substituting the figures in the formula above:

$$\frac{1.96^2 \times 0.28(1-0.28)}{0.05^2}$$

$$\frac{1.075648 \times 0.72}{0.0025} = 309.7$$

Therefore n = 310

Nf = n / 271+ (n-1)/N where population was less than 10000

Nf =desired sample size

N=total population size

310/1+ (310-1)/1000

384/1.383=278

Therefore sample size was 278

The researcher used 100 respondents due to time and resources available and also a sample size from 30 participants is minimum acceptable in quantitative studies

3.9: Sampling procedure

Purposive sampling procedure was used in this study to identify hospital units (MCH, Ward 2 and ward 6) and stratified sampling procedure was used to identify respondents by stratifying them according to age of their child. The researcher used elements that best represented the phenomenon being studied.

3.10: Data Collection, Analysis and Management

3.10.1: Data collection techniques

This study used researcher administered open and closed-ended questionnaire because it ensures higher return rate.

3.10.2: Construction and Testing of Research Tool

Validity

It is the accuracy the research tool, defined as the extent to which a concept, conclusion is well-founded and corresponds accurately to the real world (Keller, 2003).

Technical persons and experts reviewed the questionnaire to ensure its accuracy so that it elicit the genuine results within the stipulated time frame

Reliability

This referred to the ability a research instrument to be dependable, measure and yield consistent results after a repeated trial. It can be ensured by through a pre-test done on a different population with same characteristics using 10% of the desired sample size one to two weeks before the actual study day. Pretesting is the process of carrying out an initial survey to test the validity and reliability of a survey to obtain quality data. The questions were restructured and the necessary corrections made before the actual field is carried out. To avoid false information during the actual field study elements used for the pre-test were different from those used for the actual study, and the results of pre-test were included in the actual study.

3.10.3: Data cleaning, entry, and analysis

Data collected was cleaned, coded, checked for accuracy and entered into Statistical Package for Social Science (SPSS version 12 for windows) for analysis and presented in form of tables, graphs and charts.

3.11: Ethical considerations

Permission of ethical clearance was sought from the medical superintendent in charge of Nakuru County level five hospital through an introductory letter from the field attachment coordinator, Faculty of Health sciences, Egerton University.

Respondents in this study (caregivers) signed a written informed consent. Their participation was voluntary and privacy, confidentiality, anonymity were assured.

Study Findings.

4.1 Socio-demographic characteristics

Table 4.1: Age of caregiver

Age	**Frequency**	**Percentage**
18-23 years	14	14%
24-29 years	26	26%
30-35 years	31	31%
36-41 years	20	20%
42-47 years	9	9%
TOTAL	**100**	**100%**

Table 4.1 above shows that 31% of the caregivers were aged30-35 years and 9% were aged 42-47 years

Figure 4.1: Gender of caregiver

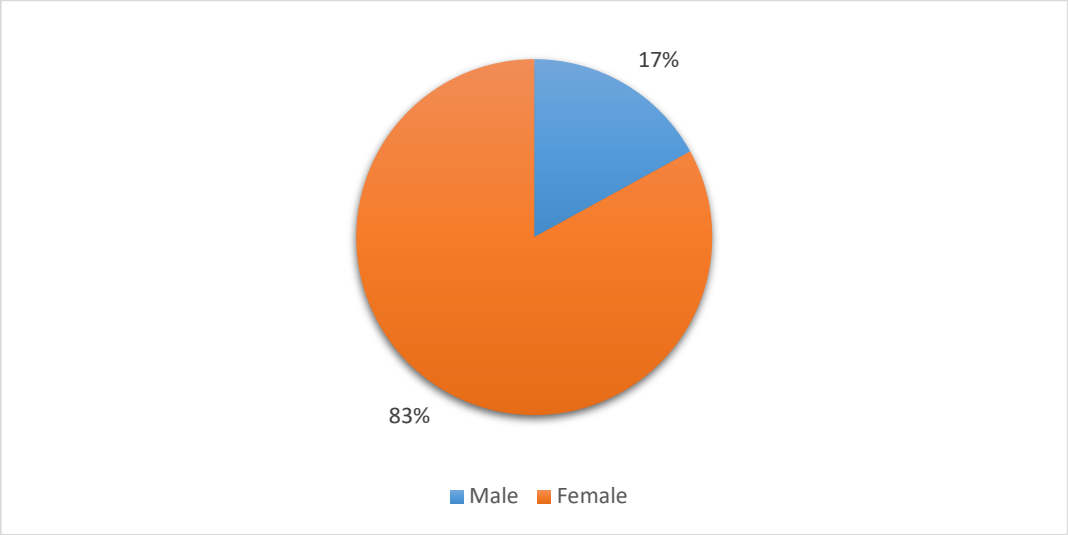


Figure 4.1 above shows that majority of the caregivers were female and minorities 17% were male

Table 4.2: Religion

Response	**Frequency**	**Percentage**
Christian	73	73%
Muslim	27	27%
TOTAL	**100**	**100%**

Table 4.2 above shows that majority 73% of the caregivers were of Christian religion and minorities 27% were of Muslim religion

Table 4.3: Education Level

Response	**Frequency**	**Percentage**
Primary	23	23%
Secondary	64	64%
Tertiary	17	17%
TOTAL	**100**	**100%**

Table 4.3 indicates that 64% of the caregivers had attained up to primary level of education and 17% had attained tertiary level of education

Figure 4.2: Occupation

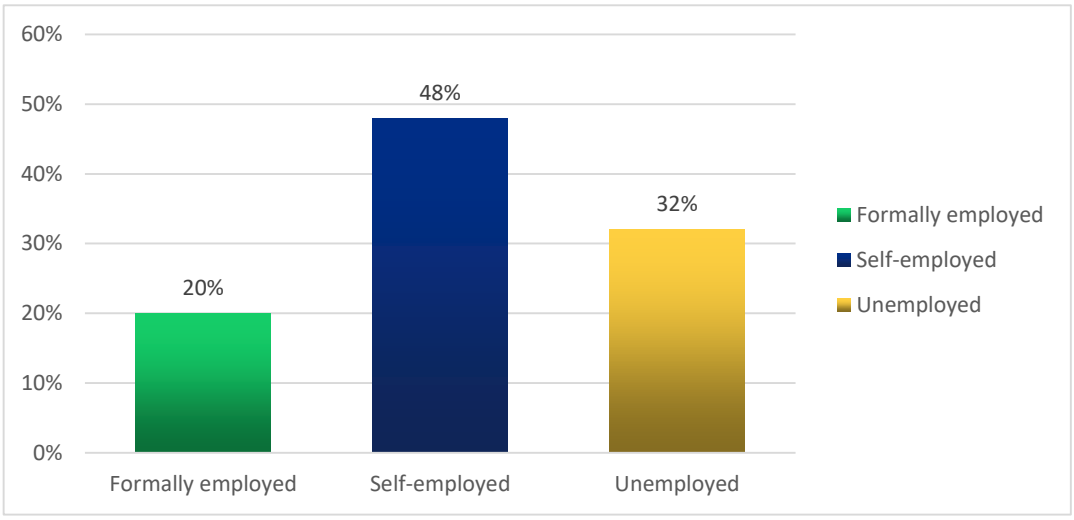


Figure 4.2 indicates that 48% of the caregivers were self-employed and 20% were formally employed

Table 4.4: Marital Status

Response	Frequency	Percentage
Single	11	11%
Married	37	37%
Divorced	20	20%
Separated	32	32%
TOTAL	**100**	**100%**

Table 4.4 above shows that 37% of the caregivers were married and 11% were single parents

Table 4.5: Number of children

Number of Children	Frequency	Percentage
One	9	9%
Two	19	19%
Three	34	34%
Four	32	32%
Five	6	6%
TOTAL	**100**	**100%**

Table 4.5 shows that 34% of the caregivers had three children and 6% had five children respectively

4.2 Knowledge, attitude and practice

Figure 4.3: Awareness of immunization services for children under 5 years

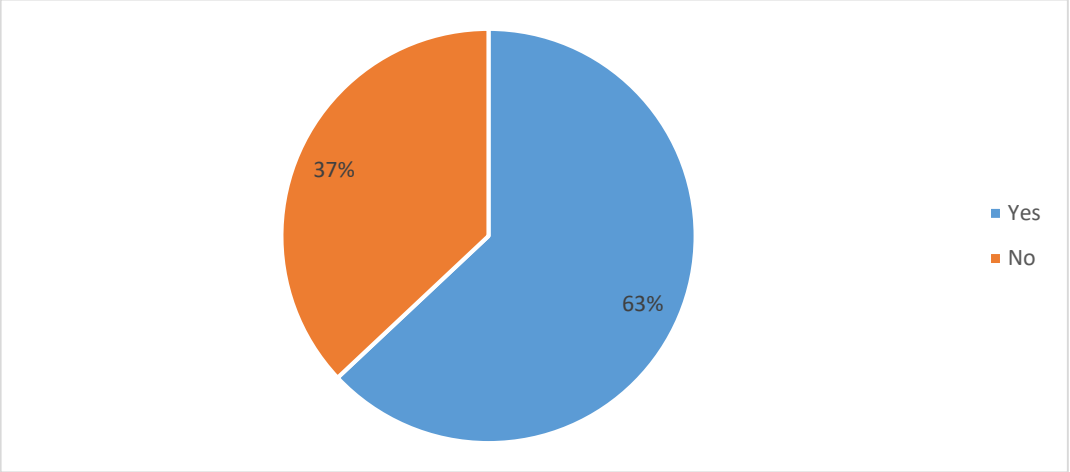


Figure 4.3 indicates that 63% of the respondents were aware of immunization services for children under 5 years and 37% were not aware of the immunization services

Table 4.6: Source of Information

Response	Frequency	Percentage
Health care worker	33	33%
Friend	27	27%
Media	22	22%
School	18	18%
TOTAL	**100**	**100%**

Table 4.6 shows that 33% got the information from health care workers and 18% got the information from school

Figure 4.4: Age at which child got first immunization

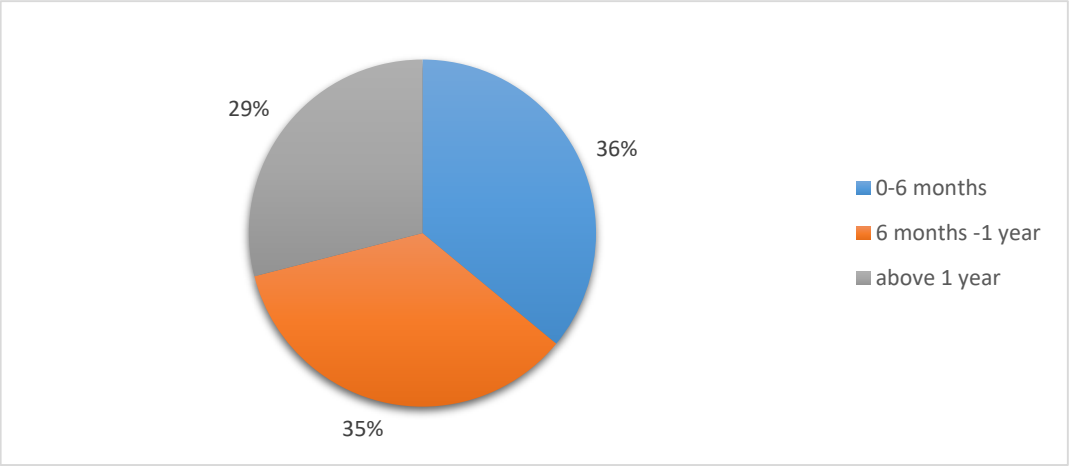


Figure 4.4 shows that 36% of the caregivers children got their first immunization at 0-6 months and 29% got their first immunization at above 1 year

Table 4.7: Child ever missed immunization

Response	Frequency	Percentage
Yes	39	39%
No	61	61%
TOTAL	**100**	**100%**

Table 4.7 indicates that 61% of the caregivers children have never missed immunization and 39% have missed immunization

Figure 4.5: Reason for missing immunization

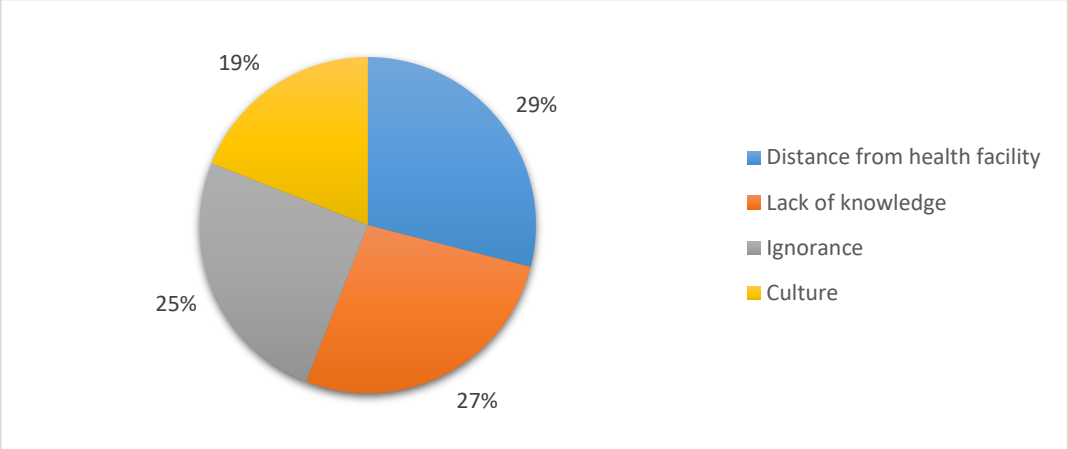


Figure 4.5 indicates that 29% of the caregivers said the reason for missing immunization was distance from the health facility and 19% said their culture was the reason

Table 4.8: Measures taken when child missed immunization

Response	Frequency	Percentage
Waited for next visit	69	69%
Went to other hospital	31	31%
TOTAL	**100**	**100%**

Table 4.8 shows that 69% of the caregivers waited for next visit and 31% took their children to other hospitals

Figure 4.6: Measures taken when caregiver took the baby to other hospital

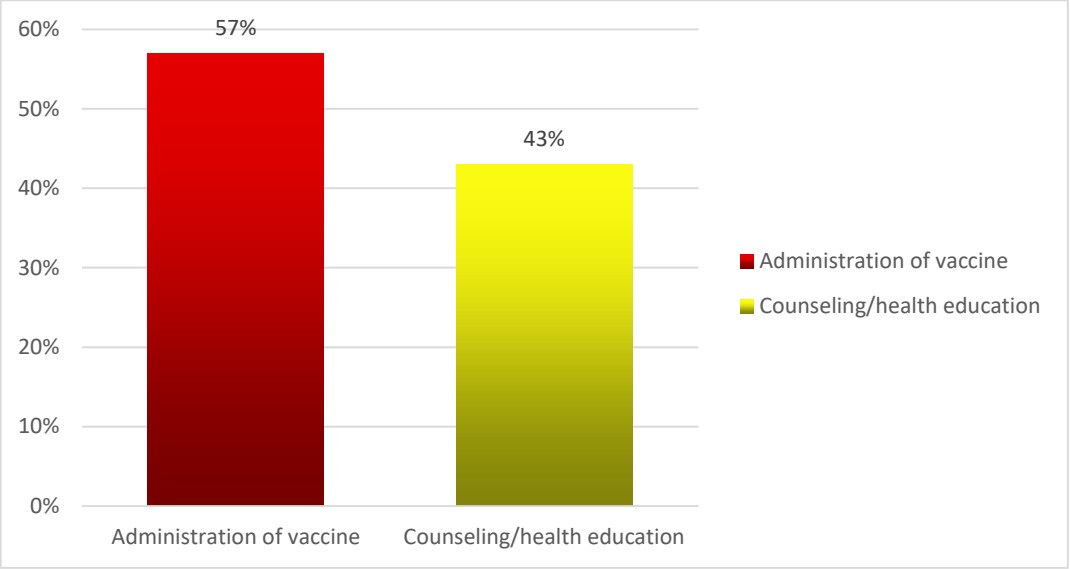


Figure 4.6 indicates that 57% of the caregivers said their children were given the vaccine and 43% said they were received counseling and health education on Immunization.

4.3 Health facility factors

Table 4.9: Attitude of health care worker

Response	Frequency	Percentage
Good	68	68%
Bad	32	32%
TOTAL	**100**	**100%**

Table 4.9 shows that 68% of the health care workers had good attitude towards clients and 32% of them had bad attitude towards clients

Figure 4.7: Ever missed immunization because drug was unavailable

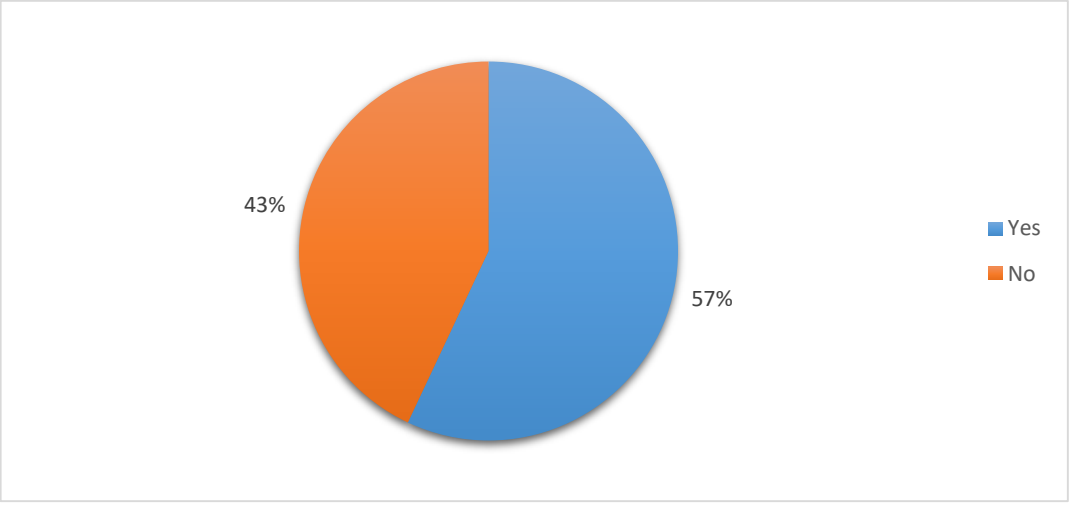


Figure 4.7 indicates that 57% of the caregivers have ever missed immunization because there were no drugs and 43% have never missed immunization

Table 4.10: Duration of waiting time before getting immunization services

Response	Frequency	Percentage
Short	17	17%
Long	60	60%
Fair	23	23%
TOTAL	**100**	**100%**

Table 4.10 shows that 60% of the caregivers said the duration of waiting time was long and 17% said the duration was short

Table 4.11: Time and number of days set for immunization

Response	Frequency	Percentage
Enough	41	41%
Few	39	39%
Too much	20	20%
TOTAL	**100**	**100%**

Table 4.11 above shows that 41% of the caregivers view the time as enough and 20% view it as too much

Discussion, Conclusion, Recommendations.

5.1 Introduction

The aim of the study was to find out the determinants of missed opportunities for immunization among children under 5 years at Nakuru Level 5 Hospital. Immunization has proved to be one of the most cost effective way of preventing child morbidity and mortality (Ngegussie et al, 2016) due to vaccine preventable disease. It is for this reason that the Expanded program on Immunization (EPI) was implemented in Kenya to ensure that primary immunization is delivered to infants. The primary caregiver mostly the mother, plays a very important role in ensuring that the child receives all recommended immunizations in EPI (Abdulraheem et al, 2011) making them key respondents in studies focusing on child immunization. The study interviewed 100 caregivers attending Nakuru Level 5 Hospital

5.2 Discussion

The study found that 31% of the caregivers were aged 30-35 years and majority of the caregivers were female. Another majority 73% of the caregivers were of Christian religion and 64% of the caregivers had attained up to secondary level of education while 48% of the caregivers were self-employed. 37% of the caregivers were married and 34% of the caregivers had three children. This concurs with another study conducted in Nigeria by (Ubajak et al, 2012) where the mean age of the caregivers was ranging from 15-45 years, and half of these mothers were literate having attained at least primary level of education (51.9%).

The researcher went further and found that 63% of the respondents were aware of immunization services for children under 5 years and 33% got the information from health care workers. 36% of the caregivers children got their first immunization at 0-6 months while 61% of the caregivers children have never missed immunization. 29% of the caregivers said the reason for missing immunization was distance

from the health facility and 69% of the caregivers waited for next visit while 57% of the caregivers said their children were given the vaccine. This finding contrasts the finding of Mohamud et al (2014) in a study conducted in Ethiopia where the majority of the respondents were aware of immunization services for their children while a number 69% of the respondents have never missed immunization services.

On health facility factors the study found that 68% of the health care workers had good attitude towards clients and 57% of the caregivers have missed immunization because there were no drugs, A number 60% of the caregivers said the duration of waiting time was long and 41% of the caregivers view the time as enough and 20% view it as too much. Thus concurs with a study done by Mohammud et al (2014) where accessibility to health facilities in terms of transport cost, time taken to reach and get the immunization services as also found to be significantly associated with the risk of missed opportunity for immunizations.

5.3 Conclusion

There is need to increase the uptake of specific immunizations especially those given at 9 months whose rates were lower compared to the rest of the vaccines. The reasons given by the caregivers as reasons for missed immunizations were mainly vaccine stock outs and ill children.

Lack of information, vaccinator absent, fear of side effect, negligence and wrong ideas about contraindication were the most common reasons given by the caretakers for incomplete immunization.

It will also be helpful to bring the employers on board, when it comes to addressing the issue of day offs for nursing mothers to enable them take their children to hospital for vaccinations.

5.4 Recommendations

i. Strengthening of routine refresher courses of health care workers on basic immunization with regular updates.
ii. Community advocacies to improve ANC attendance and deliveries at health facilities.
iii. Advocacy in the community is needed to increase awareness on the routine immunization among caregivers of the children.
iv. The Kenya Expanded Programme of Immunization (KEPI) should come out with a clear opportunity that every child comes in contact with a health facility should have her/his immunization status updated.
v. Health awareness of caretakers on the importance of immunizations

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Appendix 1: Questionnaire for Caregivers.

Instructions

- Answer all the questions in both part 1 and 2.
- Tick appropriately within the brackets or write your responses in spaces provided.
- Do not write your name anywhere on the sheet.
- This study questionnaire is strictly for academic purposes and any information given will be held in privacy and confidentiality.

Part 1: Socio Demographic characteristics

1. Age in years
   (a) 18 – 23 [ ]
   (b) 24 – 29 [ ]
   (c) 30 – 35 [ ]
   (d) 36 – 41 [ ]
   (e) 42 – 47 [ ]
2. Gender
   (a) Male [ ]
   (b) Female [ ]
3. Religion
   (a) Christian [ ]
   (b) Muslim [ ]
   (c) Hindu [ ]
   (d) Pagan [ ]
   (e) Others. Specify ……
4. Residence

(a) Urban [ ]
(b) Rural [ ]
(c) Suburban [ ]

5. Educational level(tick where appropriate)
   a) Primary level [ ]
   b) Secondary level [ ]
   c) Tertiary level (University/ College) [ ]
6. Occupation
   (a) Formally Employed [ ]
   (b) Self-employed [ ]
   (c) Unemployed [ ]
7. Marital status?
   (a) Single [ ]
   (b) Married [ ]
   (c) Divorced [ ]
   (d) Separated [ ]
   (e) Others. Specify……
8. How many kids do you have?
   (a) 1 [ ]
   (b) 2 [ ]
   (c) 3 [ ]
   (d) 4 [ ]
   (e) 5 [ ]
   (f) Other. Specify……..

Part 2. Knowledge, attitude and Practices of parents/guardians (Care givers).

9. Are you aware of immunization services for children under five years of age?
   a. Yes [ ]
   b. No [ ]
10. If yes, where did you get the information from?
    a. Experience. [ ]
    b. Nurse. [ ]
    c. Doctor [ ]
    d. Friend. [ ]
    e. Media [ ]
    f. School. [ ]
    g. Others (specify)……..
11. At what age did the child get first immunization? ……..
12. Has your child ever missed any immunization opportunity?
    a. Yes. [ ]
    b. No. [ ]
13. If yes, what were the reasons ……
14. Which measures did you take when your child missed immunization?

a. Waited for next visit. [ ]
b. Went to the other hospital. [ ]
c. Others, specify)……

15. If you went to the hospital, which measures were taken?
(a) Administration of vaccine.
(b) Counseling/ health education.
(c) Others,(specify)……
16. According to you what are some of the factors that contribute to missed opportunity for immunization (You can tick more than one)

a. Distance and access of health facility [ ]
b. Place of delivery [ ]
c. Knowledge, perception and education [ ]
d. Fear of side effects [ ]
e. Religious, cultural and social beliefs, norms and rumors [ ]
f. Health staff performance and attitude [ ]
g. Poor communication [ ]
h. Lack of resources/ logistics, Reliability [ ]
i. Waiting time [ ]
j. Limited time and day of opening are the study variables [ ]
k. None of the above [ ]
l. Other, specify……

Part3: Health Facility Factors

17. How is the attitude pf healthcare workers who give immunization services
(a) Good [ ]
(b) Bad [ ]
(c) Other, specify …….
18. Have you ever missed vaccination for your child because the vaccine was not available in stock?
(a) Yes [ ]
(b) No [ ]
19. How is the waiting time before getting immunization services?
(a) Short [ ]
(b) Long [ ]
(c) Fair (Tolerable) [ ]
20. What is your view on the time and number of days set for immunization in a week?
(a) Enough [ ]
(b) Little [ ]
(c) Too much [ ]

Appendix 2: Map of Nakuru County