

**FACTORS ASSOCIATED WITH UPTAKE OF MEASLES
RUBELLA VACCINE AMONG CHILDREN AGE 9-18
MONTHS IN EASTLEIGH NORTH WARD NAIROBI
COUNTY, KENYA**

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**Factors Associated with Uptake of Measles Rubella Vaccine among
Children Age 9-18 Months in Eastleigh North Ward Nairobi County,
Kenya**

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**A Thesis Submitted in Partial Fulfilment for the Degree of Master of
Science in International Health in the Jomo Kenyatta University of
Agriculture and Technology**

2020

DECLARATION

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

Signature Date.....

Ruth Wangari Kanyiru

This thesis has been submitted for examination with our approval as University Supervisors

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JKUAT, Kenya

DEDICATION

I dedicate this thesis to my family for their, prayers, support and patience as I pursued my studies. And especially my mother for praying and supporting me.

Most of all, to God almighty for the opportunity and brains to pursue my education

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ABBREVIATION AND ACRONYMS

CBO:	Community Based Organization
CDC:	Centers for Disease Control and Prevention
CHV:	Community Health Volunteer
CRS:	Congenital rubella syndrome
DHIS 2:	District Health Information Software 2
EPI :	Expanded program of immunization
EU :	European Union
GAVI:	Global Alliance for Vaccines and Immunizations
GOK :	Government of Kenya
GVAP:	Global Vaccine Action Plan
HCW	Health Care worker
KRCS	Kenya Red Cross Society
MCV1:	Measles-Containing-Vaccine First-Dose
MOH:	Ministry of Health
MR:	Measles Rubella
NA:	Not applicable
NACOSTI:	National Commission for Science, Technology and Innovation
NGO:	Non-Governmental Organization

SAGE:	Strategic Advisory Group of Experts
SIA:	Supplemental Immunization Activity
UNDP:	United Nations Development Programme
UNICEF:	United Nations Children's Fund
USA:	United States of America
VPD	Vaccine preventable disease
WHA:	World Health Assembly
WHO:	World Health Organization

DEFINITION OF OPERATIONAL TERMS

Caregiver: A caregiver is someone who is responsible for looking after a very young child. It is nearly always women who are the primary care givers.

Catchment area: the area from which a hospital's patients are drawn

Coverage: is the percentage of people who receive one or more vaccines in relation to the overall population.

Defaulter tracking: information systems, procedures and tools which enhances following up of children who have dropped out of immunization program, those infants who started the routine EPI immunizations but failed to complete the schedule for whatever reason are followed up.

Hard to reach: is a group of children who are at high risk of being under-served with vaccination services, and therefore susceptible to vaccine preventable diseases. These hard to reach are migrants or hard to access buildings

Immunization: It's the process whereby a person is made immune or resistant to an infectious disease, typically by the administration of a vaccine.

Uptake: It's utilization of vaccination services for a particular vaccine antigen

Vaccine: A biological preparation that provides active acquired immunity to a particular disease

Zero Dose: children who haven't got a single dose of vaccine to build their immunity to measles.

ABSTRACT

Globally, 535 000 children died of measles in 2000. By 2010, there was a global push to improve vaccine coverage which resulted in a 74% reduction in deaths. These efforts contributed to 23% of the overall decline in under-five deaths between 1990 and 2008. However, in several countries in African, measles is still a major public health problem. Rubella remains a threat to pregnant women and their fetus, with more than 100 000 children born each year with congenital rubella syndrome. Kenya in May 2016, introduced Measles-Rubella combined vaccine in its nationwide supplementary immunization activities campaign. However, since its introduction, the coverage has been very low especially in urban areas. This study aimed at assessing factors associated with uptake of measles rubella vaccine among children age 9-18 months in Eastleigh North Ward Nairobi County. This was a descriptive cross sectional study where data was collected from 186 caregivers of children age 9-18 months using semi-structured questionnaires and key interviewers guides. Analysis involved descriptive statistics such as frequencies and proportions. Test of association of study variables was done using Pearson's Chi-square test. Level of significance was fixed at 0.05 ($p < 0.05$) with a 95% Confidence interval and P value less than 0.05 was considered significant. Qualitative data was analyzed using thematic analysis where HCW provided and ranked reasons for low uptake of MR and content analysis methodology. Approximately 52.2% caregivers had secondary education, majority were self-employed 58.1%. About (60.8%) were Muslims while (32.3%) were Christians. Of the 186 caregivers interviewed (159, 85.5%) had their children vaccinated with MR1 and 35.5 % with MR2. Awareness about MR vaccine was high (90.3%) among the caregivers; however, knowledge of child ever being diagnosed with measles or rubella was low 44.6%. There was a strong correlation between level of education and MR1 vaccine uptake, ($P=0.007$). This study also identified that caregivers who were aware of the schedules of MR vaccine ($P=0.039$) had a higher chance of bringing their children for MR2 vaccine. Other factors associated with uptake of MR vaccine were lack of immunization services at the health facility ($P=0.008$), awareness of existence of MR vaccine hospital delivery, communication and health system related factors like availability of vaccine and vaccinator. Barriers identified for not receiving the vaccine, myths/negative attitude (66.7%) and religion (15%). Most care givers obtained information about MR vaccine from health care personnel 58.1% (108). Among the children, 18.3% (34) had been diagnosed with measles or rubella. The uptake of MR2 is relatively low according to the findings suggesting that majority of the caregivers rarely bring their children for the second dose (MR2). The result established a low correlation between the awareness of MR vaccine doses. This implies the importance of instituting strategies that involves, aggressive awareness campaigns and education programs that focus on increasing caregiver awareness of MR vaccine dosing and risk factors for none vaccination. The ministry of health and other non-state actors to come up with ways of improving immunization program. This will consequently increase uptake of MR vaccine and reduce the disease burden. Finally, findings of the study will benefit scholars as source of literature on the factors associated with uptake of MR vaccine.

CHAPTER ONE

INTRODUCTION

1.1 Background Information

Measles is a deadly and highly infectious virus that has affected mankind for centuries. Despite the existence of a highly effective measles vaccine since 1963, and although vaccination reduced the number of deaths from measles, it still remains one of the leading causes of vaccine preventable deaths in the world.

Globally, it's estimated that 535 000 children died of measles in 2000. By 2010, there was a global push to improve vaccine coverage which resulted in a 74% reduction in deaths. These efforts, supported by the Measles and Rubella Initiative, contributed 23% of the overall decline in under-five deaths between 1990 and 2008. However, in several countries in African, South-East Asian, European, Eastern Mediterranean and Western Pacific Regions, measles is still a major public health problem. Rubella also remains a threat to pregnant women and their fetus, with more than 100 000 children born each year with congenital rubella syndrome (CRS), like includes heart defects, blindness and deafness. (Global measles and rubella strategic plan WHO, 2012)

The Global Immunization Vision and Strategy of the World Health Organization (WHO) created a strategic framework for vaccination with the Measles Rubella Immunization (MRI) goals in 2008, which were achieved by most countries (UNDP, 2014). In 2015, the global measles coverage was at around 85% and the decline in mortality from measles at around 79%, compared to the 2000 baseline estimates. Both the figures were short of the WHA targets and at risk of missing the 2020 GVAP objectives. In 2016, the Strategic Advisory Group of Experts (SAGE) gave a recommendation for the introduction of routine second dose vaccine in all countries, regardless of their fulfillment of the 80% coverage criterion for introduction of the two-dose schedule (SAGE, 2016).

In the African region, progress in immunizing children against measles has increased by 85% coverage in 2010 from 56% in 2001 (Gastañaduy, Redd, Fiebelkorn, Rota,

Bellini & Seward, 2014). Despite the progress, Africa has experienced measles outbreaks and stagnation in vaccination coverage. The outbreaks came as a result of conflicts in the region disrupting the immunization activities by resistance religious groups, and from the epidemiological shift in measles cases towards older age groups (Parker *et al*, 2017).

Kenya has been a strong follower of the set protocols to ensure reduced cases of measles. However, the delay in the 2006 SIA resulted in massive outbreak of measles, which was a setback in achievement of national and international goals (GOK, 2012).

In 2013, Kenya introduced a second dose measles vaccine in its routine immunization schedule, but has not had high MCV1 or MCV2 coverage in recent years (Makokha, Wanjala, Githuku & Kutima, 2014). In May 2016, the Kenyan government launched measles and rubella vaccine campaign for children under 15years to increase its coverage and introduce a combined measles-rubella (MR) vaccine to the country. It was also announced that MR vaccine will be formally introduced into the routine immunization schedule in early 2017 (Mbabazi, Collins & Chemirmir, 2017). It remains to be seen whether the addition of second dose vaccine and MR vaccine into the routine schedule has led to an improvement in measles coverage and incidence decline in the country. This required a study to determine the level of uptake of MR among children 9-18months.

The Nairobi county health records indicated Eastleigh North Ward leading in terms of incidences of measles rubella infections. This was despite optimal efforts to ensure adequate vaccination coverage (Anecdotes, Nairobi County Ministry of Health, 2017). Presence of an immigrant community in the Eastleigh North Nairobi County has been cited as a predisposing factor owing to the failure to adhere to the vaccination regimes by the affected populations. The need to carry out the study and determine the other predisposing factors was of paramount importance.

1.2 Statement of the Problem

In 2016, the Strategic Advisory Group of Experts (SAGE) gave a recommendation for the introduction of routine second dose vaccine in all countries. Although the

African region has made progress in immunizing children against measles, attaining a coverage 85% in 2010, measles outbreaks and stagnation in vaccination coverage continues (Gastañaduy *et al.*, 2014).

Measles remains a major public health concern in Kenya. It contributes significantly to the burden of disease among children below 5 years (MOH, 2013). In May 2016, Kenyan government introduced Measles-Rubella (MR) combined vaccine. This change came as a result of an increase in cases of rubella in Kenya with 422 cases in 2015 (CDC and Prevention Progress in Measles Control - Kenya, 2016). Rubella has serious consequences for pregnant women, like fetal death and congenital rubella syndrome.

There has been low level of coverage of measles vaccine in urban areas in Kenya, where Eastleigh North is located (KDHS, 2009) as compared to rural areas at 76% versus 81% respectively. This predisposes them to risks associated with MR infection since there is no treatment. This shouldn't be the case, as a vaccine exists for prevention of MR.

A study on risk factors for non-vaccination against measles among children below five years in Eastleigh, Nairobi Kenya, found that routine measles vaccination coverage in the area had remained below 75%. This was attributed to factors such as being born outside Kenya like immigrant refugee Somali population. (Omolo, 2007) The last outbreak was in Somali community of Wajir in February 2018 with more than 135 cases reported, out of which 35 were classified as rubella. It's needless to say that there is migration from Eastleigh to North Eastern region where MR coverage is very low at 45%.

Lack of adequate measles coverage has been associated with vaccine unavailability 75% to 100% and this suggest that lack of measles vaccination is associated with 28% higher mortality.(GAVI, 2015) In this regard, it is important to identifying determinants of vaccine uptake in the area so as to implement policies for increasing vaccine compliance. The aim of this study was to identify the factors associated with MR vaccine uptake in Eastleigh North Ward Nairobi County.

1.3 Justification of the Study

Despite the progress made in ensuring that vaccination realizes the necessary coverage outbreaks of measles are still being reported, with Nairobi County reporting many incidences of MR in Eastleigh North. It's attributed to Kenya sharing borders with the conflict countries of Somalia and South Sudan, leading to a large influx of refugees and immigrants, many not vaccinated against measles. This has led to several outbreaks in the past few years, either in refugee camps or in informal settlements communities and neighboring counties. (GOK, 2012).

This has led to the need to conduct the research and determine the factors associated with vaccine uptake in Eastleigh North ward which host a large community of Somali immigrants. It is hoped that the findings of this study will provide recommendations on ways of improving the MR vaccine uptake in this risk prone area. In this regard, the data collected will lead to more sensitization of mothers and public on MR vaccine benefits, increase in knowledge on socio demographics effects as well as awareness among caregivers.

The Ministry of Health as well as non-state actors such as NGOs will gain information on measures that can be put in place to overcome such challenges, come up with ways of improving immunization program, at County and facility levels to increase uptake of MR and consequently reducing the disease burden .The findings of the study could also be important to scholars as it builds on literature on the factors associated with MR vaccine uptake.

1.4 Objectives

1.4.1 General Objective

To determine factors associated with measles rubella vaccine uptake among children age 9-18 months in Eastleigh North Ward Nairobi County

1.4.2 Specific Objectives

The study will be guided by the following objectives:

- i. To determine uptake of measles rubella vaccine among children age 9-18 months in Eastleigh North Ward Nairobi County.
- ii. To determine the individual factors associated with uptake of measles rubella vaccine among caregivers of children age 9-18 months;
- iii. To determine awareness regarding measles rubella vaccine among caregivers of children age 9-18 months Eastleigh North Ward Nairobi County;
- iv. To determine health system related factors associated with uptake of measles rubella vaccine in Eastleigh North Ward Nairobi County.

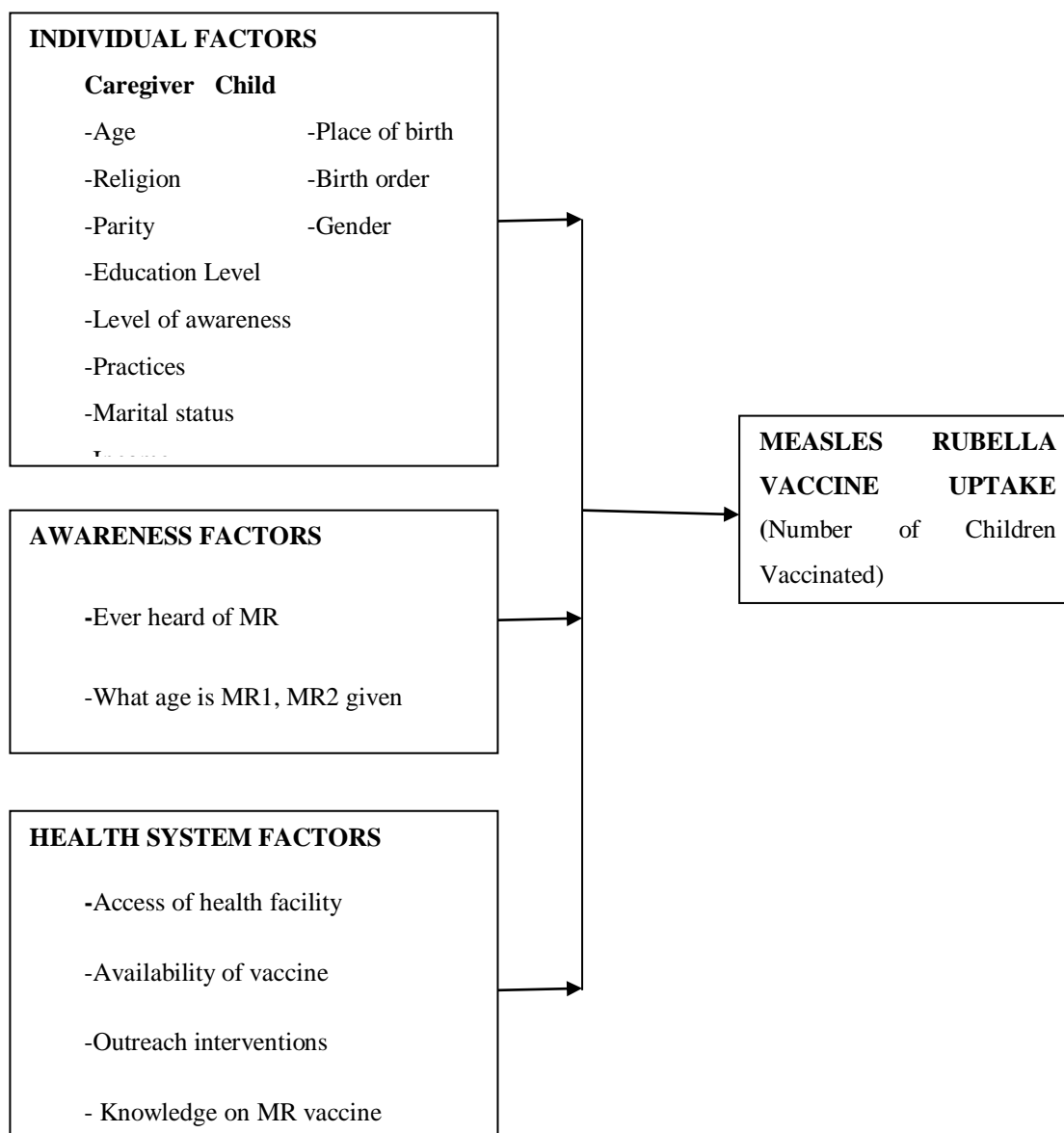
1.5 Research Questions

- i. What is the level of uptake of measles rubella vaccine among children age 9-18 months in Eastleigh North Ward Nairobi County?
- ii. What individual factors influence measles rubella vaccine uptake by caregivers with children age 9-18 months in Eastleigh North Ward Nairobi County?
- iii. What is the level of awareness on measles rubella vaccine among caregivers of children age 9-18 months influence uptake in Eastleigh North Ward Nairobi County?
- iv. What are the health system factors associated with uptake of measles rubella vaccination in Eastleigh North Ward Nairobi County?

1.6 Conceptual Framework

The individual factors associated with uptake of Measles rubella vaccine. Age, education level, social economic status, marital status, religion, parity, and awareness level of the mother influences the uptake of vaccination services. Sex and birth order of the child, distance and time taken to reach the nearest vaccinating facility affect uptake of MR vaccine.

Healthcare worker factors, such as opening/closing time of health facility and availability of vaccine.



Independent Variable

Dependent Variable

Figure 1.1: Conceptual Framework

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

Measles and rubella are serious diseases that can cause significant morbidity and lead to potentially fatal illness, disability and death. German measles, or rubella (MR) is a viral disease that is transmitted through contact with droplets from infected persons. The disease causes a red rash on the body, a fever and swollen lymph nodes (Atkinson, 2011). The disease is highly infectious, touching mouth, nose, or eyes after coming into contact with droplets from an infected person.

Global estimates of the burden of rubella suggest that the number of infants born with congenital rubella syndrome in 2008 exceeded 110 000 which makes rubella a leading cause of preventable congenital defects (Ministry of Health, 2013). The 2008 estimates suggest that the highest congenital rubella syndrome burden is in the South-East Asia (approximately 48%) and African (approximately 38%) regions. (Ministry of Health, 2013).

2.2 Measles Rubella in Children

Measles and Rubella are one of the leading causes of death among children under-five years of age particularly those with low immunity, anaemia or severe infectious diseases (Lyimo, 2012). In Kenya, Mariara, Karienyeh and Kabubo (2012) observed that, child mortality rates have remained high in spite of the government's commitment to create an enabling environment for provision of quality healthcare and reduction of mortality levels. Measles is not known to affect animals and neither is it unique to children nor gender as all ages and gender are susceptible.

Children less than five years old are vulnerable to acute infectious vaccine-preventable diseases because of low disease-specific antibodies underpinning timely vaccinations to stimulate cell-mediated immune response. Measles rubella vaccine protects vaccinated people and cuts down on spread of the disease to uninfected people because vaccinating enough (85% to 90%) people in a community lowers the

chance of measles infection spreading from person to person, and lowers the likelihood of unvaccinated individuals getting infected as a result of a lower risk of exposure (Atkinson, 2011).

Measles' outbreaks experienced in Kenya have been affecting all age groups as young as three months to fifty years of age (Kenya Red Cross Society, 2011). Rubella is an infectious viral disease characterized by a mild cutaneous maculo-papular rash. The rubella rash occurs only in 50%-75% cases and is sometimes misdiagnosed as measles or scarlet fever (WHO, 2015). Rubella is a benign disease and children usually develop few or no constitutional symptoms.

2.3 Clinical Manifestations , Risks ,Transmission, Management and Prevention and control

2.3.1 Measles

It is a respiratory disease affecting the throat and lungs with clinical presentation of high fever, running nose, bloodshot eyes and tiny white spots on the side of the mouth appearing within the first 8-12 days after infection, several days later a characteristic rash develops starting with the face and upper neck gradually spreading downwards with severe and fatal complications which include blindness, encephalitis, and ear infection (Republic of Kenya, 2013).

Measles is an acute, highly infectious viral disease caused by a Morbillivirus and for which humans are the only reservoirs. WHO (2015) notes that transmission is primarily person-to-person via aerosolized droplets or by direct contact with the nasal and throat secretions of infected persons. When measles virus is introduced to a non-immune population, nearly 100% of individuals will become infected and develop Clinical illness. The incubation period of measles is about 10 to 12 days (range 7-18 days). Malnourished children are at higher risk of developing complications and mortality from measles infection.

2.3.2 Rubella

Rubella is a contagious viral infection preventable by vaccine and best known by its distinctive red rash. It has an average incubation period of 17 days. Arthralgia or arthritis may occur in up to 70% of adult women with rubella. Rubella is transmitted through airborne respiratory droplets (coughs or sneezes), saliva (kissing or shared drinks) and mother to child during pregnancy, labor, or nursing. Persons with rubella are most infectious when rash is erupting, but they can shed virus from 7 days before to 7 days after rash onset. Post auricular and posterior cervical lymphadenopathy is characteristic and precedes the rash by 5-10 days. Measles and rubella are highly infectious (spread very fast) causes rashes, eye infection, respiratory infections, diarrhea and death in some cases. Symptoms of rubella mimic those of measles and include red rash, fever, painful joint and muscle spasm, clenched teeth and swollen lymph glands around the ears and the back of the head. Up to 50 per cent of rubella victims may not show symptoms. Rubella infection on the other hand is on the increase globally and in Kenya (MOH, 2013).

Rare complications include thrombocytopenic purpura and encephalitis. There is no specific treatment for rubella but the disease is preventable by vaccination. World Health Organization estimates that in most developing countries, case-fatality rates for measles among young children may still reach 5–6% annually (WHO, 2015).

2.4 Management and Prevention

2.4.1 Management of Measles Rubella

Measles vaccination provides a safe, efficacious and cost-effective method for disease protection, and is credited with preventing over 2 million infant deaths per year accounting for a 78% decrease in measles related deaths globally between 2000 and 2008 (WHO, 2013). Promptly isolation of people suspected to have rubella or measles and report them to the local health department. It is tested through collection of throat (best source), nasal, or urine specimens for viral detection by polymerase chain reaction (PCR) testing and molecular typing, and blood for serologic testing. This is done to confirm diagnosis as there is no treatment. Fever is managed with

analgesics and antibiotic cover is given for infections. Rehydration with oral fluids helps bring down the fever.

2.4.2 Prevention and control of Measles Rubella

Immunization is essential for reducing under-five mortality, monitoring immunization coverage services, guiding disease eradication, disease elimination efforts and probably health resources allocation (Lyimo, 2012). Baale (2013) notes that immunization is one of the most effective public health investments with proven strategies making it accessible to the most hard to reach and vulnerable populations, and is a proven tool for controlling and eliminating life-threatening infectious diseases.

Due to the high disease burden of measles and rubella, the Ministry of Health introduced rubella vaccine into the routine vaccination. The vaccine is administered as a combined vaccine with measles (MR) and replaced the measles vaccine in the routine immunization schedule. Kenya conducted its first measles catch-up campaign in 2002 with the primary objective of reducing measles related mortality through the provision of a second opportunity for measles vaccination and achieved the highest ever coverage for a measles campaign. In 2013, Kenya introduced measles second doses to be administered at the 18th month. Later Measles-rubella (MR) vaccines were introduced into routine immunization in January 2017 (MOH, 2017).

Risk factors for MR are children with immunodeficiency due to HIV or AIDS, leukemia, alkylating agents, or corticosteroid therapy, regardless of immunization status. Travel to areas where measles is endemic or contact with travelers to endemic areas. Failure to adhere to the vaccination regimes among the immigrant community in the Eastleigh North Nairobi County has led to the need to carry out the study and determine the other predisposing factors to the regular outbreaks. Control measure include; Counsel susceptible pregnant women regarding the risks for intrauterine rubella infection and vaccination and isolation of patients during their infectious period (i.e., 5--7 days after rash onset).

2.5 Level of Uptake of Measles Rubella Vaccination

2.5.1 Global Coverage of MR

Immunization averts an estimated 2.5 million deaths annually; however millions of children in developing countries, almost 20% of all children born every year do not get complete immunization scheduled for their first year of life. Measles vaccine is preferably administered at the ninth month of life and at this time all children under five years of age are expected to have been fully immunized according to routine immunization schedule. (Lyimo, 2012).

The impact of MR campaign on vaccination coverage and routine immunization services in Bangladesh like other countries was suboptimal whereas 90–95 % coverage was needed for elimination of these diseases. The study found that MR uptake rose to 90 % after the campaign clearly indicating there still was no complete MR vaccination coverage, in many countries in the world. (Uddin *et al.* 2016).

2.5.2 National and county Coverage of MR

Between 2013 and 2015, 1,468,268 children below 1 year were not effectively reached with measles vaccine risking measles outbreak even amongst older children, if nothing was done to ensure these children got vaccinated (UNICEF, 2015). In 2015, there were 422 cases of measles in Kenya and more than 95% of children needed to be vaccinated with at least 2 doses of the vaccine to avoid measles outbreaks in the country, of the confirmed measles cases in Kenya in 2015, 13% were zero dose (never received vaccine) and 49% had only one dose of measles vaccine.

Elizabeth *et al.* (2015) in East Pokot immunization coverage among children between 12-23 months who had vaccination cards showed that measles had one of the lowest coverage for individual vaccines at 46.5%. Some of the impeding factors highlighted in the study on the low immunization coverage were lack of knowledge on the vaccination schedules and literacy levels.

In a study on factors influencing immunization coverage among children under five years, Ibnouf *et al.* (2007) showed that, children from urban areas were 7.4 times more likely to have had the correct vaccinations for their age than were children from rural areas. This was contrary to KDHS (2009), results which showed that Vaccination coverage was higher in rural areas than urban areas in Kenya at 81% versus 76% respectively. However, children who resided in urban areas had a 90.4% chance of getting Measles-Containing-Vaccine First-Dose (MCV1) as compared to 83.4% for their rural counterparts. A study by Mutua (2017) on epidemiology and impact of vaccination coverage and delays in informal settlements in Nairobi, indicated that only 67% of the children had been immunized and post-natal care; and health facility delivery were identified as the determinants of being fully immunized. Lack of adequate measles coverage was attributed to the fact that there was shortage of measles vaccines. Lack of measles vaccination ranged from around 75% to 100% between the 6 centers under study suggested that lack of measles vaccination is associated with 28% higher mortality. The study further highlighted that children who lacked the measles vaccination before 12 months of age was linked to excess mortality through childhood. GAVI (2015).

2.6 Determinants of Measles Rubella Vaccine Uptake

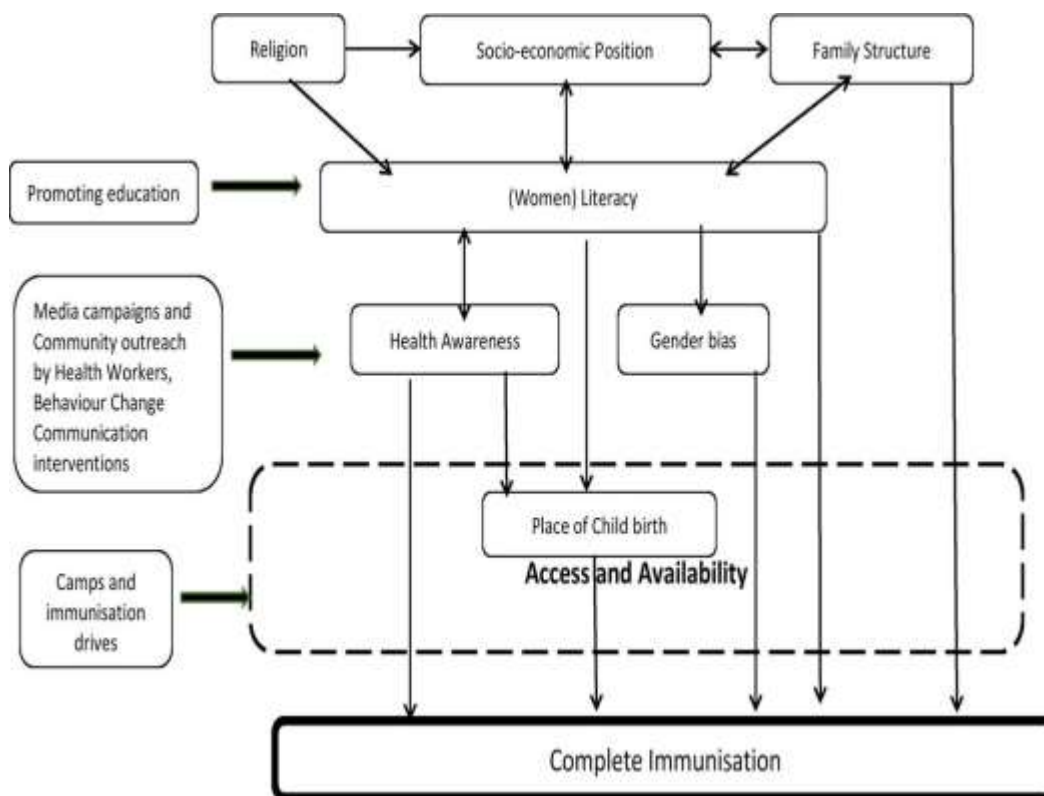


Figure 2.1: Determinants of Childhood Immunization Coverage

Source: Devasenapathy, Jerath and Sharma (2016)

2.6.1 Individual Factors

2.6.1.1 Social Economic

Godi and Kusuma (2008) A study to compare of immunization coverage of different vaccines used among urban and rural children in a distinct socio-economic environment in India, found that those who are poor, were more likely not to have their children vaccinated while those from wealthier families were likely to be vaccinated due to their knowledge on better health states. Although majority of

mothers were aware of vaccination, their reception of vaccination services was mainly determined by their habitat, caste, and occupation.

The qualitative data indicated non-satisfaction by the community of available vaccination services, particularly the rural areas. According to KDHS (2009), factors associated with the uptake of MCV1 were; birth order, place of residence, mother's education level and wealth quintile. The MCV1 coverage in children in the lowest wealth quintile was 75.6% as compared to 93.9% in the highest quintile. Ibnouf *et al.* (2007), this concluded that the following background variables were also related to vaccination uptake.

2.6.1.2 Education Level

Education level was found to determine immunization coverage in Nigeria, uptake was higher in areas where most mothers were aware about vaccine preventable disease symptoms. Additionally, coverage was high in areas where vaccination services were available at a privately funded health facility. While the current study only targeted accessibility factors and its effects on uptake. Maternal level of education is also a contributory determinant of vaccination outcomes (Olumuyiwa *et al.*, 2008)

Calhoun *et al.* (2014) a study on full and timely vaccination coverage and associated factors in children aged 12-23 months in Gem, Siaya County Kenya, was used to compare the situation in Eastleigh North Ward, which is fairly urban in comparison to the rural area to determine relationship between the mothers' education levels and the vaccination uptake.

Many studies show that maternal education or literacy is a strong and consistent predictor of child immunization outcome. Higher maternal education is associated with higher immunization uptake (Abuya *et al.*, 2011). Despite most studies associating maternal education with immunization uptake, this relationship is not so clear.

However ante-natal care follow-up and mother's knowledge about the age at which vaccination begins were significant determinants of immunization uptake. The study however did not consider that the mothers report may under or overestimate the immunization coverage or that the mother may forget the total dose taken by the child. This study sort to explore further factors associated with MR vaccine uptake and caregivers' education level.

2.6.1.3 Place of Residence and delivery

The place of residence is also an underlying determinant to vaccination coverage. Children living in urban areas had consistently higher immunization rates than their rural counterparts. This is attributed to the fact that immunization services are more accessible in urban areas due to higher availability of health facilities (Henry, 2011).

The current study focused on a predominantly urban area but the essence is that most of the population in the area comprises of immigrants. Belachew and Wakgari (2012) a community-based studies to investigate the determinants of immunization coverage. The results showed that the mother's area of residence was not significantly associated with full immunization among children.

Studies have been able to demonstrate a strong correlation between place of delivery and the ability of the child to complete immunization. In Nigeria, Antai (2009) extended his analysis of immunization determinants to involve community factors. In this study, he found that living in a community with a low number of hospital deliveries was associated with lower likelihood of full immunization. This illustrates the potential importance of communities in which mothers live and how they influence individual decision making, including health-seeking behaviour.

2.6.1.4 Maternal Age

Fatiregun and Okoro (2012) established an association between maternal age and immunization completion. In this study however, young mothers were more likely to immunize their children than older mothers. A similar study carried out in the Philippines failed to identify maternal age as a significant predictor of full

immunization status in children though there was a trend approaching significance ($p=.053$), (Bondy, Thind, Koval, & Speechley, 2009).

In their study in Ambo Woreda, Ethiopia, Etana and Deressa (2012) were able to show that children of younger mothers were likely to be fully immunized. In the Philippines, children of younger mothers were more likely to be vaccinated than those whose mothers were older (Bondy, Thind, Koval, & Speechley, 2009). This shows that the age of mothers was a major predictor of the likelihood to be immunized and vice versa.

2.6.2 Caregiver's Level of Awareness

Most respondents knew the importance of immunization for their children's health and had a positive attitude towards childhood immunization. However, different myths and misconceptions towards vaccinations arise strongly (Esmail, Cohen-Kohler & Djibuti, 2007). The different side effects of vaccinations create fear among parents.

The benefits of immunizations were somehow recognized, but the details of the benefits and the disease prevention immunization were not easy to identify by the participants, mostly because lack of information (WHO, 2015). Most parents just considered childhood immunization beneficial for the future, and thought that the children were protected from illness when immunized. They equally trusted the vaccines not to cause illness.

Studies confirmed that previous experiences in the parents made them consider the immunizations unnecessary. This was attributed to the fact that they themselves never got any vaccinations in childhood and they have been healthy all along (Lyimo, 2012). The parents' own busy schedule was also a barrier to immunization. This was going by their own previous experiences of not having had benefited from the same. This made them to have negative opinions towards immunizations (Cole & McNulty, 2011).

Religion equally had an impact on vaccination decision-making. In the instance of Islam, persons who professed to the faith considered God's will as the most important act of fate. Immunization or not did not matter if God has planned something for someone. This occasioned great risks as regards the undue exposure to the children in need of immunization. In the cases of illegal or undocumented migrants, they considered immunization important, but the fear of arrest and continuing migration were significant barriers for immunizing their children (Omolo, 2007). This forced them to use homemade herbal remedies instead and exposed the children to risk.

Rainey *et al.* (2011) health care workers factors have been cited as discouraging children's vaccination. Health workers who reportedly shouted/screamed at mothers who forgot/lost the child's card, missed a scheduled vaccination appointment, or had a dirty, poorly dressed, or malnourished child. Mothers felt humiliated and discouraged from returning to the health facility. Such cases were mainly reported from many developing countries.

A report by WHO (2012) notes that in order to address vaccination perception challenges, the MR Initiative will work with partners and more so health workers to analyze the determinants of vaccine acceptance. The need for effective immunization communication with parents and health workers so as to address culture and belief systems and improve the demand for measles and rubella immunization so as to reach vulnerable and high risk populations, coupled with training and supervision of health workers.

2.6.3 Health System Factors

In a study carried out by Chen *et al.* (2004), it was showed that the quality of output and production of health systems is determined by the number and competence of health workers. This study points out the crisis in the health sector is mostly due to health workers not having the right skills, lack of support network and overstressed staff.

Eboreime, Abimbola and Bozzani (2015) in a study carried out in Nigeria on distribution of nurses and community health extension workers showed no regional

disparity in the human resources trained to deliver immunization services. In some facilities non-qualified personnel are involved in administering vaccines as 30% of health facilities lack an adequate number of trained personnel for vaccination services. As is in most developing countries, in Nigeria, immunization services at PHC centres are delivered mostly by mid-level health workers. While the importance of health workers in service delivery is not disputed, the variation in association between the cadre of health workers and immunization outcome is not yet widely acknowledged.

Parents mentioned limited time at the health care clinics as a reason for the low uptake. They felt they do not have enough time and therefore they are not getting enough information and explanations to the questions in their minds, which seemed to shape the fear towards vaccinations. In some instances parents felt they got comprehensive information from health care facilities and from health care professionals, but some felt it was not enough. Related sources of information entailed the media, friends and social networks.

Trust on vaccinations and on health care professionals by the parents affected the ability to confer the requisite coverage standards. The mistrust especially to health care professionals, their motivation and parental suspicion on vaccine efficacy were critical underlying factors to immunization coverage (Eboreime, Abimbola & Bozzani, 2015). Measles and rubella vaccines were considered efficient on the recommendation by the government health care facilities. The distance to a health facility determined vaccination outcomes. In a study carried out in Khartoum State, Sudan the study revealed that children whose mothers walked less than 30 minutes to vaccination place were more likely to have had the correct vaccinations than children whose mothers walked longer distances. The study thus found out that walking time to the nearest vaccination center had a strong influence on vaccination. (Ibnouf, Borne & Jam, 2007).

In the case of illegal or undocumented migrants, the ability to immunize children is restricted. The basic survival requirements are more critical in comparison to the health and vaccination needs. Affordability was a major factor influencing on

immunizing children among parents. The participants disclosed that they would rather miss the immunization appointments and spare the cash to travel to work.

2.7 Chapter Summary

From the literature reviewed, it is evident that various studies have been attempted on the determinants of vaccination uptake among children. The study on Measle rubella vaccine is limited since it was introduced in Kenya in 2016 into routine immunization schedule. The previous literature on immunization focuses majorly on Measles Containing Vaccines (MCV).

CHAPTER THREE

MATERIALS AND METHODS

3.1 Study Site

The study was carried out in Eastleigh North Ward Nairobi Kenya. The ward is found in Eastleigh division, Kamukunji Constituency in Nairobi County. The constituency is among seventeen constituencies of Nairobi City County consisting of five wards namely Eastleigh North, Eastleigh South, Pumwani/Shauri Moyo, California and Airbase. Kamukunji is located at 1°16'S, 36°48'E and occupies 684 sq km (260 sq km). It is situated 1661 metres (5450 ft) above sea. The population of Kamukunji is estimated at 261,855 (population census, 2009).

Eastleigh North is the commercial hub, located east of the central business district. Predominantly inhabited by Somali immigrants it has been described as "Little Mogadishu". (ngcdf.go.ke)

Eastleigh North ward has two main boundaries National Government and political boundaries 2nd avenue from 12th street to Juja Rd, Right side Airbase left side Muratina Rd to Juja Rd . It has a total population of 21450. Population of less than 5 years is 8903, while under 24 months is 3349. During the time of the study, there was an active measles outbreak in Nairobi County and Eastleigh having high number of reported cases (DHIS II, 2017).

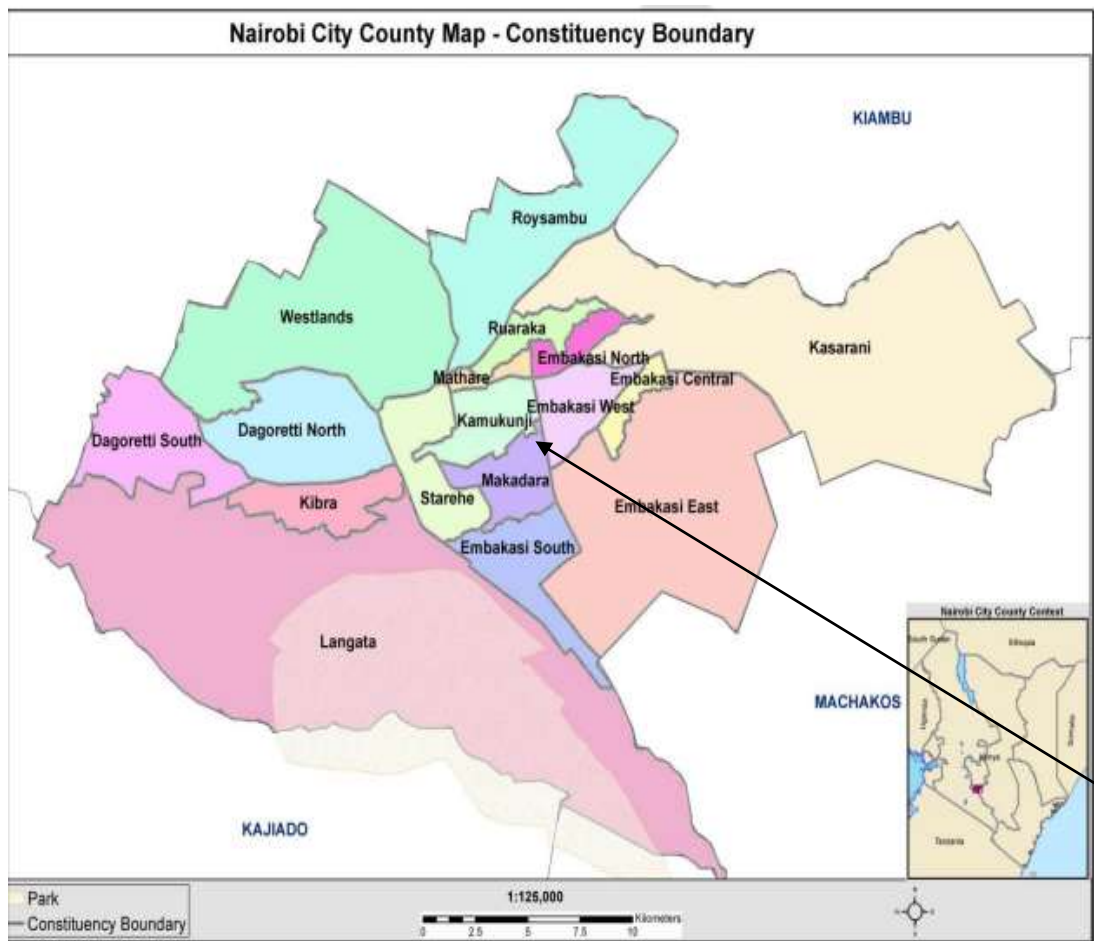


Figure 31: Map of Nairobi County showing Kamukunji constituency, home to Eastleigh North ward

<https://softkenya.com/kamukunji-constituency/>

3.2 Study Design

This study was a cross-sectional descriptive study.

3.2.1 Dependent Variables

The dependent variable for the study was uptake of measles rubella vaccine.

3.2.2 Independent Variables

The independent variables were: social demographics; level of awareness about MR vaccine and; health system factors.

3.3 Study Population

The study populations were caregivers with children aged 9-18 months in Eastleigh North in Nairobi County.

3.3.1 Inclusion Criteria

- The study included Caregiver with children aged exactly 9-18 months on the day of interview and with some days before nineteen months from Eastleigh North Ward Nairobi County.
- The Caregiver who provided informed consent were included in the study

3.3.2 Exclusion Criteria

- All children whose caregivers were mentally incapacitated or refused to give consent to participate in the study or had not resided in Eastleigh North Ward for a period exceeding three months were excluded from the study.
- Caregivers with children below 9 months or above 18 months

3.4 Sampling

3.4.1 Sample Size Determination

Sample size was determined using Cochran (1977).

$$n_o = \frac{z^2 pq}{e^2}$$

Where, n_o is the sample size, z is the selected critical value of desired confidence level, p is the estimated proportion of an attribute that is present in the population, q p

= -1 and e is the desired level of precision. Assuming the maximum variability, which is equal to 50% (p =0.5) and taking 95% confidence level with ±5% precision.

From the DHIS II database, Kenya had measles coverage of 85%, in 2017 (DHIS2 2017) which was used to determine the sample size as shown below.

p = 0.85 and hence q =1-0.85 = 0.15; e = 0.05; z =1.96

$$\text{So, } n_o = \frac{(1.96)^2(0.85)(0.15)}{(0.05)^2} = 195.92 = 196$$

The sample size was calculated at 95% confidence level with margin of error equal to (0.05), in this case the representative sample size for the study is 196.

Cochran also proposed a correction formula to calculate the final sample size

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

Here, n_o is the sample size derived from equation above and N is the population size. To calculate the population the final sample size for the population in the study where, population size N=3349 and $n_o= 196$ is as follows;

$$n = \frac{196}{1 + \frac{(196 - 1)}{3349}}$$

$$n= 186$$

Therefore; the final sample size for the study was 186 respondents

3.4.2 Sampling Procedure

Multi-stage sampling technique was used. First; administrative locations in the ward with their respective population of children age 9-18months were listed to provide a

sampling frame. Eastleigh North Ward has 2 locations and 5 sub locations which were randomly sampled to get 3. In sampling of clusters, polio campaign clusters 2018 were used. (Polio Campaign clustering Round 2-2018 MOH Nairobi County)

According to WHO guidelines of conducting immunization coverage cluster survey (WHO, 2005), cluster sampling is recommended with a minimum of 30 clusters (Villages). The total sample size was the product of the number of children per cluster and the total number of clusters. With a sample size of 186 children each cluster will have; Number of children per cluster = sample size ÷ number of clusters

$$186 \div 30 = 6.2 = 7 \text{ children per cluster}$$

A sampling interval was determined by dividing households (number of households in each polio campaign clusters classified by roads-Eastleigh North 1-Juja Rd, Eastleigh North 3-Buswaga lane 7th Avenue and GNR Waruinge on Garage 2) by the sample per sub-location (62). The sampling interval is as highlighted below;

$$\text{Eastleigh North 1 sub-location} = 210\text{HH} \div 62 = 3.38 \text{ K}^{\text{th}}=3$$

$$\text{Eastleigh North 3 sub-location} = 240\text{HH} \div 62 = 3.8 \text{ K}^{\text{th}}=4$$

$$\text{Garage 2 sub-location} = 151 \text{ HH} \div 62 = 2.43 \text{ K}^{\text{th}}=2$$

The sampling interval per sub-location was then used in systematically selecting households. Table 3.1 illustrates the sampling procedure.

Table 3.1: Schematic table of the Multi-stage sampling

Multistage sampling	Details
Stage 1	Listed all the 5 administrative sub-locations in the two locations (Easteigh North 1 and Garage)of Eastleigh North ward with their population of children aged 9-18months
Stage 2	Randomly selected 3 sub-locations using cluster sampling technique proportionate to size, then selected 3 roads per sub-location using simple random sampling.(Eastleigh North 1,Eastleigh North 3 and Garage 2) then divide the sample size ($186/3=62$) to get number of children per sub-location
Stage 3	Systematic clustering was used where the first door in the household was the starting point at an interval shown above.
Stage 4	Got details for the child who is aged 9-18 months per household. NB/If more than one child in HH 9-18months, write numbers whoever picked number1, caregiver gave details of that child.

Through purposive sampling, all the health facilities in the sampled sub-locations were interviewed using the key informant guide.

The researcher got approval from the university, permission from the Division of disease surveillance and response unit/Easteigh North ward to access community leadership and parents, to carry out the study in their jurisdiction. After informing them about the study objectives and how it will be carried out.

Each sub-location was visited by the researcher or research assistants at different times and consent obtained from the caregivers with eligible children before conducting the interview. Then a semi-structured questionnaire was administered.

3.5 Data Management and Analysis

3.5.1 Data Collection

Primary data was collected using semi-structured questionnaires. Using simple random sampling households were selected. A pen was spun on the ground from the midpoint of the selected roads to determine the direction of the movement then table of random numbers was used to select the first household with an eligible child. Subsequent households were selected by moving to the left of each household without skipping until the desired number of children was reached with replacement. The youngest eligible child in the household was selected for the study. Caregivers of eligible children were interviewed. The questionnaires contained questions based on individual characteristics, awareness among caregivers of children 9-18 months and also health system factors associated with MR vaccine uptake. Qualitative data was collected using Key informants guide, from a multi-professional sample of health care workers drawn purposively from the 9 health facilities in Eastleigh North Ward Nairobi County.

The principal investigator and two research assistants who were newly qualified nursing students conducted the interviews. They were trained by the researcher on tools and ethics related to the study.

The questionnaire was pre-tested to ascertain validity and reliability. Twenty caregivers of children age between 9-18 months were drawn from Mathare Valley County. The sample size of 20 was based on Kasomo (2007), who points out that 10% of the target population is sufficient for pre-testing of questionnaires in descriptive studies.

3.5.2 Validity

The data collection tools were pretested in Mathare Valley Nairobi County which is not in Eastleigh North. Kenyatta National Hospital/University of Nairobi Ethics and Research Committee (KNH-UoN ERC) was given the questionnaire for their expert review and recommendations.

3.5.3 Reliability

The questionnaires were pretested twice to the same respondents two weeks apart. Comparison in responses was done using t-test at 95% confidence level. To avoid differences in rating of questionnaires, hence they were administered by one person who was trained on the design to ensure consistent of results.

3.5.4 Data Entry and Analysis

After data collection the researcher edited the raw data to ensure it was free of inconsistencies and incompleteness. A coding scheme was developed for categories from responses. Analysis of data was done using Statistical Package for Social Sciences version 19.0 (Kombo *et al.*, 2006). Descriptive statistics was used to give proportions and frequencies for quantitative test of association on the study variables was done using Chi-square test. Level of significance was at = or <P 0.05, with a 95% Confidence interval. Data was then presented in tables form. Qualitative data was analyzed using thematic analysis where HCW provided and ranked qualitative reasons for (1) service delivery and finance for health (2) health commodities and health information in relation to MR vaccine uptake were used to identify key MR vaccination motivators and barriers to uptake through content analysis methodology where a coding template was first created.

Research findings were shared with caregivers, division of disease surveillance and Kamukunji sub county health management team .These groups will reach other parents thus improving MR uptake. Results were also shared in meetings held monthly at the sub-county health offices where some these groups are members. Recommendations were shared according to study findings. Publishing was done for scholars to gain insight on the topic.

3.6 Ethical Considerations

Permission to carry out the study was granted by Jomo Kenyatta University of Agriculture and Technology, Scientific and Ethical clearance approval was by Kenyatta National Hospital/University of Nairobi-Ethics and Research Committee

Scientific Steering Committee and the Ethical Review Committee. Permission from the concerned health facilities to conduct research on the respondents was sort through division of disease surveillance. The respondents who consented were included in the study. This was after being informed that their participation was voluntary and they could withdraw from the study at any time without giving any reason. The findings were shared with the participants. The participants were informed that the research did not pose any potential risk and their identities and personal particulars were kept confidential and data would have no names or any identifiers. The participants were informed about their child's measles rubella vaccination status and subsequent vaccination, those who had missed vaccine, were referred to the nearest health facility for follow-up.

CHAPTER FOUR

RESULTS

4.1 Individual Factors

4.1.1 Caregiver factors of Children 9-18 months in East-Leigh North Ward Nairobi County

A total of 186 caregivers of children participated in the study. The number of respondents per sub-location had Garage-2 (63, 33.3%), Eastleigh North-1 (63, 33.3%) and Eastleigh North-3 (63, 33.3%). Each sub-location enrolled 62 caregivers with children 9-18months. The socio-demographic characteristics of the respondents are shown in Table 4.1. Majority of the caregivers who participated in this study were mothers to the children 83.3%. Most were between the ages of 26 to 35 years (54.8%). Approximately 52.2% caregivers had secondary education and majority were self-employed 58.1%. Most participants (60.8%) were Muslims while (32.3%) were Christians.

Table 4.1: Individual factors of the Caregiver of Children aged 9-18 months in Eastleigh North Ward Nairobi County

Variables	N=186	%
Caregivers Relationship to Child		
Mother	155	83.3
Father	15	8.1
Other relatives	16	8.6
Caregivers Age (years)		
15-25	71	38.2
26-35	102	54.8
>35	13	7.0
Level of Education		
No formal education	31	16.7
Primary	32	17.2
Secondary	97	52.2
Tertiary and above	26	14.0
Religion		
Christian	60	32.3
Muslim	113	60.8
Others	13	7.0
Occupation		
Employed	24	12.9
Self-employed	108	58.1
Unemployed	54	29.0
Marital Status		
Married	143	76.9
Single/ Divorced / Widowed	43	23.1

N- Sample Size; % - Percentage

4.1.2 Factors of Children aged 9-18 months in Eastleigh North Ward Nairobi County

Over 95.2% of the caregivers had delivered at health facility setting (n=186), while 36% reported they had had 4 or more live births. Over 95.7% of the caregivers reported they had attended scheduled ANC clinics during the pregnancy period (Table 4.2)

Table 4.2: Factors of Children aged 9-18 months in Eastleigh North Ward Nairobi County

Variables	N=186	%
No. of Children alive		
1-3	119	64
>4	67	36.0
ANC attendance during pregnancy		
Yes	178	95.7
No	8	4.3
Place of Delivery		
Home by skilled birth attendant	9	4.8
Health facility	177	95.2
Child's age (months)		
9-17	103	55.4
18 months	83	44.6
Child's birth order sequence		
1 st -3 rd	133	71.5
4 th or more	53	28.5
Child's gender		
Male	85	45.7
Female	101	54.3
Time Taken to reach nearest immunizing facility (minutes)		
1-30	151	81.2
>30	35	18.8

N- Sample Size; % - Percentage

4.2 Uptake of measles rubella Vaccine among Children 9-18months in Eastleigh North Ward Nairobi County

Table 4.2 shows the general MR vaccine uptake. MR1 uptake was at 85.5% and MR2 uptake was at 35.5%.

Table 4.3: Uptake of measles rubella Vaccine among Children 9-18months in Eastleigh North Ward Nairobi County

Vaccination Category	Response	N=186	(%)
Received MR1	Yes	159	85.5
	No	27	14.5
Received MR2	Yes	27	35.5
	No	56	67.5

N- Sample Size; % - Percentage

4.3 Uptake of measles rubella Vaccine by Sub -location among Children 9-18 months in Eastleigh North Ward Nairobi County

Table 4.3 shows MR uptake by sub-location, Garage had the highest uptake of 34.6% for MR1 and MR2 at 33.3%. Eastleigh North 3 had the most children who hadn't received MR1 and MR2 44.4% and 42.9% respectively.

Table 4.4: Uptake of measles rubella Vaccine by Sub -location among Children 9-18months in Eastleigh North Ward Nairobi County

Sublocation	MR1		MR2	
	Given	Not Given	Given	Not Given
	No. (%)	No. (%)	No. (%)	No. (%)
Eastleigh North-1	54 (34)	8 (29.6)	7 (25.9)	16 (28.6)
Eastleigh North-3	50 (31.4)	12 (44.4)	11 (40.7)	24 (42.9)
Garage2	55 (34.6)	7 (25.9)	9 (33.3)	16 (28.6)

N- Sample Size; No. - Number; % - Percentage

4.4 Awareness about MR vaccine among Caregivers of Children 9-18months in Eastleigh North Nairobi County

Majority of the respondents 90.3% had heard about MR Vaccine. More than half heard from health workers (58.1%), 16.1% from religious and local leaders. A high proportion of respondents (81.7%) were aware that children received MR vaccine at 9 and 18months. A quite a number of respondents were not aware if their child had been diagnosed with measles or rubella (44.6%), while 18.3% claimed their children had been diagnosed with measles or rubella (Table 4.4).

Table 4.5: Awareness about MR vaccine among caregivers of children age 9-18 months Eastleigh North Ward Nairobi County

Variables	N=186	%
Ever heard of Measles-Rubella Vaccine for children		
Yes	168	90.3
No	18	9.7
If yes, source of information		
Health workers	108	58.1
Religious and local leaders	30	16.1
Neighbors	7	3.8
Other sources (Radio, T.V, Megaphone)	23	12.4
Knowledge of the doses of Measles-Rubella Vaccine		
Yes	152	81.7
No	34	18.3
Knowledge of the timing for the Measles-Rubella Vaccination		
At 9 or 18 Months	119	64
Both at 9 and 18 months	67	36
Has your child ever been diagnosed with measles or rubella		
Yes	34	18.3
No	69	37.1
Don't Know	83	44.6
Reasons for low uptake of Measles-Rubella Vaccine		
Religion not encouraging vaccination	28	15
Myths/Negative attitude towards many vaccines	124	66.7
Unavailability of mothers to take children for vaccination	24	12.9
Some of their friends' children have not been vaccinated and were not sick	10	5.4

N- Sample Size; % - Percentage

4.5 Health System factors in Eastleigh North ward Nairobi County

Majority of the respondents 181/186 of caregivers had Mother/child booklet. More than half of the children were vaccinated in government facility (54.3%), 39.2% in faith-based organizations. Table 4.5, we find that 83.9% of the caregivers indicated that at no time had they taken their child for MR vaccine and were not vaccinated.

Table 4.6: Health system factors in Eastleigh North ward Nairobi County

Variables	N=186	%
Mother/Child Booklet available		
Yes	181	97.3
No	5	2.7
Facility for Immunization (Type)		
Government	101	54.3
Faith Based organization	73	39.2
Private	11	5.9
Other	1	0.5
Ever experienced lack of attendance for Measles-Rubella Vaccine in a facility		
Yes	30	16.1
No	156	83.9
If yes, Reason for non-attendance*		
Long waiting time	4	2.7
Vaccinator absent	8	5
Child ill	5	3.1
Health facility closed	1	0.6

N- Sample Size; % - Percentage

4.6 Bivariate analysis of measles rubella - 1 vaccine uptake in relation to caregiver's individual factors, Eastleigh North Ward, Nairobi County

There was a statistical significant between measles rubella vaccine uptake and level of education of the caregivers (chi-square=12.2, d.f=3, p = 0.007, n=186). Over 60% of the caregivers who had post-primary education. Other caretaker individual parameters such as relationship between child and caregiver, age, religion, occupation and marital status, number of children born to the caregiver, and monthly income were not associated with MR-1 vaccine uptake as profiled in Table 4.7.

Table; 4.7: bivariate analysis of measles rubella - 1 vaccine uptake in relation to Caregiver's individual factors, Eastleigh North Ward, Nairobi County

Variables	Given (n=159)		Not Given (n=27)		Chi-square	d.f.	p-Value
	No.	(%)	No.	(%)			
Caregiver relationship to child							
	Mother	133 (83.6)	22 (81.5)		2.265	4	0.69
	Father	13 (8.2)	2 (7.4)				
	Grandparents	4 (2.5)	1 (3.7)				
	Aunt/Uncle	8 (5)	1 (3.7)				
	Siblings>18yrs	1 (0.6)	1 (3.7)				
Age (years)							
	15-20	9 (5.7)	2 (7.4)		3.666	5	0.46
	21-25	51 (32.1)	9 (33.3)				
	26-30	67 (42.1)	8 (29.6)				
	31-35	20 (12.6)	7 (25.9)				
	36-40	8 (5)	1 (3.7)				
	>40	4 (2.5)	-				
Level of Education							
	No formal education	25 (15.7)	6 (22.2)		12.225	3	0.007
	Primary	28 (17.6)	4 (14.8)				
	Secondary	89 (56)	8 (29.6)				
	Tertiary and above	17 (10.7)	9 (33.3)				
Religion							
	Christian	49 (30.8)	11 (40.7)		6.623	3	0.45
	Muslim	99 (62.3)	14 (51.9)				
	Others	11 (6.9)	2 (7.4)				
Occupation							
	Employed	20 (12.6)	4 (14.8)		0.501	2	0.779
	Self-employed	94 (59.1%)	14 (51.9)				
	Unemployed	45 (28.3%)	9 (33.3)				
Monthly income (KSH)							
	1,000-5,000	20 (12.6)	5 (18.5)		1.442	3	0.70
	5,001-10,000	57 (35.8)	7 (25.9)				
	10,001-20,000	58 (36.5)	10 (37.0)				
	20,001-50,000	24 (15.1)	5 (18.5)				
Marital Status							
	Married	124 (78.0)	19 (70.4)		1.269	2	0.53
	Single	27 (17.0)	8 (25.9)				
	Separated /	8 (5.0)	1 (3.7)				
	Divorced /						
	Widowed						
Children born by the mother							
	1-3	103 (64.8)	16 (59.3)		4.525	2	0.104
	4-6	49 (30.8)	7 (25.9)				
	>7	7 (4.4)	4 (14.8)				

N- Sample Size; No. - Number; % - Percentage; P - Level of significance; $P \leq 0.05$ indicates the relationship is statistical significant.

4.7 Bivariate analysis of measles rubella - 2 vaccine uptake in relation to caregiver's individual factors, Eastleigh North Ward, Nairobi County

A bivariate analysis was carried out on pre-selected social-demographic variables of caregiver against MR-2 vaccine. The variables included caregiver-child relationship, age (in years), highest level of education, religion, and occupation. None of the socio-economic variables was found to be statistically significant with MR-2 vaccine uptake as profiled in Table 4.8.

Table 4.8: Bivariate analysis of measles rubella - 2 vaccine uptake in relation to caregiver's individual factors, Eastleigh North Ward, Nairobi County

Variables	Given (n=27)	Not Given (n=56)	<i>Chi-square</i>	<i>d.f.</i>	<i>p-Value</i>
	<i>No. (%)</i>	<i>No. (%)</i>			
Caregiver relationship to child					
Mother	23 (85.2)	47 (83.9)	1.663	3	0.88
Father	2 (7.4)	5 (8.9)			
Other relatives	2 (7.4)	4 (7.2)			
Age (years)					
15-25	10 (37)	17 (30.4)	3.061	5	0.3
26-35	16 (59.2)	35 (62.5)			
>35	1 (3.7)	4 (7.1)			
Level of Education					
No formal education	5 (18.5)	8 (14.3)	1.377	3	0.711
Primary	6 (22.2)	8 (14.3)			
Secondary	13 (48.1)	31 (55.4)			
Tertiary and above	3 (11.1)	9 (16.1)			
Religion					
Christian	9 (33.3)	14 (25)	0.88	2	0.644
Muslim	17 (63)	38 (67.9)			
Others	1 (3.7)	4 (7.2)			
Occupation					
Employed	6 (22.2)	4 (7.1)	4.606	2	0.1
Self-employed	17 (63)	37 (66.1)			
Unemployed	4 (14.8)	15 (26.8)			
Marital Status					
Married	18 (66.7)	47 (83.9)	4.661	2	0.097
Single	6 (22.2)	8 (14.3)			
Separated	3 (11.1)	1 (1.8)			
Number of children born					
1-3	18 (66.7)	33 (58.9)	2.108	2	0.349
>4	9 (33.3)	23 (41.1)			

N- Sample Size; No. - Number; % - Percentage; P - Level of significance; $P \leq 0.05$ indicates the relationship is statistical significant.

4.8 Multivariate analysis between receiving MR-1 vaccine uptake Socio-demographics of children 9-18 months

A multivariate analysis between MR-1 vaccines and selected child related parameters was carried-out. Results indicated that Caregivers who reported not being offered immunization services at the health facilities was statistically significant with MR-1 vaccine uptake ($\lambda=9.628$; d.f.=1, $p=0.008$). Other child-related parameters such as parity, birth order, facility where measles rubella was administered, and sex were not statistically significant against MR-1 uptake as profiled in Table 4.9.

Table 4.9: Multivariate analysis between receiving MR-1 vaccine uptake Socio-demographics of children 9-18months

Variables	Reference response group	Chi-square (d.f)	OR	95%CI		
				Lower	Upper	p-Value
Children born	1-3 children	0.305 (1)	1.26	0.55	2.91	0.581
No. of children alive	1-3 children	0.305 (1)	1.26	0.55	2.91	0.581
ANC attendance	Yes	1.420 (1)	-*	-	-	0.233
Place of Delivery	Public facility	1.606 (1)	-*	-	-	0.205
Birth Order	1st - 3rd born	0.363 (1)	1.31	0.55	3.13	0.547
Sex of child	Male	1.237 (1)	0.63	0.28	1.43	0.266
Whether caregiver had mother-child booklet at clinic visit	Yes	2.689 (1)	4.16	0.66	26.15	0.101
Facility to receive childhood immunization	Public facility	0.020 (1)	0.94	0.41	2.14	0.887
Taken child for immunization but not attended to	Yes	9.628 (1)	0.63	0.22	1.86	0.008*
Heard of MR vaccination for children	Yes	1.289 (1)	0.32	0.04	2.52	0.256

Note: d.f. – degree of freedom; - could not be computed as some cells have a null value; ** - statistically significant at $p \leq 0.05$*

4.9 Multivariate analysis between MR-2 vaccine uptake and awareness among caregivers of children age 9 to 18 months

A multivariate analysis between MR-2 vaccines and selected child related parameters indicated that caregivers awareness of MR schedule of vaccine for children was statistically significant to the child receiving MR-2 vaccine (chi square=4.26, d.f.=1;

p=0.039). Other child-related parameters such as parity, birth order, facility where measles rubella was administered, and sex were not statistically significant against MR-2 uptake as profiled in Table 4.9.

Table 4.10: Multivariate analysis between MR-2 vaccine uptake and awareness among caregivers of children age 9 to 18 months

Variables	Reference response group	Chi-square (df)	OR	95%CI		p-Value
				Lower	Upper	
Children born	1-3 children	0.46 (1)	1.39	0.53	3.64	0.497
No. of children alive	1-3 children	0.46 (1)	1.39	0.53	3.64	0.497
ANC attendance	Yes	2.03 (1)	-*	0	0	0.155
Place of Delivery	Public facility	2.56 (1)	-*	0	0	0.109
Birth Order	1st - 3rd born	0.79 (1)	1.59	0.57	4.4	0.373
Sex of child	Male	1.55 (1)	1.8	0.71	4.58	0.212
Whether caregiver had mother-child booklet at clinic visit	Yes	2.10 (1)	-*	0	0	0.147
Facility to receive childhood immunization	Public facility	1.99 (1)	1.96	0.77	5.03	0.158
Taken child for immunization but not attended to	Yes	1.43 (1)	-*	0	0	0.488
Heard of MR vaccine for children	Yes	4.26 (1)	4.33	0.51	36.57	0.039*

Note: d.f. – degree of freedom; - could not be computed as some cells have a null value; ** - statistically significant at $p \leq 0.05$*

4.10 Qualitative data on health system factors associated with MR vaccine uptake in Eastleigh North ward Nairobi County

A total of 9 key informants interviews were conducted involving health care workers drawn from the public health facilities, which were randomly selected in various sub-

locations in Eastleigh North Ward Nairobi County. The key themes discussed during the interviews included service delivery, target population /hard to reach populations, and sensitization of communities on MR vaccine and capacity building.

4.10.1 Service Delivery

Majority of the health workers were from the government sector (34%), 33% of the health workers were from the private facilities. 67% of the health care workers who participated in the study were nurses, 22% were clinical officers and 11% were doctors. 56% of the health workers had been in their position of providing vaccines for 2 to 4 years, 33% for more than 4 years and 11% for less than 2 years.

All the health workers interviewed knew their immunization target population for children 9 to 18 months for their respective areas. Nonetheless, the health staffs were not only responsible for the vaccination but also responsible for providing other health services such as working in the in and out patient department and maternity while other were mandated in broad spectrum administering of injections.

“We are the jack of all trains...” (Public, Nurse, Garage-2 Sub-locality)

Health workers indicated that the MR uptake in children 9 to 18 months in their catchment area for the past month was for MR1 50% to 84% an average of 61% uptake rate while as for MR2 was between 25% to 40% an average of 30%. Compared to the caregiver information, MR1 was at 88.9% and MR2 was even lower, although in our sample those who were eligible for MR2 by age were vaccinated.

“...But mark you the measles rubella campaign are currently ongoing, so it’s possible to see like we are at 100% coverage for eligible..sana sana on the ground.” (Public, Clinical Officer, Eastleigh North-1)

Most of the facilities provided vaccination once a week mainly on Thursday while others offered vaccination services twice a week. Notably though, none of the facility provided vaccination services on a daily basis. Again, none of the health facilities conducted vaccination outreach services. All the facilities indicated that they offered

vaccination services mainly on Thursday and during ANC on Friday. 4.3% of children failed to get immunized because they came on none vaccinating days. None of the health facilities experienced vaccine stock outs or other supply shortages (syringes, needles) in the past three months. However, it was noted that sometimes the stock ordered was incorrect.

” Like 2cc syringes for tetanus for vaccine are supplied instead of 0.5 solo-shots syringes.” “...But mark you the measles rubella campaign are currently ongoing, so it’s possible to see like we are at 100% coverage for eligible...sana sana on the ground.” (Public, Nurse, Eastleigh North-1)

Health care workers did also experience the challenge of mother misplacing their booklets and this posed a challenge in keeping accurate vaccination records. According to the sample only 2.7% did not have their mother- child booklet at the time of the interview.

Some of the challenges highlighted by the health workers in service delivery were that at times they lacked diluents at the depots and the clients were also quite few in the facility. Other health workers indicated that failure to come back for MR2 since the community within the facility is migrant community and they keep shifting from one facility to another. There was general feel that there was low turn up of children at the health facility as the community believed that vaccination mainly ends at nine months.

4.10.2 Hard to Reach

The health workers indicated that there were had to reach population in their respective health facility catchment areas hindering MR uptake in terms of caregivers traveling and often forgot to come back or just refused to come back altogether.

“Unaona hizi complex congested flats, that’s already hard to reach, because Somalis bila legal papers hide in there with children and you can’t get them.” (Public, Nurse, Eastleigh North-1).

“...But mark you the measles rubella campaign are currently ongoing, so it’s possible to see like we are at 100% coverage for eligible...” (Public, Clinical Officer, Eastleigh North-1).

This could be linked to the caregivers who work late hours (17.7%) who find facility already closed. There is a big percent of self-employed 58.9% whose children missed their vaccine.

“Others refuse due to lack of knowledge mtoto hapana gonjwa”. Caregivers stated that children never got sick...” (Public, Doctor, Eastleigh North-2).

Health workers did indicate that they had a vaccine defaulter tracking method though not always done. Nonetheless, they did check the permanent registers check for caregivers who did not come back for subsequent vaccination and called them on phone.

“Most times, mothers came for delivery and then go back to Somalia so tracking them was is a challenge”. (Public, Nurse, Eastleigh North-1)

Some health care workers, on clinic days told the caregivers when to come back for next vaccine but if they never came back no-one made a follow-up.

” No resources are set aside for that.” (Public, Doctor, Eastleigh North-2)

4.10.3 Sensitization of Communities regarding MR vaccine

Health care workers mobilized communities in their catchment areas for routine immunization by giving health messages on importance of vaccination at waiting bay. 74% Of the uptake was related to health worker informing the mothers during their visits to hospital.

‘There is no time for individual talk’ (Public, Nurse, Garage-2)

Word of mouth was at times deemed ineffective.

“Tracing mechanism for defaulters is not done due to lack of resources.”

(Public, Nurse, Eastleigh North-1)

“Mass mobilization we do only during massive funded vaccination campaigns”. (Public, Clinical Officer, Eastleigh North-1)

Despite the information shared by health workers a significant 66.8% had not received both MR1 and MR2, hence it's worth noting the role of religious leaders in informing the public (17.2%) about vaccines.

CHAPTER FIVE

DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS

5.1 Discussion

5.1.1 Individual Characteristics of caregivers

In the current study, the level of education was found to influence the uptake of the MR1 vaccine ($p = 0.007$ table 4.7) who caregivers with secondary education. This confirms the argument that maternal education has been highlighted in most literatures as a predictor of childhood immunization owing to changes in attitudes and traditions brought about by education, Thus mothers with higher education levels are more likely to have their children fully immunized (Abuya *et al.*, 2011). Education level was found to determine immunization coverage in Nigeria (Olumuyiwa *et al.* 2008).

However, when individual factors were subjected to bivariate analysis in Table 4.8, there was no association with MR-2 uptake. Thus, it could be argued from literature that MR-2 vaccine is not dependent on socio-demographic or socio-economic factors of caregivers. Contrary to other studies where factors like maternal age been underscored to influence immunization completion. (Fatiregun & Okoro, 2012, Bondy *et al.*, 2009 and Etana and Deressa, 2012).

5.1.2 Measles rubella vaccine Uptake among children aged 9 to 18 months

The findings indicate that about 85.5% of the children had received MR1 vaccine and 35.5% of the children had received MR2 vaccine. A study done on the risk factors for non-vaccination against measles among children below five years in Eastleigh, Nairobi Kenya, found that routine measles vaccination coverage in the area had remained below 75% (Omolo 2007). The current study showed that there was relationship between the availability of immunization services and MR-1 vaccines uptake ($p=0.008$ table 4.9). This implies that availability of supplies or HCW had an effect on MR-1 uptake. This concurs with a study done on risk factors for under-immunization in poor urban infants where it cited if caregiver found difficulties to get

the vaccine or appointment was associated with not vaccinating (A.S. Bates, & J.F. Fitzgerald, *et al.*, 1994)

5.1.3 Awareness by caregivers about MR Vaccine

Awareness of MR vaccine among caregivers (90.3%) and timings of doses when each is given was (81.7%). A multivariate analysis on table 4.10 indicated that caregivers who were aware of MR schedule of vaccine for children had a statistical significance to the child receiving MR-2 vaccine ($p=0.039$). This implies that caregiver knowledge about the full vaccination schedule for children increased four folds the chances of a child will receive the MR-2 vaccine (O.R=4.3). These findings are in conformity with previous studies that reported that knowledge on vaccination significantly influenced vaccination coverage (Mapatano *et al.*, 2008). The children of mothers or caretakers who were aware of MCV2 were 15 times more likely of receiving MCV2 than those whose caretakers had no knowledge of MCV2 (Makhoha, 2016).

These results were similar to a study conducted by Sheikh *et al.* (2014) that showed that the caretaker's knowledge of the immunization increased the uptake of OPV and IPV during immunization campaigns. This confirms with another study done by Elizabeth *et al.* (2015) in East Pokot immunization coverage among children between 12-23 months. The impeding factors highlighted in the study on the low immunization coverage were lack of awareness on the vaccination schedules.

The primary reason for low uptake of measles-rubella vaccine was cited to be to myths / negative attitude towards many vaccines by the caregiver (31.2% figure 4.2). Concur with the finding, that parents' own busy schedule was also a barrier to immunization. This was going by their own previous experiences of not having had benefited from the same. This made them to have negative opinions towards immunizations. (Cole and McNulty 2011).

5.1.4 Health System Factors

One hundred and eighty one caregivers had their mother child booklets, out of which (MR1=98.7) had vaccinated their children. Contrary to Rainey *et al.*, (2011) health

care workers factors have been cited as discouraging children's vaccination. Health workers who reportedly shouted/screamed at mothers who forgot/lost the child's card, missed a scheduled vaccination appointment, or had a dirty, poorly dressed, or malnourished child.

In this study nurses were the main providers of vaccination service (67%). Similarly to Eboreime, Abimbola and Bozzani (2015) in a study carried out in Nigeria on distribution of nurses, showed no regional disparity in the human resources trained to deliver immunization services. As is in most developing countries, in Nigeria, immunization services at PHC centres are delivered mostly by mid-level health workers.

Parents mentioned limited time at the health care clinics as a reason for the low uptake. They felt they do not have enough time and therefore they are not getting enough information and explanations to the questions in their minds, which seemed to shape the fear towards vaccinations. In this study, health care workers stated that they were burden with lots of other responsibilities hence not much time to explain to caregivers in details. A report by WHO (2012) notes that in order to address vaccination perception challenges, the MR Initiative will work with partners and more so health workers to analyze the determinants of vaccine acceptance. The need for effective immunization communication with parents and health workers so as to address culture and belief systems and improve the demand for measles and rubella immunization so as to reach vulnerable and high risk populations, coupled with training and supervision of health workers

The distance to a health facility determined vaccination outcomes, those who lived more than forty minutes away had a low uptake (MR2=8.9%). Equally in a study carried out in Khartoum State, Sudan the study revealed that children whose mothers walked less than 30 minutes to vaccination place were more likely to have had the correct vaccinations than children whose mothers walked longer distances. The study thus found out that walking time to the nearest vaccination center had a strong influence on vaccination. (Ibnouf, Borne & Jam, 2007).

5.2 Conclusion

This study aimed at determining factors associated with uptake of measles rubella vaccine. This were the individual factors of the caregiver, awareness among caregivers and health system factors associated with MR uptake among children age 9-18 months in Eastleigh North Ward Nairobi County. Caregiver's level of education was found to influences uptake of MR vaccine.

The MR2 uptake in Eastleigh North ward was very low and given that the majority of those who missed MR1 also missed MR2 there was a likelihood of frequent measles outbreaks in the Ward. The caregiver's awareness on availability of MR2 vaccine for children and knowledge on the two dosage of the MR vaccine influenced uptake. However, other factors like the sex and age of the caregiver, marital status or economic status did not affect the uptake of MR2. Measures need to be put in place to optimize uptake of MR2 vaccine by creating awareness.

The lack of immunization services and obstacles to immunization were the major causes of not receiving MR2. Myths and negative attitudes were the least determinant of missing MR2. Majority of the caregivers were not aware of the need for MR2. There is need to create awareness of MR2 in Eastleigh North Ward Nairobi County.

5.3 Study Limitations

The study was a cross sectional in nature. Hence temporal sequences could not be established and therefore causality was not determined. There was also a possibility of recall bias due to the long immunization schedule. Therefore, early immunization history may not have been accurate. This limitation was therefore addressed by sampling only children who were vaccinated less than one week preceding the study.

5.4 Recommendation

This study recommends the following;

In the face of measles rubella outbreak resurgence and increasing measles' rubella related infant and child morbidities and mortalities .The government should increase efforts to increasing awareness among the population on the importance of timely child-hood vaccination against measles and rubella through mass media, social mobilization and health education.

1. There is need to strengthen strategies to reach in hard-to-reach areas like door-to door and mobile outreach services.
2. Health workers need to be encouraged to avoid missed opportunities for capturing children who have missed MR2 and other vaccines. The low vaccine uptake can be improved by defaulter tracing mechanisms too.
3. For scholars, consider studying factors associated with MR2 uptake in ages above 18 months for late vaccinations.

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APPENDICES

Appendix 1a: Consent; Form English

Title; to determine factors associated with measles rubella vaccine uptake among children age 9-18 months in Eastleigh North Ward Nairobi County

Introduction

I am a postgraduate student in the department of Public health, at the Jomo Kenyatta University of Agriculture and Technology, Juja. I would like to invite you to take part in a research study.

In order to be sure that you understand what it means to be involved in this study, please read the information in this consent form carefully,(or I'm going to read it for you) if there is anything you do not understand in this consent form please ask me to explain.

Objective of the research

The purpose of this study is to determine the factors associated with measles rubella vaccine uptake among children age 9-18 months in Eastleigh North Ward Nairobi County. This will take about 15 minutes of your time.

Study procedure

If you agree to take part in the research study you will be interviewed by the principal investigator or her assistant in confidential manner. Your name will not be recorded in the questionnaire. This is what will happen if you decide to participate in this study. I will ask several questions regarding you and your child. I will also check your child's Mother Child Booklet to confirm dates when your child was vaccinated.

Benefits and risks of involvement in the study

There are no risks if you are involved in the study. You are free to ask any question. We will not write your name on the data collection form and we will keep the

information you provide us confidential; your responses will not be used against you, but solely for the research study purposes. However you will have an opportunity to know your child's measles rubella vaccination status and subsequent vaccination follow, for free in the nearest government hospital.

Compensation

We will not be able to provide you with any payment or gift for being in the research, but we will appreciate your participation.

Voluntarism

There is no penalty or lose of benefit if you decline to participate or decide to stop as this is voluntary. Your decision will not be used against you if you decide not to participate in the study. We will only ask questions regarding measles rubella vaccine. The study does not involve any follow up program.

If you have any inquiry please contact the researcher at:

Ruth Wangari Kanyiru

Jomo Kenyatta University of Agriculture and Technology, Kenya

Tel: +254722503502 Email: rkanyiru@yahoo.com

Or contact the Kenyatta National Hospital/ University of Nairobi Ethics and Research Committee at:

Kenyatta National Hospital

P O BOX 20723 code 00202

KNH/UON-ERC tel: 726300-9 Fax: 725272

Consent Form

The above document describing the benefits, risks and procedures for the research study factors to determine factors associated with measles rubella vaccine uptake among children age 9-18 months in Eastleigh North Ward Nairobi County has been explained to me.

I have been given an opportunity to ask any questions and answered about the research, to my satisfaction; I have agreed to participate in the study as a volunteer

Signature of subjectDate.....

or

Left thumbprint of subjectDate.....

Name of Subject.....

Signature of witness (If thumbprint used).....

Name of Witness.....

Signature.....Date.....

Signature of investigator Date.....

Name of Investigator

Appendix 1b: Kiambatisho: Ruhusa ya kushiriki katika Utafiti

Kuamua mambo yanayohusiana na upungufu wa chanjo ya rubella na sukari kati ya watoto wa umri wa miezi 9 hadi 18 katika Eastleigh ya Kaskazini Kataya Nairobi

Utangulizi

Mimi ni mwanafunzi wa darasani katika idara ya afya ya umma, Chuo Kikuu cha Jomo Kenyatta cha Kilimo na Teknolojia, Juja. Napenda kuwakaribisha kushiriki katika utafiti wa utafiti.

Ili uhakikishe kwamba unaelewa maana ya kushiriki katika utafiti huu, tafadhali soma habari katika fomu hii ya kibali kwa uangalifu, (au nitakuisomea) ikiwa kuna jambo lolote usiloelewa katika hili fomu ya ridhini tafadhali nipe na nitaelezea.

Lengo la utafiti

Madhumuni ya utafiti huu ni kutambua mambo yanayohusiana na upungufu wa chanjo ya rubanda kati ya watoto wa umri wa miaka 9-18 katika Wilaya ya Nairobi ya Eastleigh North Ward.

Hii itachukua muda wa dakika 15 za muda wako. Ikiwa unakubali kushiriki katika utafiti, nitawauliza maswali.

Utaratibu wa kujifunza

Ikiwa unakubali kushiriki katika utafiti wa utafiti utaulizwa na uchunguzi mkuu au msaidizi wake kwa njia ya siri. Jina lako halitarekodi kwenye swali la maswali.

Faida na hatari za kushiriki katika utafiti

Hakuna hatari ikiwa unahusika katika utafiti. Wewe ni huru kuuliza swali lolote. Hatuwezi kuandika jina lako kwenye fomu ya kukusanya data na tutaweka maelezo ambayo unatupa siri; majibu yako hayatatumiwa dhidi yako, lakini tu kwa madhumuni ya uchunguzi wa utafiti. Hata hivyo utakuwa na fursa ya kujua hali ya chanjo ya mtoto wako wa ugonjwa wa kasoro na chanjo inayofuata, kwa bure katika hospitali ya serikali ya karibu.

Fidia

Hatuwezi kukupa malipo yoyote au zawadi kwa kuwa katika utafiti, lakini sisi tutafurahia ushiriki wako.

Kujitolea

Hakuna adhabu au kupoteza faida ikiwa unashindwa kushiriki au kuamua kuacha kama hii ni ya hiari. Uamuzi wako hautatumiwa dhidi yako ikiwa unaamua kushiriki katika utafiti. Sisi tuta kuuliza maswali kuhusu chanjo ya rubella na sukari . Utafiti hauhusishi mafuatilio yoyote.

Ikiwa una uchunguzi wowote tafadhali wasiliana na mtafiti mkuu katika

Ruth Wangari Kanyiru

Jomo Kenyatta University of Agriculture and Technology, Kenya

Tel: +254722503502 Email: rkanyiru@yahoo.com

Au wasiliana na Hospitali Kuu ya Kenyatta / Chuo Kikuu cha Nairobi Kamati ya Maadili na Utafiti katika

Kenyatta National Hospital

P O BOX 20723 code 00202

KNH/UON-ERC tel: 726300-9 Fax: 725272

FORM YA SHAHA

Hati hii inayoelezea manufaa, hatari na taratibu za mambo ya utafiti wa kuamua mambo yanayohusiana na kupata kwa chanjo ya rubella na sukari kati ya watoto wa umri wa miezi 9-18 katika Kata ya Nairobi Eastleigh Kaskazini limeelezewa kwangu.

Nimepewa fursa ya kuuliza maswali yoyote na kujibu kuhusu utafiti, kwa kuridhika kwangu; Nimekubali kushiriki katika utafiti kama kujitolea

Saini ya somo..... Tarehe.....

Au

Alama ya mkono wa kushoto ya Somo.....Tarehe.....

Jina la somo.....

Sahihi ya Shahidi(kama alama ya mkono wa kushoto).....

Jina la Shahidi.....

Sahihi.....Tarehe.....

Sahihi ya Mpelelezi.....Tarehe.....

Jina la Mpelelezi.....

Appendix II: Caregivers Questionnaire

QUESTIONNAIRE SERIAL NO.:.....

To determine factors associated with measles rubella vaccine uptake among children age 9-18 months in Eastleigh North Ward Nairobi County

Sub-Location..... Date: _ _ / _ _ / 2018 Interviewer:
.....

Once the caregiver has accepted to participate in the survey, fill out the following Information for a child aged 9-18 months. For questions with several options, CIRCLE the responses.

Section A: Family Background

A1. Interviewee relationship: Mother Father Grandparent Aunt/ Uncle
 Sibling > 18years

A2: Caregiver's Age: 15-20 21-25 26-30 31-35 36-40 >40

A3: The caregiver's highest level of formal education reached?

No formal education Primary Secondary Tertiary and above

A4: Caregiver's religion? Christian Muslim Others
Specify.....

A5: What is the caregiver's occupation?

Employed Self-employed Unemployed

A6: What is the caregiver's average monthly income in Kenya shillings?

1000 - 5000, 5001-10000, 10001- 20000, 20001-50000,

A7: Marital status of the caregiver's? Married Single Separated
Divorced Widowed

A8: Number of children born by the caregiver? 1-3 4-6 >7

How many are alive 1-3 4-6 >7

A9: Did the caregiver's attend antenatal clinic visit during the child's pregnancy?

Yes No

A10: Where was the child delivered?

Home by skilled birth attendant Health facility

A11: What is the child's age in months: 9-17 months 18 months

A12: What is the child's birth order: _____? 1st-3rd 4th -6th >7th

A13: Child's Sex: Male Female

A14: How long do you take to reach the nearest immunization facility? ~~In~~ minutes

0-10 11-20 21-30 31-40 >40

Section B: MR Vaccine uptake

Ask the interviewee to bring the mother Child Booklet for the youngest

Child age 9-18 months and asks the following questions.

B1: Mother Child Booklet Available? Yes / No

Check for immunization status of:

MR1 Yes No

MR2 Yes No

B2: Where do you take your child for immunization? Government facility Faith Based Organization Private Don't Know

B3: a Have you ever taken your child for MR vaccine and was not attended?

Yes No

B3: b If yes what was the reason? [Tick all that applies]

<input type="checkbox"/>	Long waiting time	Vaccinator absent	<input type="checkbox"/>
<input type="checkbox"/>	Vaccines not available	Child ill	<input type="checkbox"/>
<input type="checkbox"/>	Health facility closed	Other	<input type="checkbox"/>

Section C: Awareness and Practices

C 1: Have you heard about Measles Rubella Vaccine for children? Yes No

C 1a: If yes, where did you hear about it? Health workers Religious Leader Local Leader Neighbor Megaphone Radio Television Not Applicable

C 2: Are you aware that children are given two doses of measles rubella vaccine

At 9 and 18 month of age? Yes No

C 3: Has your child ever been diagnosed with measles or rubella? Yes No don't know If yes at what age?

C 4: In your opinion, what reasons make mothers/caregivers not to take their children for MR vaccine in your neighborhood? [Select all that applies]

	Religion not encouraging vaccination	Some of our friends and neighbors have not vaccinated their children and they are not ill	
	Myth/Negative attitude towards vaccination		
	Mothers working the whole day and health facility is closed when they get home		

Appendix III: Key Informant Guide

I am Ruth Kanyiru. I am pursuing my master’s degree in International health at Jomo Kenyatta University of Agriculture and Technology. I’m conducting a study on to determine factors associated with measles rubella vaccine uptake among children age 9-18 months in Eastleigh North Ward Nairobi County. I’m going to ask you a few questions. I expect this session to be as interactive as possible. Be as truthful as you can. All issues discussed will only be for the purposes of this research and will never be mentioned in any other forum. In case you don’t understand any of the questions kindly seek clarification.

Once the health care worker has accepted to participate in the survey, fill out the following information.

A. Identification

1. Health facility Code.....
2. Health facility type.....

	Hospital		Health Centre
	Government		Dispensary
	Private		Private Clinic
	Others (NGO/Mission)		

3. Staff interviewed Cadre/Qualification _____
Position _____ Years in the position _____

B. Service Delivery

4. Do you know Immunization target population for children 9-18months for the area?

If Yes, how many _____

If No please explain

5. Are the health staffs that provide vaccinations also responsible for providing other health services? [If yes, which services?]

Health Education

Supplementary Feeding

Other (specify) _____

6. What is the MR uptake in children 9-18month in your catchment area last month (please give % of children vaccinated)

MR1 [] MR2 [] Don't Know []

7. How frequently are vaccination services provided in this facility?

	Daily	Once in two weeks	
	Once a week	Monthly	
	Twice or thrice per week	Quarterly	

Other, specify _____

8. Do you conduct vaccination outreach services? [If No Please explain]
9. Do you face any challenges in offering MR vaccine? [If Yes Please describe]

C. Hard to reach

10. Are there hard to reach areas/populations in your health facility catchment area hindering MR vaccine uptake? [If yes Please describe]

11. Do you have a vaccine defaulter tracking method? [If yes Please describe]

12. Have you had any stock outs or supply shortages of vaccination logistics in the past three months [select all that applies]

Vaccine stock outs

Syringes and needles

Other (specify) _____

D. Communications

14. Do you mobilize the communities in your catchment area for routine immunization? [If yes Please describe the channels used]

Thank you very much for your participation.

Appendix IV: Ethics Review Committee Approval



UNIVERSITY OF NAIROBI
COLLEGE OF HEALTH SCIENCES
P.O. BOX 19676 Code 00202
Telegrams: unairobi
Tel: (254 020) 2726300 Ext 44355

KNH-UoN ERC
Email: mech@erc.uonbi.ac.ke
Website: <http://www.erc.uonbi.ac.ke>
Facebook: <https://www.facebook.com/erc.uonbi.ac.ke>
Twitter: @ERC_uonbi; <https://www.linkedin.com/company/erc-uonbi>



KENYATTA NATIONAL HOSPITAL
P.O. BOX 20723 Code 00202
Tel: 254 20 566 5
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Telegrams: MEDSHP, Nairobi

Ref: KNH-ERC/A/22

28th November 2018

Ruth Wangari Kanyira
Admission No. HESL-314 2925/2016
School of Public Health
College of Health Sciences (CoHES)
U.N.N.A.T

Dear Ruth

RESEARCH PROPOSAL – FACTORS ASSOCIATED WITH UPTAKE OF MEASLES RUBELLA VACCINE AMONG CHILDREN AGE 9-18 MONTHS IN EASTLEIGH NORTH WARD NAIROBI COUNTY. (P/522/98/2018)

The University of Nairobi (UoN) Ethics & Research Committee (ERC), UoN ERC has reviewed and approved your above research proposal. The approval is valid from 28th November 2018 – 27th November 2019.

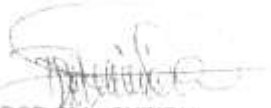
This approval is subject to compliance with the following requirements:

- Only approved documents (informed consents, study instruments, advertising materials etc) will be used.
- All changes (amendments, deviations, violations etc.) are submitted for review and approval by KNH-UoN ERC before implementation.
- Death and life threatening problems and serious adverse events (SAEs) or unexpected adverse events whether related or unrelated to the study must be reported to the KNH-UoN ERC within 72 hours of notification.
- Any changes, anticipated or otherwise that may increase the risks or affect safety or welfare of study participants and others or affect the integrity of the research must be reported to KNH-UoN ERC within 72 hours.
- Clearance for export of biological specimens must be obtained from KNH-UoN ERC for each batch of shipment.
- Submission of a request for renewal of approval at least 60 days prior to expiry of the approval period. (*Attach a comprehensive progress report to support the renewal*).
- Submission of an *executive summary* report within 90 days upon completion of the study. This information will form part of the data base that will be consulted in future when processing related research studies so as to minimize chances of study duplication and/ or plagiarism.

For more details consult the KNH-UoN ERC website <http://www.erc.uonbi.ac.ke>

Protect to discover

Yours sincerely,



PROF. M.L. CHINDIA
SECRETARY, KNH-UoN ERC

- c.c The Principal, College of Health Sciences, UoN
The Director, CS, KNH
The Chairperson, KNH-UoN ERC
The Assistant Director, Health Information, KNH
Supervisors: Prof. Gideon Kikwii(J.K.U.A.T), Dr. Dennis Magu(J.K.U.A.T)

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Appendix V: Introduction letter from Ministry of Health



MINISTRY OF HEALTH

Department of Preventive and Promotive Health

Telephone: (020) 2717077
Direct Line: (020) 2718653
E-mail: director@dpphs.moh@gmail.com
When replying please quote:

AFYA HOUSE, CATHEDRAL ROAD
P.O. Box 30016 – 00100,
NAIROBI

28th November 2018



Dear Sir/Madam

RE: FACTORS ASSOCIATED WITH UPTAKE OF MEASLES RUBELLA VACCINE AMONG CHILDREN AGE 9-18 MONTHS IN EASTLEIGH NORTH WARD NAIROBI COUNTY

I would like to request you to allow the bearer of this letter to collect data in your Sub-County.

She is researching on factors associated with MR uptake in your area. This is in line with ongoing measles rubella vaccination campaign in your area.

If you have any concerns, you can contact my office. She will share the study findings with your sub-county health team. Your support will be appreciated.

Yours faithfully,

Dr. Daniel Langat
Head of DDSRU



Certified

Appendix VI: Certificate of Publication

**International Journal of Scientific and
Research Publications**

ISSN 2250-3153

www.ijsrp.org

Certificate of Publication

This is to certify paper titled "**Factors Associated with Uptake of Measles Rubella Vaccine Among Children Age 9-18 Months in Eastleigh North Ward Nairobi County**" submitted by Author(s) **Ruth Wangari Kanyiru, Prof Gideon Kikuvi, Jomo, Dr. Dennis Magu Jomo** has been published for May 2019, Volume 9, Issue 5 publication under ISSN 2250-3153.

Signed by:



[J. Prakash]
Publication Head, IJSRP Inc.
Email: editor@ijsrp.org
www.ijsrp.org



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