

**PREVALENCE AND FACTORS ASSOCIATED WITH MISSED
OPPORTUNITIES FOR VACCINATION IN WAJIR COUNTY REFERRAL
HOSPITAL**

**BY
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OF MASTER OF MEDICINE DEGREE IN PAEDIATRICS AND CHILD HEALTH
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DECLARATION

I declare that 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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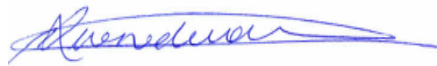
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ABBREVIATION

ANC	Antenatal Clinic
DTP	Diphtheria-tetanus-pertussis vaccine
EPI	Extended Program on Immunization
FGD	Focused Group Discussions
GAVI	Global Alliance for Vaccines and Immunization
IDI	In-Depth Interview
MCH	Mother and Child Health
MCV	Measles containing vaccine
MOV	Missed opportunities for Vaccination
SAGE	Strategic advisory group of experts
SDG	Sustainable Development Goals
SIA	Supplemental immunization activity
SPSSv23	Statistical package for the social sciences version 23
UNICEF	United Nations International Children`s Emergency Fund
WHO	World Health Organization

DEFINITION

Caregiver; a caregiver is a person aged more than 18 years with responsibility for a child under 24 months of age at the healthcare facility they had visited on the day of the survey.

Healthcare workers; are staff engaged to provide both preventive and curative health services to the population.

Mother and Child Health; a unit within a healthcare facility where children receive and women of childbearing age receive vaccination and other healthcare services.

Missed opportunities of vaccination; any contact with healthcare services by a child, who was/is eligible for vaccination (i.e. unvaccinated, partially vaccinated, or not up-to-date), which did not result in the individual receiving all the vaccine doses for which he/she was eligible.

ABSTRACT

Introduction: Immunization is the most effective preventive health strategy worldwide through which several childhood illnesses have been prevented or eradicated. Missed opportunities for vaccination greatly contribute to severe under-vaccination especially in low-income countries, resulting in outbreaks of vaccine-preventable diseases observed in the past few years. According to Kenya Demographic Health Survey 2014, disparities in immunization coverage do exist among the various regions in the country, coverage is highest in the central region (90%) as compared to 51% in the Northeastern region. This study aimed to determine the prevalence of missed opportunities for vaccination and factors associated with these missed opportunities among children less than two years in Wajir county referral hospital.

Objective: To determine the prevalence of missed opportunities for vaccination and factors associated with a missed opportunity for vaccination at Wajir County Referral Hospital.

Methodology: This was a hospital based cross-sectional study employing both quantitative and qualitative data collection. Health exit interviews of mothers/caregivers who bring children less than 2 years to Wajir County Referral Hospital was administered, vaccination cards and MCH booklets reviewed. Healthcare workers' knowledge, attitude and practices (KAPs) was assessed by using self-administered standard questionnaires. Focused group discussion conducted for both healthcare workers and caregivers. An in-depth brainstorming session with the hospital director, EPI manager and the staffs at the EPI department was carried out.

Data management and analysis: Data collected was entered into a Microsoft excel sheet, checked for errors and completeness and analyzed using SPSSv23. Categorical variables were summarized as proportions and compared using Pearson's Chi-square test, while continuous data was described as medians (interquartile range) if skewed and with means and standard deviations if normally distributed. Factors with a $p < 0.05$ on univariate analysis were subjected to multivariate logistic regression analysis. Crude (unadjusted) and adjusted odds ratios were calculated to quantify the strength of association between the factors and MOV. The 95% confidence intervals determined and the factors with a p-value of less than 0.05 was considered to have a significant association with MOV.

Results: A total of 271 caregivers, 32 healthcare workers and 1 key informant were interviewed. MOV prevalence was found to be 23.2% and was significantly associated with older infants, hospital visits other than vaccination services and longer time taken to reach facility. Both health workers and caregivers were receptive and have positive attitude towards vaccination. Both expressed desire to increase health education for both caregivers and health workers and to increase vaccination days and space. Health workers and key informants emphasized the need to standardize vaccination checks and integrate with other health services.

Conclusion and recommendation: There is a high prevalence of MOV at Wajir county referral hospital of 23.2% and this can be reduced by health education of caregivers and healthcare workers, integration of immunization with other health services and robust outreach and defaulter tracing services.

CHAPTER ONE

INTRODUCTION

1.1 Background

Immunization is the most effective health intervention worldwide through which several childhood diseases have been prevented or eradicated. Immunization has been a tool to control and eliminate life-threatening infectious diseases and is estimated to avert between 2 to 3 million deaths each year(1).

World Health Organization/United Nations International Children's Emergency Funds (WHO/UNICEF) September 2019 report estimated that in 2018, 5.3 million died under the age of five years(2). More than half of these early child deaths are preventable or can be treated with simple affordable interventions such as immunization, exclusive breastfeeding in the first 6 months of life and continued breastfeeding with complementary feeding until 24 months, safe water, and food and appropriate care by trained healthcare providers when needed. Children in Sub-Sahara Africa are more than 15 times more likely to die from vaccine-preventable diseases before the age of five years compared to children in high-income countries (3). The WHO Strategic advisory group of experts (SAGE) on immunization April 2019 observed that there were multiple outbreaks of measles and other vaccine-preventable diseases in the Horn of Africa region. These outbreaks reflect a weakened immunization system. Of note was that, conflict-ridden countries face challenges in sustaining immunization as do many lower-income countries concerning financing.

Kenya established an extended program on immunization (KEPI) in 1980 to provide immunization against 6 killer diseases of childhood- TB, polio, diphtheria, whooping cough, tetanus, and measles building on a long history of childhood immunization. In the 1990s, the country has achieved the universal child immunization goal of 80% coverage. KEPI's focus changed to disease control, elimination and eradication. This approach quickly faced challenges of achieving control/elimination and maintaining high routine immunization coverage in all districts. In Kenya demographic and health survey 2014 coverage is highest in the central region (90%) as compared to 51% in the Northeastern region (4). Further to this, 11% of children in Northeastern have not received any of the recommended vaccines as compared to 2% or less in other regions; (KDHS 2014) (5).

Over the years the basic routine childhood immunization panel has improved as newly developed vaccines are added. The current panel includes the pentavalent vaccine which protects against diphtheria, pertussis and tetanus as well as hepatitis B and Haemophilus influenza type b (Hib) infections. In February 2012 pneumococcal vaccine introduced into Kenya's routine immunization program and protects against Streptococcus pneumoniae bacteria, which causes severe pneumonia, meningitis, and other illnesses. Other vaccines added were rotavirus, measles-rubella at 18 months, and most recently HPV (4).

Immunization services are offered through either routine vaccination as outlined by the KEPI schedule or through supplemental immunization activities (SIA) where campaigns are conducted as a catch-up immunization to increase coverage or to respond to outbreaks. SIA and outreach programs have been the main strategy in Kenya. High vaccine coverage is essential to achieving the promise of health offered by this robust panel of routine childhood immunization. This study seeks to gain a better understanding of the missed opportunities for immunization in this region and possible interventions to bridge this gap.

CHAPTER TWO

LITERATURE REVIEW

2.1 Overview

Over the decades, immunization and breastfeeding has proved to be the most successful and cost-effective global health intervention in reducing childhood mortality and morbidity globally. In December 2019, the World Health Organization celebrated the 40th anniversary of Smallpox eradication.

The WHO goal of immunization agenda 2030 is to make vaccination services available to everyone everywhere by 2030. The population of children who receive the recommended vaccines has remained the same over the past years. In 2018, approximately 86% of infants worldwide received three doses of DTP3 vaccine protecting them against killer diseases and disabilities. by 2018, 129 countries had reached at least 90% coverage of DTP3 vaccine(6).

In 2018 an estimated 19.4 million infants worldwide were not reached with routine immunization services, of the 19.4 million 13.5 million did not even receive an initial dose of DTP3 indicating a lack of access to immunization services(6). Reaching 86% of infants is not enough to control the outbreaks of these killer vaccine-preventable diseases; for example, 90-95% coverage is needed to achieve herd immunity for measles.

The gap between the best immunization performer, the European region, and the lowest performer, the African region, is 18%. Though over the last 20 years the biggest gain in immunization has been made by the Africa region still outbreaks and deaths by vaccine-preventable diseases do occur (7).

According to the WHO vaccine-preventable disease monitoring system: the 2019 global summary indicates that Kenya reported 822 measles cases, 6 pertussis cases, and 24 rubella cases. In the 2018 measles outbreak occurred in various parts of Kenya, specifically Mandera, Wajir, Garissa, Nairobi, and Kitui County. The situation is really dire with less than half of children in Wajir and Mandera fully immunized according to KDHS2014 report, and only 31 percent are fully immunized in West Pokot (5). Achieving recommended vaccine coverage has been a challenge in the country especially among districts with a predominantly nomadic lifestyle.

Anecdotally a situational report analysis confirmed outbreaks of measles in Wajir on 14th September 2018. As of 8 January 2019, 174 cases were reported with two deaths. Overall only 20% of the cases received one dose of Measles containing vaccine (MCV), 3% received two doses of MCV, 48% had unknown vaccination status and 29% have not received any MCV dose.

2.2 Missed opportunities for vaccination

Missed opportunity for vaccination (MOV) includes any contact with health services by a child who is eligible for vaccination (unvaccinated, partially vaccinated or not up-to-date and free of contraindication to vaccination), but which does not result in the individual receiving all the vaccine doses for which or she is eligible. WHO`s EPI recommends every child eligible be vaccinated at every contact with health facility regardless of the health services they sought.

Children are considered to have received all basic vaccinations if they have received a vaccination against tuberculosis (also known as BCG), three doses each of the DPT-HepB-Hib (also called pentavalent vaccine), polio vaccines, and vaccination against measles according to the guidelines developed by the World Health Organization. BCG vaccine is routinely given at birth or 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. In the Kenyan immunization program for a child to be considered fully vaccinated the child must have received all basic vaccinations and three doses of the pneumococcal vaccine (also given at age 6, 10, and 14 weeks).

Missed opportunities contribute greatly to under vaccination of children. It is expected that vaccine coverage could improve by up to 30% in many places by eliminating missed opportunities. Missed opportunities result from failure of existing policies and procedures that were put in place to optimize vaccination services, previous MOV assessments suggests various common reasons why opportunities for vaccination were missed in health facilities- these includes (8):

1. Failure or inability of health providers to screen patients for eligibility
2. Perceived contraindication to vaccination on the part of providers and the parents
3. Vaccine stock-out
4. Rigid clinical schedule that separates clinical services from vaccination areas
5. Parental or community resistance to immunizations

Reducing MOV is an action plan to increase vaccination coverage by ensuring better use of vaccination services. It also improves the delivery of other health services in general and promotes synergy between treatment services and other programs at health facility levels.

2.3 Factors associated with missed opportunities for vaccination

Several studies have been conducted to determine the prevalence of MOV and factors associated with missed opportunities and low vaccine coverage. If these factors are addressed it is believed to drastically improve vaccine coverage.

MOV assessment done by WHO/UNICEF and other partners in Jordan showed that MOV prevalence among eligible children under 2 years was 36%. Higher prevalence was estimated among children attending the clinic for non-vaccination visits (65%), children of caregivers with no formal education (47%), children of caregivers employed as laborers (40%), and older children (37% for 12-24 Months vs 25% for 0-11Months). Challenges highlighted by caregivers include vaccine stock-outs, caregivers not coming with vaccination cards to health facilities, husbands not fully supportive of vaccination, concerns expressed about vaccination and ill child, and sub-optimal knowledge about vaccine contraindication(2).

A descriptive cross-sectional survey carried out in 2014 among under-five-year-old children in Ilorin, Metropolis Nigeria estimated MOV prevalence at 24.4%. Factors responsible for missed opportunities included the attitude of healthcare workers, the prolonged waiting time for immunization services, low level of knowledge on immunization, and educational background among caregivers (9).

According to KDHS 2014, there is no difference between male and female children immunization coverage rate. Immunization coverage decreases as birth order increases, with 80 percent of first-born children and only 59 percent of children of birth order six and above being fully immunized. Increasing mother's education increases immunization coverage; more than three-quarters of children whose mothers have completed primary or higher education are fully immunized, as compared to 55 percent of children whose mothers have no education. Only 62 percent of children in the lowest wealth quintile are fully immunized, compared to around 8 in 10 children in the other quintiles (5).

In 1996, a hospital-based study at Kenyatta National Hospital by Wainaina L.N showed the prevalence of missed opportunity for immunization as 57.7% for in-patients and 100% for outpatients. The reason for this high rate was attributed to the hospital not having a policy for immunizing children who were admitted or attending pediatrics outpatients for services the healthcare workers were also noted not to have enough knowledge on the immunization schedule.

A cross-sectional descriptive study to determine factors influencing immunization coverage in Mathare Valley, Nairobi showed excellent access to immunization services at 95.6%. However, suboptimal utilization of immunization services was detected as shown by the low fully immunized child percentage of 69.2% and the high dropout rate of penta3 at 12.0%. factors that contributed to the low immunization coverage included ignorance on the need for immunization and return dates, fear of adverse event following immunization, negative attitude of healthcare service providers and missed opportunities(10)

A cross-sectional study by Pertet et al published in 2018 among Masai nomadic pastoralists in Kenya estimated the prevalence of missed opportunities at 30.1 %. 42.2% of children did not receive any vaccination by their first birthday. Geographic mobility and distance to the health facility were key determinants of severe under vaccination among pastoralists in Kenya (11).

A population-based cross-sectional study done in East Pokot, Baringo County indicated immunization coverage in east Pokot could be 23%. The factors contributing to low immunization coverage included; the number of children within the family, place where the child was born, literacy level, knowledge on the immunization schedule, nomadic lifestyle, distance to the nearest health facility, and area of residence (urban/rural). (12).

In a descriptive cross-sectional study at Siaya County Referral Hospital, the prevalence of missed opportunities for immunization was found to be 16.2%. The main reasons given for the occurrence of the high MOV was mainly vaccine stock out, ill children, home delivery, poor ANC attendance, and lack of adequate knowledge on vaccine-preventable diseases and contraindications for vaccination among healthcare workers. (14)

Missed opportunities in immunization studies have been conducted in many countries using different methodologies. However, to provide a coordinated and standardized strategy WHO published in 1988 a simple methodology for assessing MOV that used purely quantitative methods (Health exit interviews). The methodology was revised and expanded in 2013 by the Pan American Health Organization, and was then simplified in the latest 2017 WHO revision and a qualitative component has been added.(14)

A missed opportunity for vaccination study done in Chad and Malawi and published in 2019 using the WHO MOV methodology have shown that the proposed WHO methodology provides a breadth of actionable information while focusing in on the primary reasons for missed opportunities of Vaccination, it is less complex to implement compared to a nationally developed survey tool and the new methodology is implementable in resource limited settings in African and other regions.(15)

Evaluation of immunization services through a strength, weakness, opportunities and threat (SWOT) analysis is also an important tool to identify the internal and external factors that can potentially facilitate or hinder provision of immunization services. It is a visual study tool that provides a unique opportunity to gain greater insight in the operation of immunization services and thus helps in decision making and planning ahead.(16)

2.4 Justification and utility

Missed opportunity for vaccination greatly contributes to low vaccine coverage. A collective effort addressing those factors associated with MOV and are easy to correct will lead to tremendous improvement in vaccine coverage.

Despite improved national coverage, there is still low immunization coverage in the study area with outbreaks of preventable diseases. No or few studies have been done/published to determine the prevalence and factors associated with a missed opportunity for vaccination in Wajir County with its unique population.

2.4.1 Utility

The findings of this study are expected to provide information on effective strategies to overcome the barriers to reduce MOV and increase immunization coverage. The findings will be shared with relevant departments to institute measures to reduce the occurrence of MOV and enhance vaccine coverage.

2.5 Study question

What is the prevalence of missed opportunities for vaccination of children between 0-23 months at Wajir county referral hospital?

What are the factors associated with missed opportunities for vaccination in Wajir county referral hospital?

2.6 Objectives

2.6.1 Primary objective

To determine the prevalence of missed opportunities for vaccination of children aged 0-23 months attending Wajir County Referral Hospital for health services.

2.6.2 Secondary objectives

1. To determine factors associated with missed opportunities for vaccination of children aged 0-23 months attending Wajir county referral hospital for health services.
2. To conduct community and healthcare workers focused group discussion to explore causes of missed opportunities as well as possible solutions to those barriers.
3. To carry out key informant interview with hospital director/EPI service manager to analyze strength, weakness, opportunity, and threats (SWOT) in offering immunization services

CHAPTER THREE

METHODOLOGY

3.1 Study area description

Wajir county referral hospital is in Wajir east constituency, which borders Somalia to the east and has a huge catchment area serving the whole population from all corners of the county and by extension some patients from bordering Mandera County. The hospital has four wards with a total bed capacity of 102 beds; the pediatric ward has a capacity of 25 beds with a daily average of 20 in patients. The MCH daily turnover is 125 clients seeking both immunization and well-child clinic services.

3.2 Study population

The study targeted mothers/caregivers of children between 0-23 months who attended WCRH on the days of assessments. It also targeted healthcare workers especially those working in a pediatric ward and MCH.

3.3 Study design

The research was a hospital-based cross-sectional study.

3.4 Selection of study population

Inclusion criteria

1. All children under 23 months of age accessing health services at Wajir county referral hospital.
2. Children whose mothers/caregivers give consent.

Exclusion criteria

Children whose mothers/caregivers did not give consent.

3.5 Study duration

The study took 3 months.

3.6 Sample size determination for cross-sectional studies

The sample size calculation will be done using Fischer's formula.

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

n= sample size

z= standard normal deviate for 95% confidence level

p= estimated prevalence of missed opportunities for vaccination (The prevalence value used is 30.1% based on the study done at Pertet et al.)

d= desired level of precision (0.05)

n=320

10 % of the estimated non-response rate added to raise the target population 352.

3.7 Sampling technique

A consecutive sampling technique was employed whereby every mother/caregiver with a child less than 2 years was interviewed as they were exiting the facility after they have received services and after giving consent until the required sample size was achieved. However, due to low turnout as a result of Covid scare the required sample size was not achieved. Interviews was conducted every day including weekends on daytime. Healthcare knowledge attitude and practice (KAP) questionnaire was administered to all health personnel offering both curative and preventive services who are present during the time of the study.

3.8 Consent procedure

Before the interview, mothers/caregivers and healthcare workers were asked to provide a consent by signing or/affixing a thumb print for those who are not literate and counter-signed by a witness. They were reaffirmed and made aware that participation is voluntary and optional.

3.9 Enrollment process

All mothers/caregivers exiting WCRH with a child aged between 0-23months were eligible for the study were all requested to participate. The principal investigator and research assistant stationed themselves at the exit points of the MCH/EPI departments and Pediatric in-patient wards. They explained the process and obtained written consent for participation.

All healthcare workers at the MCH/EPI and pediatric ward of WCRH on the days of field activity were interviewed.

3.10 Data collection

Data was collected by the principal investigator and research assistant.

3.10.1 Quantitative data collection

Exit interviews of caregivers at MCH and pediatric wards who consented to the survey was conducted using a tool adapted from the WHO standard assessment tool for the MOV health facility exit survey (APPENDIX III). After filling the questionnaires, vaccination records were reviewed using the KEPI schedule as a standard vaccination schedule reference.

Healthcare workers at the MCH department and pediatric ward were interviewed using the healthcare worker questionnaire also adapted from WHO (APPENDIX IV). Focus group discussion for caregivers and healthcare workers carried out separately on the final day of the field activity.

3.10.2 Qualitative data collection

The team conducted FDGs of both caregivers and healthcare workers once weekly for four weeks. During the interviews participants were requested to volunteer for FDGs to explore further causes and solutions to MOV. Discussions were held Friday afternoons from 3pm to 4pm. Each group composed of 6-8 participants; the principal investigator facilitated the group to discuss predetermined subject using the WHO tool (APPENDIX V). A comfortable and appropriate site away from distractions was chosen for the discussion and each FGD lasted for about 45 minutes to 1 hour. Refreshment and transport cost was provided for the participant.

An in-depth brainstorming session with the EPI manager was done on the final day of the field work. The discussion focused on the strengths, weaknesses, opportunities, and threats (SWOT) in providing vaccination services and dwelled on answering:

1. What the hospital does especially well in offering immunization services?
2. Critical self-awareness on the hospital weakness in offering immunization
3. What can be done well to improve immunization coverage?
4. What are the factors/challenges that pose risk to immunization services?

Table 1. Overview of fieldwork activity

Activity	Targets
Child exit interview with caregivers	352
MCH/EPI and pediatrics' ward service provider knowledge, attitudes and practice(KAPs)	All healthcare provers present during the days of assessment
FGD- caregivers	4 Groups
FGD- health providers	4 Groups
SWOT analysis	Hospital director and EPI services providers

3.11 Data management and analysis

Data collected from the field was uploaded into a Microsoft excel sheet, data checked for errors and completeness daily. The data was cleaned and analyzed using SPSS v 23.

MOV prevalence was computed from the proportion of studied children who had missed a vaccine and expressed as a percentage.

Categorical variables were summarized as proportions and compared using Pearson's Chi-square test, while continuous data described as medians (interquartile range) if skewed and with means and standard deviations if normally distributed. Factors with a $p < 0.05$ on univariate analysis were subjected to multivariate logistic regression analysis. Crude (unadjusted) and adjusted odds ratios were calculated to quantify the strength of association between the factors and MOV. The 95% confidence intervals determined and the factors with a p-value of less than 0.05 were considered to have a significant association with MOV.

3.12 Ethical Consideration

Proposal approval was sought from the University of Nairobi/ Kenyatta National Hospital Ethics and Research Committee.

Permission to conduct field work obtained from Wajir County Referral Hospital administration before data collection.

Informed written consents obtained from the study participants and only those who voluntarily consented were interviewed.

CHAPTER FOUR

RESULTS

4.1 Characteristics of study children

Table 2 below summarizes descriptive frequency distribution of demographic characteristics for children whose caregivers were interviewed in the study. A total of 271 caregivers with children 0 to 23 months were interviewed and review of mother and child health booklet done. Majority of the children were below 9 months of age (77.2%) with a median age of 15 months, 15.0 (6.0-36.0). There was no significant sex difference, 52% male and 48% female. 61.3% came to the facility for vaccination, 29.5% for medical consultation, 9% were hospitalizes and few others for checkup and accompanying their caregivers

Table 2: Demographic characteristics of children

Variable	n=271 Frequency (%)
Age of the child in weeks	
Median (IQR)	15.0 (6.0-36.0)
Min –max	0.1-104.0
Category, n (%)	
0 to 6 weeks	71 (26.2)
>6 to 14 weeks	64 (23.6)
>14 weeks to 6 months	50 (18.5)
>6 to 9 months	24 (8.9)
>9 months	62 (22.9)
Sex of the child	
Male	141 (52.0)
Female	130 (48.0)
Reason for the current visit to health facility	
For medical consultation	80 (29.5)
For Vaccination	166 (61.3)
Check up	11 (4.1)
Not for treatment	3 (1.1)
Hospitalization	9 (3.3)
Others	2 (0.7)

4.2 Sociodemographic characteristics of caregivers

Social demographic characteristics of caregivers are as summarized in table 3 below. Almost all caregivers were female (95.2%) and were the mothers of the children (93.7%), only 4.8% were fathers showing poor participation of male in healthcare of their children. 47.2% had no

formal education and few had more than secondary education. Majority were housewives 78.6%, 10.7% in formal job, 8.1% self-employed. Slightly more than half of the caregivers walked to the facility (55.4%) and mostly live in the neighboring villages, 39.1% used a car to the facility and those from far came by bus (4.8%) taking a maximum of 210 minutes

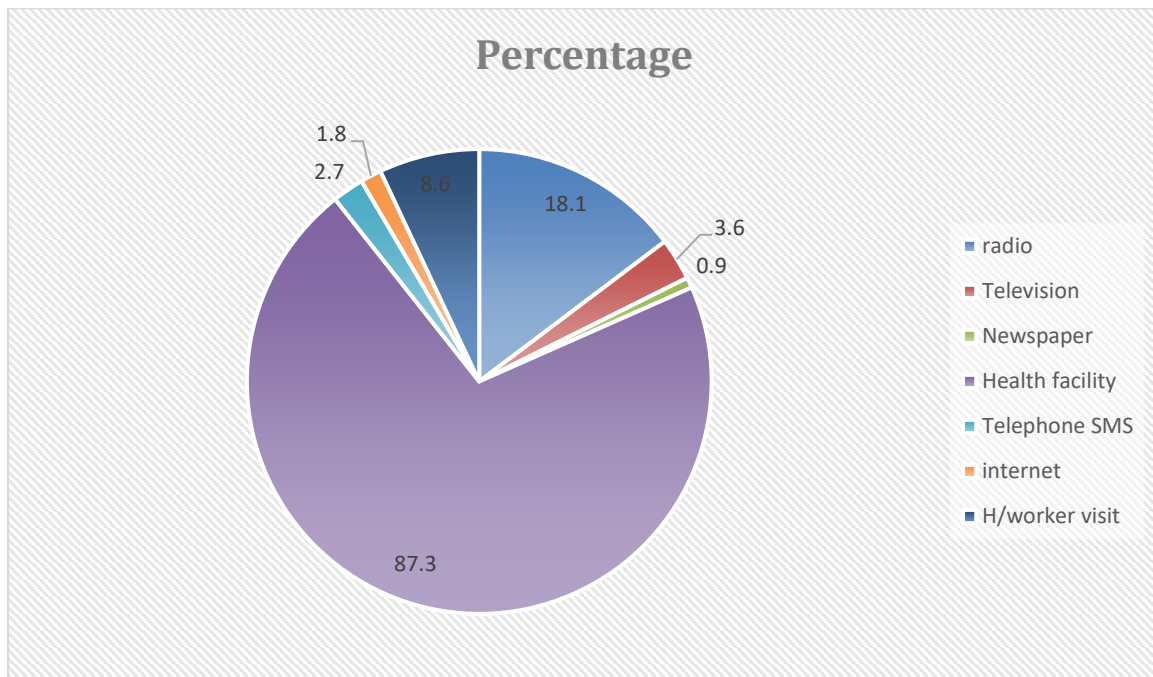
Table 3: Sociodemographic characteristics of caregivers

Variable	n=271 Frequency (%)
Sex of caregivers	
Male	13 (4.8)
Female	258 (95.2)
Relationship with the child	
Mother	254 (93.7)
Father	14 (5.2)
Grandparent	2 (0.7)
Others	1 (0.4)
Able to read or write	
Yes	135 (49.8)
No	136 (50.2)
Education Level	
No Formal education	128 (47.2)
Did not completed primary	21 (7.7)
Completed primary	50 (18.5)
Completed secondary	41 (15.1)
More than secondary	31 (11.4)
Occupation	
Housewife	213 (78.6)
Employed / Laborer	29 (10.7)
Farming	5 (1.8)
Self-employed	22 (8.1)
Teacher	1 (0.4)
Others	1 (0.1)
Means of transportation	
Walk to the facility	150 (55.4)
Use bicycle to the facility	0
Use motorcycle	2 (0.7)
Use a car	106 (39.1)
Use a bus	13 (4.8)
Time taken to reach the facility	
Median (IQR)	15.0 (10.0-30.0)
Min – max	2.0-210.0

4.3 Access to information on vaccination of children

Most of the caregivers (81.5%) have heard or seen message on vaccination in the last month preceding the interview. Majority, 193/271 (87.3%) got vaccination messages from healthcare workers in health facilities, 18.1% heard from radio and other rare various source such as newspaper, internet, television and home visits were mentioned by few caregivers. Community sensitization through communication media is low and if well utilized might help to improve immunization coverage.

Figure 1: Source of information



4.4 Prevalence of missed opportunities of Vaccination

Prevalence of missed opportunities of vaccination was computed as a proportion of vaccine age eligible children who attended Wajir county referral hospital for various reasons and did not receive the due vaccine(s). Overall, 63(23.2%) out of 271 studied children had MOV during the time of interview, 25/271 (9.2%) have never received any vaccine in their life. Measles at 9 months was the most frequently missed vaccination at 66.1%, followed closely by Penta at 14 weeks and OPV at birth (22.1% and 21.4% respectively), BCG at Birth was found to be the least missed vaccine. Fewer older children infants coming to the facility when number taken as a ratio of those seen at birth. Differences in missed opportunities of antigens that are given on the same day suggestive of differential Vaccine stock out, poor client flow and information (possibly mother is not aware the baby needed several injections) – e.g. differences between PCV and Rota in weeks 10 and 14.

Table 4: Prevalence of Missed opportunity of Vaccination

Variable	Frequency (%)
Missed opportunities of vaccination	
Missed	63 (23.2)
Received	208 (76.8)
BCG at birth (n=271)	
Missed	16 (5.9)
OPV at birth (n=271)	
Missed	58 (21.4)
OPV at 6 weeks (n=228)	
Missed	26 (11.4)
OPV at 10 weeks (n=179)	
Missed	21 (11.7)
OPV at 14 weeks (n=140)	
Missed	26 (18.6)
IPV at 14 weeks (n=140)	
Missed	26 (18.6)
DPT at 6 weeks (n=228)	
Missed	18 (7.9)
DPT at 10 weeks (n=179)	
Missed	21 (11.7)
DPT at 14 weeks (n=140)	
Missed	31 (22.1)
Rotavirus at 6 weeks (n=228)	
Missed	18 (7.9)
Rotavirus at 10 weeks (n=179)	
Missed	13 (7.3)
PCV at 6 weeks (n=228)	
Missed	21 (9.2)
PCV at 10 weeks (n=179)	
Missed	23 (12.8)
PCV at 14 weeks (n=140)	
Missed	28 (20.0)
Measles at 9 months (n=56)	
Missed	37 (66.1)
Measles at 18 months (n=18)	
Missed	8 (44.4)

4.5 Factors associated with Missed opportunity of vaccination

Variables contributing to missed opportunities in immunization are examined in table 4. SPSS version 23 logistic regression tool was used to compute a binary logistic regression which showed the odds probability of belonging to either group (missed or did not miss). Only variables which were significant from bivariate analysis were entered into the logistic regression. The following variables were found to be independently associated with missed opportunity for immunization in children 0-23 months at Wajir county referral hospital; age 14 weeks to 6 months (p 0.004), visit for medical consultation (p 0.047), hospitalization (p 0.002) and longer time taken to reach facility of 1-3 hours (p 0.020). However, ability to read and

write was found not to be significantly associated with MOV (p 0.912) as shown in the table below.

Table 5: Factors associated with missed opportunity for vaccination in children 0-23 months

Variable	Missed (n=63)	Did not miss (n=208)	OR (95% CI)	P value
Median age in weeks (IQR)	36 (16-52)	12 (6-24)	-	<0.001
Category, n (%)	5 (7.9)	66 (31.7)	1.0	1.000
0 to 6 weeks	5 (7.9)	59 (28.4)	1.1 (0.3-4.1)	0.004
>6 to 14 weeks	13 (20.6)	37 (17.8)	4.6 (1.5-14.0)	<0.001
>14 weeks to 6 months	13 (20.6)	11 (5.3)	15.6 (4.6-52.5)	<0.001
>6 to 9 months	27 (42.9)	35 (16.8)	10.2 (3.6-28.8)	<0.001
>9 months				
Reason for the current visit	11 (17.5)	62 (33.2)	0.5 (0.2-1.0)	0.047
For medical consultation	42 (66.7)	124 (59.6)	1.0	
For Vaccination	2 (3.2)	9 (4.3)	0.7 (0.1-3.2)	0.734
Check up	0	3 (1.4)	-	0.575
Not for treatment	7 (11.1)	2 (1.0)	10.3 (2.1-51.7)	0.002
Hospitalization	1 (1.6)	1 (0.5)	-	0.448
Others				
Able to read or write	31 (49.2)	104 (50.0)	1. (0.6-1.7)	0.912
Yes	32 (50.8)	104 (50.0)	1.0	
No				
Time taken to reach the facility				
Median (IQR)				
Category, n (%)	15 (10-30)	15 (10-30)	-	
1-3 hours	1 (1.6)	23 (11.1)	0.1 (0.01-0.98)	0.862
1 hour	62 (98.4)	185 (88.9)	1.0	0.020

4.6 Healthcare workers Knowledge, attitude and practice

4.6.1 Participants demographics

A total of 32 healthcare workers present in various department were interviewed. Nurses 26 (81.3%); Doctors 1 (3.1%) Clinical officers 2 (6.3%) and 3 from other cadres. In terms of area of work 12 work in-patient wards, 5 outpatient department and 15 at the MCH department (9 EPI service providers). 29/32 (90.6%) had basic training.

4.7 Healthcare worker's knowledge on immunization

4.7.1 General knowledge

All health workers knew the all the antigens in the immunization schedule that a child receives- that is BCG, polio vaccine, pentavalent, Rota virus, pneumococcal vaccine and measles containing vaccines. Among the 32 health workers interviewed, 18 (56.3), 6 (18.8), 7(21.9) and 8 (25.0) mentioned local reactions to previous dose, light fever, seizures under medical treatment and Pneumonia or other diseases as absolute contraindication to vaccination. Only 4 health workers identified the above as not absolute contraindication to vaccination. 27/32 health workers were able to identify Poliomyelitis and measles as vaccine preventable diseases in the process of eradication or elimination.

Table 6: knowledge of vaccination

Variable	n=32 Frequency (%)
Absolute contraindications against ANY vaccine include	
Local reaction to previous dose	18 (56.3)
Light fever	6 (18.8)
Seizures under medical treatment	7 (21.9)
Pneumonia or other serious diseases	8 (25.0)
None of the above	4 (12.5)
Vaccine-preventable diseases (VPDs) in the process of eradication or elimination	
TB	2 (6.3)
Poliomyelitis and measles	27 (84.4)
Diarrhea	2 (6.3)
None of the above	1 (3.1)

4.7.2 Knowledge on Immunization schedule

Healthcare workers demonstrated good knowledge on the timing of vaccines that are given one time such as BCG (93.8%) and measles (90.6%). However, their knowledge on immunization schedule in antigens with repeated doses was found to be lower, OPV being the most affected antigen with only 2/3 Of health workers knowledgeable of its timing. This confusion might arise from supplemental immunization activities carried out in the country.

Table 7: knowledge on Immunization schedule

Timing of vaccine	BCG	OPV	IPV	Penta	Measles/MR
At Birth	30 (93.8%)	3 (9.4%)			
Birth, 6, 10, 14 weeks	1 (3.1)	22 (68.8)			
6, 10, 14 weeks		1 (3.1%)		28 (87.5%)	
14 weeks		5 (15.6%)	30 (93.8)	14 (6.3%)	2 (6.3)
9 months					29 (90.6%)

4.8 Attitude of healthcare workers on vaccination

Only about half of healthcare workers interviewed demonstrated positive attitude in provision of immunization services. Healthcare workers when asked on whose responsibility it is to evaluate and check vaccination status of children and when should it be done, 48.4% of them said it is the responsibility of both caregivers and healthcare workers and another 48.4 % saying it is solely healthcare worker's responsibility. Only 62.5% think that vaccination status should be checked at all service points and this demonstrate poor integration of services.

Almost all healthcare workers do not see completion of vaccine registry and cards as time consuming or delaying service delivery.

4.9 Health workers practices on immunization

Health workers who were directly involved in EPI services were assessed on their practices in immunization service delivery mainly on the following areas:

Service integration; only 20% of health care workers would coordinate with other clinical areas, inpatient and emergency departments in hospitals, so that they can review the child's vaccination card/health passport

Information to caregivers; all health workers inform mothers on the vaccines their children need, side effects and how to manage. They will also fully instruct caregivers to keep the vaccine card safe and bring it at all visits to the health facility.

Vaccination services; in the event a health worker finds a child with delayed or missed vaccine majority said they will make weekly list of children with incomplete schedule, contact parent or guardian and sometimes make home visits. If a caregiver forgets the card they will issue a temporary card, vaccinate, record in the register and ask them to bring next visit. In case of a lost card they issue a new card and transcribe all information from register.

4.10 Focus group discussions

We conducted 4 FGDs with caregivers and 4 with health workers, each FGD comprised of 6 to 8 participants. All caregiver participants were female and health workers were of mixed gender. Investigator facilitated the discussion using structured questions with predetermined subject as outlined in the WHO focused group discussion tool.

Inductive thematic analysis of the results was a systematic process that involved re-reading and summarizing raw text data to discern patterns and identify major recurring themes. The following key themes arose from the discussion:

4.11 Knowledge and perception of vaccination services

In general, both health workers and caregivers demonstrated good knowledge, know that common childhood illness are preventable by simple measures such as immunization, breastfeeding and adequate nutrition. Caregivers were receptive and had positive attitudes towards vaccines in general; However, health workers noted that pastoralists communities lack knowledge and importance of vaccination services. *“The communities in the town are receptive and uptake is good, nomads don’t know the importance, health workers believe in immunization and are supportive”* EPI service provider

Caregivers are fairly satisfied with the vaccination service and appreciated that they mostly get vaccines timely, staffs are friendly and the service is free. Equally health workers feel that their clients are satisfied since they had no complaints. However, some areas of dissatisfaction were also noted by the caregivers and this include; limited vaccination time and days, long waiting time and inadequate vaccination space.

“sometimes a mother comes to the clinic and finds the station is full with no waiting area and decides to go back and this leads to delay and missing vaccine” A caregiver

4.12 Vaccine compliance

Both health workers and Caregivers agree that compliance with vaccination schedule is a challenge in the area and this contributes largely to incomplete immunization.

Poor compliance resulted from various reasons as mentioned by caregivers and health workers, these includes; forgetting return dates, some caregivers may relocate to nomads, vaccination hours clashing with working hours, parental fear of side effects and multiple injections, some health workers see minor illness as contraindication, rescheduling vaccines for fear of running out of stock or to avoid high vaccine wastage.

“some healthcare workers may decide to reschedule vaccines for fear of running out of stock or high vaccine wastage especially BCG and MR”. A health worker noted.

Recurrent strikes since start of devolution and poorly motivated staffs were also noted to interrupt vaccine services and immunization schedule.

Health workers and caregivers suggested some solutions to the poor compliance such as; enhancing community participation and sensitization to increase vaccine adherence, reminders such as phone call, text and community visits and defaulter tracing, scale up outreach programs and daily vaccination with increased working hours.

4.13 Missed opportunities in immunization

Health workers acknowledged that some children who seek services and due for immunization may not receive the vaccines they are eligible for. This was especially noted in non-EPI service point of the hospital such as the in-patient and outpatient department.

Health workers noted that the main barrier is lack of routine procedures to check vaccination status outside of vaccination visits. Care givers usually don’t carry MCH booklet/vaccination card during other visits, work overload, mostly children are sick and minor illnesses perceived as contraindication, limited vaccine days for some vaccine, some particularly nomads have negative belief and perceptions about vaccination.

Suggested strategies to above barriers include; health education to both caregivers and health workers to sensitize the community about importance of immunization and to bring vaccination cards for all visits, equally staff training and refresher courses to empower health workers to do their jobs better was seen integral. SOPS to curb the lack of consistency on when vaccination check should be completed and whose responsibility it is and enhance integration of vaccination with other services was emphasized. Other suggested solutions were employment of more staffs, staff motivation, support supervisions and increased vaccination days and time.

4.14 In-depth interview

EPI service manager was interviewed at the end of the study and the discussion mainly focused on the strength, weakness, opportunities and threats (SWOT) experienced in the provision of immunization services and the result analysis consolidated in a four-box SWOT matrix as shown below.

Table 8: SWOT analysis of a key informant interview

STRENGTH	WEAKNESS
Adequate and reliable supply of vaccines and logistics	Immunization outreach services are partner dependent Poor defaulter tracing

<p>Maps in facilities that show distribution of population</p> <p>Screening for immunization status- mainly MCH</p> <p>Well trained EPI staffs</p>	<p>Irregular support supervisions</p> <p>Poor integration of services</p>
<p>OPPORTUNITIES</p> <p>Establish strong defaulter tracing mechanism</p> <p>Develop continuous and sustained outreach services</p> <p>Service integration</p> <p>Strengthen community participation</p> <p>Train, motivate and use of CHVs</p> <p>Facilities micro-plan to map unvaccinated children</p> <p>Monitoring and use of data performance review</p> <p>Improve staff skills and motivation</p> <p>Proper documentation</p>	<p>THREATS</p> <p>Hard to reach nomadic population</p> <p>Poor documentation</p> <p>Inadequate knowledge on data utilization</p> <p>Lack of community involvement</p> <p>Limited vaccine days and vaccine reschedules</p> <p>Low education level of caregivers</p> <p>Staff strikes</p> <p>Pockets of insecurities</p>

4.15 Discussion

Immunization is the most effective preventive health strategy worldwide through which childhood illness have been prevented or eradicated. In Kenya it has been a challenge in achieving and maintaining high immunization coverage in all regions.

In our assessment the prevalence of Missed opportunity of vaccination among children 0-23 months was found to be 23.2% and 9.2% of study children have never received any vaccine in their lifetime. This is a high prevalence rate and jeopardizes efforts to achieve required vaccine coverage in the region. The high prevalence in this study is almost similar to the MOV prevalence of 30.1% in a study conducted among Masaai nomadic pastoralist.

In this assessment higher MOV prevalence was seen among older infants, children who attended the hospital for non-vaccination visits and among those who took longer time to reach the facility. Literacy level was not found to be associated with missed opportunity for

immunization. Measles at 9 months was the most frequently missed antigen and BCG was the least affected and this was attributed to forgetting return dates, relocation to nomadic pastoralist and poor defaulter tracing mechanism. Almost all caregivers who brought the children to facility were the mothers and this indicate lack of support from the fathers or poor involvement in the healthcare of their children.

Health workers demonstrated adequate knowledge of vaccines that children should receive and the timings of vaccines that are given one time. However, there was poor knowledge regarding appropriate vaccination schedule for antigens with repeated doses and this confusion might arise from recent supplemental immunization activities carried in the area or lack of proper trainings and refresher courses, poor knowledge on valid contraindications of immunization, raised concerns over vaccine rescheduling for fear of running out of stock or high vaccine wastage especially BCG and measles and all this ultimately leads to MOV and low vaccine coverage.

Both caregivers and health workers including the key informant attributed the high MOV prevalence and incomplete vaccination to limited vaccination time and days, long waiting time, inadequate vaccination space, forgetting return dates, poor defaulter tracing, considering minor illnesses as contraindication to vaccination, nomadic lifestyle and negative beliefs or misconception about vaccines among some members of the community.

The study also revealed that coordination and integration of vaccination services with other health services was poor and inconsistent. There was no standardized practice on vaccination status check leading to many service points not checking the immunization status of children and leaving the responsibility only to the EPI service providers. Mothers are not engaged and sensitized to take part in checking the immunization status of their children therefore they leave behind vaccination cards when seeking services other than vaccination.

Most of the caregivers were receptive and had positive attitude towards vaccination and are generally satisfied with the vaccination services with only a few who are mainly pastoralist showing negative beliefs and hesitancy.

Since the advent of devolution in 2013 and the counties being semi-autonomous the health sector experienced recurrent strikes and poorly motivated staffs and this has led to interruption

of immunization services and poor vaccine compliance among the community leading to low vaccine coverage.

Strategies that will impact and improve immunization coverage derived from the study include; health education to caregivers to sensitize the community and enhance participation, more staff training to improve staff skill and motivation, robust defaulter tracing mechanism, service integration, increase vaccination hours and days, provide adequate vaccination space with enough waiting area, service integration and develop continuous and sustained outreach programs.

Conclusion

The MOV prevalence of 23.2% is high and is a threat to achieving county and national immunization coverage and significantly results from lack of vaccination status check especially those seeking hospitalized and those seeking medical consultation at outpatient department. A high MOV was also demonstrated in longer distance travelled to reach the facility.

4.16 Limitations

Data did not capture ANC visit and place of delivery which are vital determinants of childhood vaccination.

FGDs and IDI were not audio-recorded due lack of consent from some participants and concern that recording would deter participants from speaking openly.

All caregivers included in the study had received services at a health facility; the perspectives captured are biased toward those and may not accurately reflect the community's perspectives who were largely affected by the drought season and relocated further from town.

4.17 Recommendations

Staff sensitization to actively and routinely screen for vaccination status

An EPI service provider to do daily rounds in non-EPI service points

Develop robust outreach services

Study on nomads' pattern of movement and develop strategy to reach every nomadic child

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Appendix I: Consent Form: Parents/Guardian

Study serial no. _____

Date: _____

STUDY TITLE: PREVALENCE AND FACTORS ASSOCIATED WITH MISSED OPPORTUNITIES FOR VACCINATION IN WAJIR COUNTY REFERRAL HOSPITAL

PRINCIPAL INVESTIGATOR:

DR. ABDULLAHI RASHID

H58/11068/2018

MASTERS OF MEDICINE IN PAEDIATRICS AND CHILD

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The UNIVERSITY OF NAIROBI.

DR. AHMED LAVING

LECTURER, DEPARTMENT OF PAEDIATRIC AND CHILD HEALTH

The UNIVERSITY OF NAIROBI.

Investigator statement

I am a postgraduate student at the University of Nairobi at the department of pediatrics and child health and requesting you to participate in this research. The purpose of this consent form is to provide you with the information you will need to help you decide whether or not to participate in the study. This process is called '**Informed Consent**'. Please read this consent information carefully and ask any questions or seek clarification on any matter concerning the study with which you are uncertain.

Introduction

Immunization is the most effective preventive health strategy worldwide through which several childhood illnesses have been prevented or eradicated. Failure to vaccinate an eligible child who attends a health facility for curative or preventive health services in the absence of any contraindication constitutes a missed opportunity for vaccination.

Missed opportunity for vaccination greatly contributes to severe under-vaccination especially in low-income countries resulting outbreaks of vaccine-preventable diseases observed in the past few years.

Purpose of the study

The study aims to determine prevalence and factors associated with missed opportunities for vaccination in children aged 0-23 months attending Wajir county referral hospital for health services. Interviews and focused group discussions will be conducted to collect data. As a participant voluntarily you will be required to fill in the questionnaires and attend and contribute actively in the focused group discussions which is estimated to take approximately 30 minutes and 45 minutes to 1 hour respectively.

Benefit

The findings of this study will be shared with the hospital and county EPI managers which may institute measures to reduce the occurrence of a missed opportunity for vaccination and hence improves vaccine coverage and reduce illnesses from vaccine-preventable diseases.

Questions you have on immunization will be addressed by the investigator

Risks

There will be no risks to you during the study. The study will only involve filling in questionnaires and no invasive procedures in the study that may harm you will be done.

Voluntariness

The study will be fully voluntary. There will be no financial rewards to you for participating in the study. One is free to participate or withdraw from the study at any point. Refusal to participate will not lead to victimization or discrimination in any way.

Audio-taped recording

We would like to audio-record the focused group discussions. Even though we will be taking notes, we are not able to write everything down and want to be able to go back and listen to any information we might have missed. All notes and the recording will be kept safely and securely.

Confidentiality

The information collected will be kept secured and strict confidentiality observed. Questionnaires will only be identified with the study number and will not bear the participant's name. Only the overall findings will be discussed and shared. No specific information about participants will be discussed or shared.

Problems or Questions

If you ever have any questions about the study or about the use of the results you can contact the principal investigator, **Dr. Abdullahi Rashid** by calling **0722243428**.

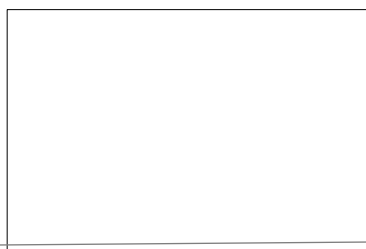
If you have any questions on your rights as a research participant, you can contact the **Kenyatta National Hospital Ethics and Research Committee (KNH- ESRC)** by calling **2726300 Ext. 44355**.

The consent form and the participant's statement.

I _____ parent/guardian of a child _____ confirm I have received information regarding the study research, risk, benefit and hereby agree to participate in the study with my child. I understand our participation is fully voluntary without monetary benefit and I am free to withdraw at any time. I have been given adequate time to ask the question and seek clarification and these have been addressed satisfactorily.

Parent/guardian's signature: ----- Date: -----

Parent/guardian's finger prints



Date: _____

Witness's signature: _____ Date: _____

I _____ declare that I have adequately explained to the above participant, the study procedure, risks, and benefits and given him /her time to ask questions and seek clarification regarding the study. I have answered all the questions raised to the best of my ability.

Interviewer's Signature _____

Date _____

**Appendix II: Dummy table 1: Socio-demographic characteristics of children
Study: Prevalence and factors associated with missed opportunities for vaccination in
Wajir County Referral Hospital**

Variables	n= 352	Frequency %
Category of patients Outpatients Inpatients		
Age of the child in months Median Range (IQR) Categories, n% 0-9 months 10-24 months		
Sex Male Female		
Place of delivery Health facility Home		
Antenatal care Yes No		

**Appendix III: Dummy table 2: Socio-demographic characteristics of primary caregivers
Study: Prevalence and factors associated with missed opportunities for vaccination in
Wajir County Referral Hospital**

Variables	n= 352	Frequency %
Age of primary caregivers Mean (SD) Range		
Relationship of primary caregiver to child Mother Father Both parents Aunt/uncle Others (specify)		
Marital status of primary caregiver Married Not married		
Education status of primary caregiver Never had formal education Primary Secondary Tertiary		
Employment status of primary caregiver Unemployed Self-employed Formal employment		

Appendix IV: Dummy table 3: factors associated with missed opportunity of vaccination

Study: Prevalence and factors associated with missed opportunities for vaccination in Wajir County Referral Hospital

Variable	Missed immunization (n=) n(%)	Immunization up-to-date (n=) n(%)	OR (95% CI)	P Value
Childs age 0-9 months 10-24months				
Antenatal care Yes No				
Place of delivery Health facility Home				
Caregivers age in years Mean (SD)				
Caregiver marital status Married Not married				
Caregivers education status Never had formal education Primary Secondary Tertiary				
Caregivers employment status Unemployed Self employed Formal employment				

Appendix V: HEALTH FACILITY EXIT SURVEY

Study: Prevalence and factors associated with missed opportunities for vaccination in Wajir County Referral Hospital

Good morning/afternoon. My name is _____ and am working on a programme assessment of vaccination of children in this locality. Our goal is to help improve the vaccination program in general. I would like to respectfully ask for your help in answering the questions in this survey. I know you are busy, so we will interview you for only a few minutes. Your participation is voluntary and completely anonymous. Would you be willing to answer these questions? Thank you very much.

Questionnaire serial number _____

Date of interview _____

Geographical location _____

Name of interviewer _____ Supervisor _____

Name of health facility _____

Sub-county _____ County _____

A. Classification of the health facility

1. Public/government services.....
2. Private.....
3. Non-profit.....
4. Faith-based organization....
5. Other (specify).....

B. Type of Health facility

1. Hospital
2. Clinic
3. Health center
4. Health post

C. Filter

The child appears to <24 months

1. Yes.....continue
2. No Thank the person and move on to the next

C. Filter

A caregiver has given consent to participate

1. Yes..... continue
2. NoThank the person and move on to the next

SECTION 1. DATA ON THE CHILD

(In case of more than one child choose the youngest child)

1. Date of birth known?
 1. YesDate of Birth.....
 2. No.....
 Age of child in months.....weeks....
2. Sex or gender of child
 1. Male.....2. Female.....
3. Why did you bring the child to this healthcare facility today (do not read out the choices)
 - 1) For medical consultation (child is sick)
 - 2) For vaccination.....
 - 3) Health child visit or growth/development checkup.....
 - 4) A child is only accompanying (not for treatment, vaccination)
 - 5) Hospitalization (child is admitted or still on admission)
 - 6) Other (specify).....

SECTION 2. DATA ON THE CHILD`S CAREGIVER, PARENTS/GUARDIAN

4. Sex of (caregiver/interviewee)
 1. Male.....2. Female.....
5. What is your relationship to the child?
 - 1) Mother
 - 2) Father
 - 3) Grandparent
 - 4) Uncle/aunt
 - 5) Brother/sister
 - 6) Other (specify)
6. Can you read and write?
 1. Yes
 2. No
7. Level of formal education
 1. No formal education
 2. Did not complete primary (less than std 6)
 3. Completed primary
 4. Completed secondary school
 5. More than secondary school

8. What do you do for a living?
 1. Housewife
 2. Employee or laborer
 3. Farming
 4. Self-employed
 5. Boss/employer
 6. Teacher
 7. Student
 8. Other (specify).
9. By what means of transportation do you usually come to this facility? (Please check all that apply)
 1. Walk
 2. Bicycle
 3. Motor cycle
 4. Car
 5. Bus
 6. Other (specify)
10. How long does it take you to get here? Hours.....Minutes.....
11. Have you heard or seen messages of vaccination in the last one month?
 1. Yes continue with question 12
 2. No skip to question 13
12. Where/how did you hear or see the message? Do not read out the options, tick all that apply.
 1. Radio
 2. Television
 3. Newspaper
 4. Health facility
 5. Telephone message
 6. Facebook/internet
 7. Child`s school
 8. Place of worship
 9. During a home visit by health workers or health outreach
 10. Community meetings
 11. Others (specify)
13. A) Do you feel that you know the vaccines your child needs?

3. Other relatives
4. The consensus of father and mother
5. Others (specify)

Section 3: Use of vaccination card/MCH booklet and information on vaccines administered

18. Does your child have a vaccination card/MCH booklet?
 1. Yes and I have it with me..... go to question 20
 2. Yes but I do not have it with me.... go to question 19a
 3. Nogo to question 19b
19. A) Could you tell us why you do not have the vaccination card/MCH booklet with you today?
 1. It is at the nursery school or daycare center
 2. I left it home (because I forgot to bring it)
 3. I left it home (because I did not it was important to bring it)
 4. The card or MCH booklet has been damaged
 5. Because the vaccination was not the reason for the visit
 6. Other (specify)

B) Why don't you have a vaccination card/MCH booklet?

1. I lost it
2. I have never been given
3. I don't know
4. Other (specify)

Whenever the vaccination card/MCH booklet is not with the caregiver today, request to complete the information in Health facility register follow up form. Assure them this information will only be used to match the records in the health facility register. #

20. Request to examine the child's vaccination card/MCH booklet to fill out the following table.

Date administered as written in vaccination card/MCH booklet

Vaccines	Dose 0	Dose 1	Dose 2	Dose 3
BCG				
Oral polio				
IPV				
DPT-HepB-Hib				
Rotavirus				
Pneumo (PCV)				
Measles or MR				
Yellow fever				

Not to the interviewer: what was the source of the vaccination dates?

1. Official vaccination card/MCH booklet
2. Temporary vaccination card
3. Health facility register

20b) please review the entire maternal and child health booklet and indicate which recording areas are available and which ones have been filled. A recording area is considered filled or marked if any deliberate mark or information is included. If it's unclear whether there are deliberate marking or recorded information, perhaps due to damage to the document, then mark that you are unsure.

CHECK ALL THAT APPLY.

	Is the recording area available?		Is the recording area marked?		
	No	Yes	No	Yes	Unsure
A child background information					
Vaccination history					
Vitamin A					
Growth monitoring chart					
Early eye or vision problem					
Newborn child delivery					

21. Have you lost a vaccination card/MCH booklet for this child?
 1. Yes
 2. No skip to question 23
22. Did you encounter it difficulty replacing it?
 1. Yes
 2. No
23. Could you tell me what purpose the vaccination card/MCH booklet serves? Don't read out options, check all that apply.
 1. To know which vaccines the child has had and which ones are missing
 2. Birth certificate and or notification
 3. Overall health record and growth monitoring
 4. Record and remind for a return visit
 5. Other (specify)
 6. Do not know/no response

SECTION 4: TODAY`S VACCINATION

24. During today`s visit did the personnel/staff ask you for the child vaccination card/MCH booklet?
 1. Yes skip to question 26
 2. No skip to question 25
25. If no, did they ask for the vaccination status of the child?
 1. Yes
 2. No
26. Was your child vaccinated here today?
 1. Yes skip to question 29
 2. No
27. Why was your child not vaccinated today?

First, listen to the reasons given by the caregiver and then try to choose one option from the following blocks. Don't read out the options

BLOCK A: REASONS RELATED TO HEALTHCARE WORKERS

- A1. The doctor/nurse said the child was not eligible for vaccination today
- A2. The health worker who saw us today did not tell me about vaccinating the child today
- A3. The doctor/nurse said the child could not be vaccinated because s/he was sick

If because of illness, what type of disease or treatment did the child receive?

1. Minor illness such as mild fever, cold, cough or diarrhea
2. Major illness requiring admissions such as severe pneumonia or severe malaria
3. Other illnesses such as intestinal parasitosis, malnutrition, anemia, dehydration, and urinary tract infection.
4. A child is taking medication to write down generic name
5. HIV/AIDS
6. Other (specify)

BLOCK B: REASONS RELATED TO THE CAREGIVER

- B1. This child is already vaccinated fully for his/her age
- B2. The last time the child was vaccinated he/she got sick or had a reaction
- B3. My religion doesn't permit vaccination or I don't believe vaccination
- B4. Vaccination was not the purpose for this visit
- B5. I don't trust the health workers/the vaccines in this facility
- B6. I forgot to take the child to the vaccination area
- B7. I did not have today the time to wait for vaccination
- B8. Other (specify)

BLOCK C: REASONS RELATED TO THE HEALTH FACILITY (LOGISTICS AND ORGANIZATION)

- C1. There was no vaccine in the health facility today
- C2. There were no syringes or other vaccination supplies
- C3. Today is not a vaccination day in this health facility
- C4. The person in charge of vaccination was not here
- C5. there would have a long wait
- C6. The staff treated us badly
- C7. Other (specify)

28. [Note to interviewer: ask only if caregiver reported child was eligible for vaccination but was not vaccinated today] if your child was eligible for vaccination but was not vaccinated today, did the health worker refer you to or inform you where you can receive the missing vaccine dose?

1. Yes
2. No skip to question 39

SECTION 5: QUALITY OF THE VACCINE SERVICES

29. How long did you wait today for your child to be vaccinated? Hours...Minutes.....
30. Did they tell you today what vaccines they gave the child?
1. Yes
 2. No
31. Today, did they tell you the date for the next vaccination appointment?
1. Yes
 2. No skip to question 33
32. Today, did they write down for the date for the next vaccination appointment?
1. Yes
 2. No
33. Did you receive information today on the reactions or side effects that can occur following vaccination?
1. Yes
 2. No skip to question 36
34. If so what did they mention? Choose all that apply
- Pain at injection site Vomiting
Fever Others
Rash
Diarrhea
35. Did you receive information today on what you should do if the child has a reaction or side effect to the vaccines?
1. Yes
 2. No
36. Are you satisfied with the service provided today?
1. Yes
 2. No skip to question 38
37. Why were you satisfied with the services? CHECK ALL THAT APPLY
1. Immediate attention skip to 39
 2. Friendly treatment by staff skip to 39
 3. No charge for services skip to 39
 4. The necessary vaccines or supplies were available skip to 39
 5. Others (specify) skip to 39
38. Why were you NOT satisfied? (CHECK ALL THAT APPLY)

1. Had to wait a long time _____
2. The staff was discourteous _____
3. The language that the health workers use is not clear _____
4. They did not explain what vaccines they had given the child _____
5. The necessary vaccines or supplies were not available _____
6. Others (specify) _____

39. a) Have you ever been asked to pay for vaccines given to a child?

1. Yes
2. No

b) What type of health facility asked you to pay?

1. Public _____
2. Private _____
3. Don't know _____

40. A) Have you ever been asked to pay for a health card/passport for a child?

1. Yes _____
2. No _____

B) What type of health facility asked you to pay?

1. Public
2. Private
3. Don't know

SECTION 6: REASONS TO VACCINATE CHILDREN

41. Could you tell me the purpose of vaccines? (CHECK ALL THAT APPLY; Please DO NOT read out the options)

1. To prevent diseases _____
2. So children will grow up healthy _____
3. To cure/heal diseases _____
4. They don't do any good _____
5. Not sure what they are for _____
6. Others (specify) _____

42. Do you think your child could get diseases if you don't vaccinate him/her?

1. Yes _____

2. No _____
43. What suggestions do you have to improve vaccination services? (CHECK ALL THAT APPLY; Please DO NOT read out the options)
 1. There should be more vaccination personnel _____
 2. There should be less of a wait _____
 3. Hours and days when vaccination services are available should not be limited _____
 4. Vaccination should remain free _____
 5. The treatment of the public, and of the children being vaccinated, should be friendlier _____
 6. Vaccines should always be in stock _____
 7. They should provide information on the vaccines that are being given, on the diseases that they prevent, and on the reactions that they produce _____
 8. More outreach services _____
 9. Other(Specify) _____
 10. None _____
 11. Don't know _____

Interviewer: Thank the interviewee and note the time when the interview ended. Read the following statement:

"Remember that vaccination is a right for all people. Demand this right and remember to bring your child's vaccination card to the health facility each time you visit the center for any reason."

Interviewer's remarks: _____

Supervisor: Please check the completed form for accuracy and completeness

1. Form is complete and accurate (skip patterns adequately observed)
2. There are no errors or inconsistencies on the form

Supervisor's remarks: _____

Supervisor's full name: _____

Supervisor's signature: _____

Appendix VI: HEALTH WORKER QUESTIONNAIRE

Study: Prevalence and factors associated with missed opportunities for vaccination in Wajir County Referral Hospital

The Ministry of Health, in collaboration with the African Regional Office of the World Health Organization, wishes to strengthen the technical skills of all health workers, especially those who provide immunization services. This questionnaire has been designed to identify future training topics in immunization for all health workers. Your collaboration is greatly appreciated. Your name is not included in this questionnaire and your participation is voluntary.

If you decide to participate, please use a pen to mark answers that in your opinion respond appropriately to the question or problem presented. Responses will not serve as the basis for any evaluation of your professional abilities.

Read each section of the questionnaire carefully, and please do not leave any questions blank.

Questionnaire Serial Number: _____

Date of interview: _____

GEOGRAPHICAL LOCATION

Name of interviewer: _____

Name of health facility: _____

Supervisor: _____

County _____ Sub-County _____

A. Classification of this health facility

1. Public/Government service _____

2. Private _____

3. Non-Profit _____

4. Faith-based organization _____

5. Other(Specify) _____

B. Type of health facility

1. Hospital _____

6. During your basic training in nursing, midwifery or medical school, were you trained in the control of vaccine-preventable diseases?

a) Yes_____

b) No_____

7. Since your basic training, have you received training or participated in courses on vaccination or control of vaccine-preventable diseases?

a) Yes_____

b) No_____ (SKIP TO QUESTION 9)

8. If YES, when were you last trained?

a) <1 year ago_____

b) 1-2 years ago_____

c) 2-3 years ago_____

d) >4 years ago_____

KNOWLEDGE OF VACCINATION

FOR QUESTIONS 9 - 10, PLEASE CHECK ALL CORRECT OPTIONS

9. Vaccines that healthy children should receive include: PLEASE CHECK ALL THAT APPLY

a) BCG_____

b) Measles_____

c) Pentavalent_____

d) Polio vaccine_____

e) Rotavirus vaccine_____

f) Pneumococcal (PCV)_____

10. Absolute contraindications against ANY vaccine include: PLEASE CHECK ALL CORRECT OPTIONS

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_____

11. Please match the vaccines listed below with the age at which they should be administered.

Please write in the blank column of the first box the number (e.g. 5) that corresponds to the correct answer in the second box

A	Pentavalent	1	At birth, and 6, 10 and 14 weeks
B	IPV	2	6, 10, 14 weeks
C	BCG	3	9 months
D	OPV	4	14 weeks
E	1st dose of Measles or MR vaccine	5	At birth

12. Vaccine-preventable diseases (VPDs) in the process of eradication or elimination include:

PLEASE MARK ONLY ONE ANSWER

1. TB_____
2. Whooping cough_____
3. Poliomyelitis and measles_____
4. Diarrhea_____
5. None of the above_____

ATTITUDES

13. From day to day, who should evaluate the vaccination status of children, review vaccination cards/health passports, and ensure that children are up to date according to the national schedule?

1. The child's parents_____
2. The health worker responsible for immunization_____
3. Physicians in external consultations, inpatient services, and emergency rooms____
4. All of the above_____

14. In which of the following situations should you inquire about the doses that children have received and those that are missing according to their age? PLEASE CHECK ALL THAT APPLY:

1. During a child's wellness visit_____
2. Consultation for any illness_____
3. When a child is accompanying a caregiver during a pre-natal check-up_____
4. When a child is accompanying a caregiver visiting a health care facility for any reason_____

5. All of the above _____

15. Why do you think that some children are not up to date on their vaccination? PLEASE CHECK ALL THAT APPLY

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

16. 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 _____

17. Please explain your response in Question 16 _____

IN THE FOLLOWING SECTION, DO YOU AGREE OR DISAGREE WITH THE FOLLOWING STATEMENTS:

18. My knowledge of vaccines and vaccination is insufficient or outdated

- 1. Agree _____
- 2. Disagree _____

19. I am very concerned about, and fear, adverse reactions from vaccines

- 1. Agree _____
- 2. Disagree _____

20. Completing nominal vaccine registries (books/notebooks/vaccination cards) delays the timely

- 1. Agree _____
- 2. Disagree _____

PRACTICES

DECISION MAKING IN DAILY PRACTICE

FOR QUESTIONS 22-24, MARK THE ONE CORRECT ANSWER

21. A female infant comes to the clinic today. She is aged for 3 months. She has a documented history of one dose of BCG and one of OPV0, both administered at birth. The mother seeks service to assess the child's growth and development. What vaccines would you give the child today?

- 1. None _____
- 2. Only Polio (OPV) _____
- 3. Only Pentavalent _____
- 4. Measles vaccine _____
- 5. Polio, Pentavalent, Rotavirus, and PCV _____
- 6. Don't know _____

22. Female infants aged 6 months with a documented history of one dose of BCG, two doses of pentavalent, and two doses of polio vaccine. The last doses of vaccines were given when the child was 4 months old. According to the mother, the child experienced a fever and seizure one month ago and is now receiving medical treatment. Following EPI guidelines, what vaccines would you give her?

- 1. I would not vaccinate her _____
- 2. Only polio vaccine and I would refer her to a specialist _____
- 3. DTP5 _____
- 4. Polio and pentavalent _____
- 5. Only measles vaccine _____
- 6. Don't know _____

23. Are vaccination services offered every day at this facility?

- 1. Yes, for all antigens _____
- 2. Yes, services are offered but not for all antigens _____
- 3. No, certain days are scheduled as immunization days _____

24. Do you work in the area of immunization or provide vaccines as part of your job?

- 1. Yes _____ CONTINUE TO NEXT QUESTION/SECTION
- 2. No _____ SKIP TO END, "ADDITIONAL COMMENTS"

NOTE: If you work in the area of immunization or provide vaccines as part of your job, please continue.

If you work in other departments, STOP HERE and thank you for your time.

PRACTICES

IMMUNIZATION PRACTICES AND DECISION MAKING

[THIS SECTION IS ONLY FOR ALL HEALTH CARE PROFESSIONALS WHO ADMINISTER VACCINES]

25. Under what circumstances would you tell the parent what vaccines you are administering AND provide advice regarding what to do in case the child experiences an adverse reaction following immunization?

1. Only if the vaccine administered could produce a severe reaction_____
2. Only when the parent or guardian requests this information_____
3. Never, since this information can be counterproductive and discourage participation in the immunization programme_____
4. Always, regardless of the vaccine used and type of reaction that might be expected_____
5. The probability that an adverse event related to vaccination is so low that I would rarely have to provide this information_____

26. Today, you vaccinate a female child aged 2 months with the first doses of pentavalent, polio and PCV vaccines. After telling her parents which vaccines she received, what other information and recommendations would you provide her caregivers? PLEASE CHECK ALL THAT APPLY

1. The child may experience a bit of fever, diarrhea, or discomfort following vaccination_____
2. The symptoms above generally do not require treatment; however, in the case of fever, the child should be lightly dressed and should NEVER stop breastfeeding_____
3. The parent should return to the health center if these symptoms persist so that the child may be seen by a doctor_____
4. All of the above_____
5. None of the above_____

27. What should be done if you notice that there are children with delayed or missed vaccines in the vaccine registry? PLEASE CHECK ALL THAT APPLY

1. Make a weekly list of children with incomplete schedule_____

2. Contact parents or guardians by telephone, email, or any other means of communication to remind them to vaccinate their children_____
3. Make home visits to encourage the family to complete the child's vaccination schedule and administer missing doses while there_____
4. All of the above_____
5. None of the above_____

28. What could be done to follow up on vaccination of children after hospitalization or outpatient treatment for a chronic condition? PLEASE CHECK ALL THAT APPLY

1. Coordinate with clinical areas, inpatient and emergency departments in hospitals, so that they can review the child's vaccination card/health passport_____
2. Send patients whose physicians consider them eligible for vaccination to the immunization unit so that they can be vaccinated before leaving the hospital_____
3. In hospitals, a health worker in the immunization unit could visit inpatient departments to review the medical records of children who will be discharged that day, thereby identifying children to start or complete the vaccination schedule_____
4. All of the above_____
5. None of the above_____

29. At 8:00 AM, you prepare a vaccination cold box for the morning shift at the health facility. You place two vials of 10 doses of measles vaccine in the cold boxes. At 3:00 pm, a mother requests that her 14-month old child receive one dose of measles vaccine. The child has not yet received a measles vaccine but has received other vaccines for children aged < 1 year. The child has no contraindications. Only two doses from the first vial have been administered since 8:30 am when the first dose was given.

Which of the two vaccine vials in the cold box would you use to vaccinate this child?

1. I would use the first open vial to prevent vaccine wastage_____
2. I would tell the mother to return the next day, since I cannot open a new vaccine vial and there are no more children to vaccinate_____
3. I would open the second vial of measles vaccine to immunize the girl_____
4. I would recommend that the mother take the child to another health center to be vaccinated____
5. None of the above_____

30. What instructions do you USUALLY give to caregivers the first time you issue them a new vaccination card? PLEASE CHECK ALL THAT APPLY

1. Keep the card safe _____
2. Bring this card to all visits to the health facility _____
3. Bring this card only when you come for vaccinations _____
4. No instructions are given _____
5. Others: Specify: _____

31. What do you do for a caregiver that forgot the vaccination card/health passport at home?

1. I do not vaccinate the child and ask mother to return with card next time _____
2. I issue a new card, vaccinate and record today's vaccinations in the new card and in the register _____
3. I issue a new card, vaccinate and record old vaccinations from the register _____
4. I issue a temporary card, vaccinate, record in register, and ask them to bring the old card for next visit _____
5. I will vaccinate without the replacing card, but I will document in register only _____
6. Other: Specify: _____

32. If a caregiver reports that the child's card has been lost or damaged, what do you usually do?

1. I issue a new card and record all future vaccines in the new card
2. I issue a new card and transcribe all previous vaccines from the register
3. I issue a new card and ask the woman to tell me of all previous vaccinations so I can write them down
4. Vaccinate without replacing the card, document in the register only
5. Other: Specify: _____

IN THE FOLLOWING SECTION, DO YOU AGREE OR DISAGREE WITH THE FOLLOWING STATEMENTS:

33. Today, I have enough vials of vaccines for all patients who seek immunization services

1. Agree _____
2. Disagree _____

34. If you disagree, which vaccines are you lacking?

1. BCG _____
2. OPV _____
3. Penta _____
4. Rotavirus _____
5. PCV _____
6. Measles/MR _____
7. Other (Specify) _____

35. Today, I have all the materials that I need to vaccinate patients who seek immunization (including syringes, recording sheets, vaccination cards/health passports, and other materials)

1. Agree _____
2. Disagree _____

If disagree, what are you lacking?

1. Syringes _____
2. Recording materials _____
3. Vaccination cards/health passports _____
4. Other _____

36. When the professional in charge of vaccination is unavoidably absent, another health care professional is available to replace him or her

1. Agree _____
2. Disagree _____

37. There is sufficient staff offering immunization services at this facility

1. Agree _____
2. Disagree _____

ADDITIONAL COMMENTS:

Thank you for your time and have a wonderful day!

Appendix VII: FOCUSED GROUP DISCUSSION

Study: Prevalence and factors associated with missed opportunities for vaccination in Wajir County Referral Hospital

Sample Focus Group Discussion Guides – for Mothers/Caregivers and Health workers

Sample introduction:

Good afternoon! My name is [Name] and I will be facilitating the discussion this afternoon. This is [Name2] and he/she will be taking notes and helping me. Thank you so much for taking the time to be here today. We will be discussing childhood vaccinations and we are interested in finding out from you what you know about the vaccination of children in this community. This information will be anonymized and will be treated as confidential. If at any point you do not want to continue participating in this discussion, you are free to leave the group and we will no longer be asking you any more questions. The information discussed today will help us to understand what can be done to improve childhood vaccination programs in [Country].

If recording:

We would like to record this discussion. Even though we will be taking notes, we are not able to write everything down and want to be able to go back and listen to any information we might have missed. All notes and the recording will be kept safely and securely. Is everyone okay with recording this conversation? (Confirm that all participants consent)

We ask that you please take turns while speaking and do not interrupt anyone. We are interested in what all of you have to say, so please be respectful of each other's opinions. This discussion will last about 45 minutes.

Before we begin, does anyone have any questions?

Sample FGD questions for Mothers/Caregivers

Opening questions:

1. What are some health problems that affect children in this community?
2. How are your children protected from being affected by these health problems/diseases?
 - a. Probe: If vaccination is not mentioned, ask: What about vaccination?

Key questions: General vaccination

1. How does the community feel about childhood vaccination?

2. What can you tell us about the childhood vaccination services in this community?
 - a. Probe for levels of satisfaction with the vaccination services they receive from public and/or private clinics/hospitals, ask: What is good and what is not so good about the vaccination services?
 - b. Probe for reasons for their satisfaction or dissatisfaction, ask: Why?
3. In your opinion, what are some of the ways these vaccination services can be improved?

Key questions: Vaccine compliance

4. In [Country], as you may be familiar with, the national program sets a vaccine schedule. How would you describe compliance with vaccination schedules in this community?
5. Many children do NOT receive all their recommended vaccines on time. What are some of the reasons children do NOT receive all their vaccines at the right time?
6. What will be your suggestion for helping children receive all their recommended vaccines according to the schedule?

Key questions: Missed opportunities

7. In some cases, children who visit health facilities, for different reasons, still do not get all the needed vaccines. In your opinion, what are some reasons some health workers may not be willing or able to give children all their recommended vaccines on time when they visit the clinic/hospital?
8. Some children receive some, but not all the vaccines they need. In your opinion, what are some of the reasons mothers/caregivers may not be willing or able to ensure that their children receive all their recommended vaccines on time when they visit the clinic/hospital?
9. What are the ways you can recommend for ensuring that children receive all their recommended vaccines on time whenever they have the opportunity of visiting a clinic/hospital for any reason? (They may be visiting for immunization, nutrition, treatment of other ailments, or accompanying an adult to the clinic/hospital)?

Closing questions

10. Are there any additional suggestions/ideas you would like to share at this time? Anything else to add?

11. Remember to close on a positive message about vaccines and reducing MOVs!

Sample FGD questions for Health Workers

(Similar questions can also be used for the in-depth interviews,)

Opening questions:

1. What are some of the health problems that affect children you see at this facility?
2. How are children protected from being affected by these health problems/diseases? (Probe for individual health workers' roles; if vaccination is not mentioned, ask: What about vaccination?)

Key questions: Vaccination services

3. What can you tell us about vaccination services in this health facility?
 - a. Probe for levels of satisfaction among clients with the vaccination services they are providing
 - b. Probe for perceptions regarding the vaccination program among different groups including health workers
4. What are some challenges to delivering vaccination services at this health facility?
5. In your opinion, what are some of the ways vaccination services can be improved?

Key questions: Vaccination compliance

6. In [Country], as you are aware, the national program sets a vaccine schedule. How would you describe compliance with the vaccination schedules in this community?
 - a. Probe for the proportion of children that receive all their recommended vaccines on time
7. Probe for reasons why some of the children DO NOT receive all their vaccines at the appropriate time In some other health facilities, we have been told that there are circumstances when children that come to the facility are not vaccinated. Can you tell me the circumstances when you, or other staff, would not vaccinate a child in this clinic?
 - a. Probe for contraindications: overage, vial doses, vaccination days, no vaccines, etc.
8. What are your suggestions for helping children to catch up with their vaccinations if needed?

Key questions: Missed opportunities

9. Some children who may not be up-to-date on their vaccinations may visit a health facility for a variety of reasons (immunization, nutrition, treatment of other ailments, accompanying an adult to the clinic/hospital) and may leave without receiving any immunizations. What is your experience with such children at this health facility?
 - a. Probe: How can they be made to receive the vaccines they are eligible for when they visit the clinic?

10. What strategies, if any, can the ministry or this health facility employ to improve the number of children receiving all of their recommended vaccinations on time?
 - a. Probe for ideas or strategies that other critical actors/entities can employ

11. In your opinion, what are the possible barriers to implementing any of these interventions to reduce missed opportunities?
 - a. Probe for possible solutions to any barriers that have been mentioned

Closing questions

12. Are there any additional suggestions/ideas you would like to share at this time? Anything else to add?