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Comliance with Immunization Regime in Children below 12 Months among Mothers in Kericho County Hospital

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**COMPLIANCE WITH IMMUNIZATION REGIMEN IN CHILDREN BELOW 12
MONTHS AMONG MOTHERS IN KERicho COUNTY HOSPITAL**

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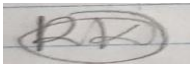
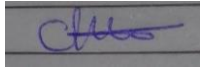
NUR/ K/0003/ 2019

**A RESEARCH THESIS SUBMITTED TO THE BOARD OF GRADUATE STUDIES IN
PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR CONFERMENT OF THE
DEGREE IN NURSING OF THE UNIVERSITY OF KABIANGA, DEPARTMENT OF
NURSING KAPKATET CAMPUS.**

JULY, 2023

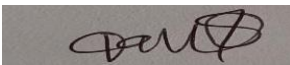
DECLARATION AND APPROVAL

We declare that this research thesis is our original and independent work and has not been presented before in this or any other institution. We affirm that the study adhered to the ethical guidelines and principles of research integrity throughout the study. We also declare that any sources of information used have been acknowledged by citations and references.

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ABSTRACT

Immunization remains as one of the most powerful tools of disease prevention and control worldwide and is thus considered to be a very crucial part of global and national disease prevention and control policies. The study aimed to assess the compliance with the immunization regimen in children below 12 months among mothers in Kericho County Hospital. The study adopted a cross-sectional survey design. The study targeted 165 mothers and caregivers of children aged below 12 months. Systematic sampling technique was used to select the study participants. The primary data was collected by use of structured questionnaires answered by mothers and caregivers. Statistical Package for Social Sciences (SPSS) version 20.0 was used for data analysis. The study found that 76.4% of children below 12 months were fully immunized, while 23.6% were not fully immunized. Various reasons non-compliances were reported included fear, negligence, forgetfulness, fear of adverse reactions, logistical challenges, unavailability of vaccines, limited access to vaccination centers, negative experiences with health workers, work commitments, lack of knowledge, and cultural reasons. All mothers were aware of child immunization, Maternal education level and the child's age were significantly associated with compliance to the immunization regimen ($p=0.024$ and 0.006 respectively), while other socio-demographic factors such as maternal age, religion, marital status, employment status, household monthly income, child gender, and birth order were not significantly associated. By addressing these factors and implementing comprehensive strategies, it is possible to increase

immunization coverage, reduce vaccine-preventable diseases, and contribute to the overall health and well-being of children in Kericho County.

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LIST OF ABBREVIATIONS AND ACCRONYMS

ANC- Antenatal care

BCG- Bacillus Calmette Guerin

EPI- Expanded Program on Immunization

FI Gfully immunized child

IPV-inactivated polio vaccine

KEPI- Kenya Expanded Program on Immunization

MCHG- Mother and Child Health Clinic

MOH- Ministry of Health

OPV- Oral Polio Vaccine

PCV-pneumococcal vaccine

SPSS- statistical package for social software

TB-tuberculosis

UNICEF- United Nations Children's Fund

WHO- World Health Organization

OPERATIONAL DEFINITION OF TERMS

Caregiver: is any person either a family member or a helper who gives care to people who need help taking care of themselves such as children and the elderly.

Compliance: it is the reception of age- appropriate vaccination by the child at the time of interview

Expanded program on immunization: it is an implementation that encompasses procedure of vaccination inline with the disease control program objectives

Fully immunized: if the child have received all dose of the eight vaccines

Maternal child health services: they are programs that focus on the health issues concerning women, children and the families such as prenatal and child well care, child nutrition and child immunization

Partially immunized: displays the child who has received either one or two doses of the vaccine without completing the remaining doses

Vaccination: it is the process of providing vaccines to persons in order to prevent them against infections or diseases

Vaccine preventable diseases: are infectious diseases caused by bacteria or viruses that can be prevented by use of vaccines.

Vaccine schedule: it is a series of vaccinations, including the timing of all doses based on the prevailing guidelines

Vaccine: it is a preparation or substance that is used to stimulate the body immune response against infections or diseases.

CHAPTER ONE: INTRODUCTION

1.1 Background of the Study

Immunization plays a vital role in preventing childhood diseases and reducing mortality rates among infants. Immunization has played a crucial role in reducing the burden of vaccine-preventable diseases worldwide. Immunization is a preventive health measure aimed at protecting children from vaccine-preventable diseases. Vaccination is recommended for all children below the age of 12 months to provide protection against infectious diseases such as polio, measles, whooping cough and recently Covid-19. Immunization plays a crucial role in protecting individuals from infectious diseases, preventing disability and death. It also has the potential to eradicate certain diseases, making it a cost-effective strategy for disease prevention and control, saving lives, and safeguarding future generations (Hotkin & Hotkin, 2011). There are different types of vaccines, including live attenuated vaccines, killed or inactivated vaccines, toxoids vaccines, and subunit/conjugate vaccines, each designed to provoke an immune response and provide protection against specific pathogens.

The World Health Organization (WHO) has identified a total of 29 vaccine-preventable diseases, with COVID-19 being one of the recent additions. The immunization schedule recommends that children complete their primary immunization by the age of 2 to be considered Fully Immunized Children (FIC). Booster vaccines are administered up to the age of 5. The immunization schedule starts at birth with the Bacillus Calmette-Guerin (BCG) vaccine against tuberculosis (TB) and oral polio vaccine. At 6, 10, and 14 weeks, a child receives multiple doses of vaccines including pentavalent, hepatitis B, oral polio, and pneumococcal vaccines. Measles

vaccine is given at 9 months, followed by yellow fever and measles rubella vaccines at 18 months, after which a child is considered fully immunized

The WHO launched the Expanded Programme for Immunization in 1974, aiming to control and reduce deaths caused by vaccine-preventable diseases, building on the success of smallpox eradication. In response, countries established their national immunization programs to facilitate effective delivery of immunization services. In Kenya, the Kenya Expanded Programme on Immunization (KEPI) was established in June 1980. Routine immunization programs became integrated into the healthcare system ensuring improved access to immunization services for all children (World Health Organization, 2019). However, private facilities also offer childhood vaccines not provided by public health facilities, leading to disparities in vaccine uptake and contributing to child morbidity and mortality.

Globally, some studies have revealed decline in global immunization coverage, particularly among under 12 months children. According to the World Health Organization (WHO), global immunization coverage dropped to 83% in 2020 from 86% in 2019, resulting in almost 23 million children below 24 months missing out on vaccination (WHO 2020). Similarly, a study by Abbas et al. (2021) analyzed global immunization coverage during the COVID-19 pandemic and found a significant reduction in vaccination rates across various countries. The study estimated that routine childhood vaccinations dropped by 7.7% globally in 2020 compared to the previous year. This decline aligns with the WHO's report of global coverage dropping to 83% in 2020. Furthermore, a report by the WHO, UNICEF, the Gavi Vaccine Alliance, and the Sabin Vaccine Institute stated that disruptions to immunization services caused by the COVID-19 pandemic led to an estimated 3.4 million more children missing out on vaccines in 2020 compared to 2019 (WHO 2020). This increase in unvaccinated children supports the claim that

immunization coverage dropped. The COVID-19 pandemic severely impacted health systems worldwide, leading to disruptions in immunization services, reduced access to healthcare facilities, and challenges in vaccine delivery and distribution (Patel et al., 2021). These disruptions resulted in a decline in immunization coverage, leaving millions of children vulnerable to vaccine-preventable diseases. A study conducted by the WHO and UNICEF found that nearly 80 million children in 68 countries were at risk of missing out on essential vaccines due to the disruption caused by the pandemic (WHO & UNICEF, 2020).

In Africa, according to WHO, the African region had the lowest immunization coverage rates compared to other regions in 2020. The coverage for the third dose of the diphtheria-tetanus-pertussis (DTP3) vaccine was 72% compared to the global average of 85% (WHO 2020). This indicates the need for continued efforts to improve coverage in the region. Immunization coverage rates can vary within countries in Africa. A study by Mohammed et al. (2020) in Ethiopia found disparities in immunization coverage based on factors such as region, wealth status, and maternal education. Vaccine-preventable diseases continue to be a concern in Africa. For instance, measles outbreaks have occurred in several African countries due to low immunization coverage. According to Mbabazi et al. (2019), there is need to establish for targeted interventions to address challenges in measles vaccination, including inadequate coverage and vaccine hesitancy.

In Kenya, immunization compliance has been a concern, with low coverage rates reported in various studies. Several studies conducted in Kenya have reported that immunization compliance in Kenya is relatively low. According to a study by Karanja et al. (2018), the national immunization coverage for children aged 12-23 months in Kenya was only 63.7%. This finding indicates that a significant proportion of children in the country are not receiving the

recommended vaccines within the specified timeframe. Furthermore, regional disparities in immunization coverage within Kenya have been observed. The Kenya Demographic and Health Survey (KDHS) 2014 reported that some regions had notably lower immunization coverage compared to the national average. For instance, the North Eastern region achieved a coverage rate of only 48.3% while the coastal region reached 77.6% (KDHS, 2014). Studies have also examined factors contributing to low immunization compliance in Kenya. One study by Ondondo et al. (2019) found that vaccine hesitancy, lack of awareness about the importance of immunization, and misconceptions about vaccines were significant barriers to immunization uptake among caregivers in Kenya. Another study by Anokye (2018) identified socio-demographic factors such as caregiver's education level, occupation, and income as influencing immunization uptake. The impact of the COVID-19 pandemic on immunization services has further exacerbated the challenge of low compliance. Disruptions to routine immunization services, reduced access to healthcare facilities, and vaccine hesitancy related to the pandemic have all contributed to lower immunization coverage rates in Kenya and globally (WHO & UNICEF, 2020).

In Kericho, according to data from the Kenya Health Information System Kericho County reported an immunization coverage rate of 83.1% (Kenya Health Information System 2020). This indicates that there is a gap in achieving the recommended coverage levels set by the World Health Organization (WHO) of at least 90%. A study conducted by Nyandieka et al. (2018) in Kenya, which included Kericho County, identified several factors contributing to low immunization compliance in the region. The study found that inadequate knowledge about the importance of immunization among caregivers was one of the key factors influencing low compliance rates. Many caregivers lacked awareness of the recommended immunization

schedule, the benefits of immunization, and the potential consequences of missed vaccinations. According to KDHS 2014 North Eastern only managed a coverage of 48.3% while the coastal region achieved a coverage of 77.6%. Understanding the key predictors of immunization uptake therefore is important in the efforts to strengthen campaign strategies aimed at increasing immunization coverage to reduce morbidity and mortality rates that result from vaccine preventable diseases. According to various studies conducted in relation to seeking of health services including immunization several factors have been attributed to these disparities and include socio-demographic, economic and health system related factors as they tend to influence uptake of vaccinations either positively or negatively. Social demographic factors such as caregiver's age, marital status, education level, occupation, income and knowledge of vaccines have been studied and reported to have an impact on vaccine uptake (Shaham 2020; Anokye, 2018). Various studies have been conducted to find the association between environmental and health system factors and immunization uptake establishing that these factors have the ability to influence the uptake of immunization services, such factors include distance to the health facility, residence, antenatal care services, place of delivery (Rup, 2008; Logullo, 2008; Mikungwa, 2015; Mutua, 2011). Knowledge, attitudes and perceptions of caregivers on immunization services have been studied to see whether they impact positively or negatively the uptake of immunization (Gunnala, 2016). Child characteristics that include age of the child, birth order of the child and sex of the child have been studied to try and establish their link to uptake of immunization services (Oadokun, 2020; Dru, 2016; Herliana, 2017). In lieu of the above studies it is thus important to try and establish the relationship between the factors mentioned in the studies that include socio-demographic, socio-economic, child characteristics and environmental and health system factors and the use of health services. It is upon this background that this study seeks to

explore the determinants of uptake of immunization services in Kericho County. In addition, understanding the factors influencing low compliance, addressing vaccine hesitancy, and strengthening immunization campaigns and healthcare delivery systems are crucial for improving immunization coverage in Kenya and reducing the risk of vaccine-preventable

1.2 Problem statement

Immunization remains as one of the most powerful tools of disease prevention and control worldwide. Despite its usefulness, maternal compliance with immunization services still remain unacceptably low, making the vaccine preventable diseases to top the list of contributors to childhood morbidity and mortality, with an estimated 1.5 million deaths among children being associated with diseases that can be averted through immunization as stated by WHO, 2018. The governments of many nations, Kenya included, Non-Governmental Organization and the private sectors have continued to put in concerted efforts to ensure availability and accessibility of the vaccines so as to maximize use by the children below 12 months. Whereas programs to ensure this is possible have been rigorous, uptake seems to remain low yet expanded availability and accessibility of immunization services. But to what extent are these services actually used? If these services are made readily available and accessible, what are the factors that will influence their compliance by the intended population? These seem to be the unanswered questions which this study seeks to provide answers to. Kenya as a country has continued to put in strategies that have been adopted by 47 counties to boost compliance with immunization services and ensure every child gets protection against vaccine preventable diseases. These strategies include: Integrated outreach programs, mass immunization campaigns, increase in number of vaccinating

facilities by making sure all government facilities and private facilities stock and offer vaccination services, media campaign on vaccination; advocacy, communication and social mobilization activities toward promoting vaccination, community health strategy ensuring every household is attached to a community health volunteer. Despite these efforts the country has continued to register low immunization uptake falling behind the WHO target of 90% with the current uptake standing at 83.2% (KHS, 2021). This uptake obtained because of efforts put in by the 47 counties immunizing facilities as per the national targets requirement given to each county tends to conceal challenges experienced by the counties, the sub-counties and their immunizing facilities in relation to access to immunization. According to KDHS, 2022 Kericho County has percentage of fully vaccinated children at 45.6% showing that its uptake is still below average. Though studies on compliance with immunization services do exist, they are minimal and yet still there is no study that seeks to address this challenge of immunization in Kericho County.

1.3 Research objectives

1.3.1 Broad Objective

To assess the compliance with the immunization regimen in children below 12 months among mothers in Kericho County Hospital.

1.3.2 Specific objectives

- i. To determine the level of compliance with the immunization regimen among mothers of children below 12 months in Kericho County Hospital.
- ii. To identify the reasons for non-compliance with the immunization regimen among mothers of children below 12 months in Kericho County Hospital.

- iii. To identify the socio-demographic factors influencing immunization compliance among mothers of children below 12 months in Kericho County Hospital.
- iv. To assess the knowledge and awareness of mothers regarding the importance of immunization for children below 12 months in Kericho County Hospital.

1.4 Research Questions.

- i. What is the level of compliance with the immunization regimen among mothers of children below 12 months in Kericho County Hospital?
- ii. What are the reasons for non-compliance with the immunization regimen among mothers of children below 12 months in Kericho County Hospital?
- iii. What are some of socio-demographic factors influencing compliance with immunization regimen in mothers with children below 12 months in Kericho County Hospital?
- iv. What is the knowledge and awareness level of mothers regarding the importance of immunization for children below 12 months in Kericho County Hospital?

1.5 Justification of the study

The study on compliance with the immunization regimen in children below 12 months among mothers in Kericho County Hospital is important for several reasons. Immunization plays a crucial role in preventing the spread of vaccine-preventable diseases and protecting children from potentially life-threatening infections. Understanding the level of compliance with the immunization regimen among mothers is essential to assess the effectiveness of the immunization program in Kericho County Hospital and identify areas for improvement.

Identifying the reasons for non-compliance with the immunization regimen is vital for developing targeted interventions and strategies to address these barriers. By exploring the factors that contribute to non-compliance, such as lack of awareness, misconceptions, or logistical challenges, healthcare providers can tailor their communication and support to better meet the needs of mothers and encourage higher compliance rates.

Additionally, assessing the knowledge and awareness of mothers regarding the importance of immunization for children below 12 months provides insights into the effectiveness of health education initiatives. It helps identify gaps in knowledge and areas where additional educational efforts are needed to enhance understanding and promote the value of timely immunization.

Furthermore, understanding the factors that influence mothers' decision-making process regarding immunization can help healthcare providers and policymakers develop strategies to address these factors effectively. This may include addressing concerns or fears, improving access to immunization services, or enhancing communication channels between healthcare providers and mothers.

Overall, this study is justified as it contributes to the body of knowledge on immunization compliance in the specific context of Kericho County Hospital. The findings will provide valuable insights for healthcare professionals, policymakers, and public health authorities to develop targeted interventions, improve immunization rates, and ultimately enhance the health and well-being of children in the community.

CHAPTER TWO: LITERATURE REVIEW

2.1. Introduction

This chapter reviews literature from diverse sources linked to immunization services and factors associated with its utilization. It reviews local, regional, and international studies with an aim to identify gaps related to immunization services and factors associated with its compliance among mothers.

2.2 Compliance with immunization services among mothers

Amugune (2019) conducted a household based community study in Mikuru kwa Njenga and Mwandani informal settlements in Nairobi county found out that 91.8%(241)respondents had taken their children for immunization at appropriate age.

Mbisi et al (2010) on a study on spatial and socio-demographic predictors of time-to immunization in Kilifi District, Kenya showed that there was a very high immunization coverage for all the recommended vaccines with 98.9%, 95.7%, 95.6% and 89.7% of subjects with vaccine cards receiving BCG, three doses of pentavalent, three doses of OPV, and measles vaccine by the age of 1 year respectively. Only 14% of enrolled subjects did not have the vaccine cards available for examination. In this group, reported coverage was three to seven percentage points lower for all doses of vaccine, (except OPV₀), but remained >90% for BCG, DPT- Hep B- Hib₃, OPV₃ and >80% for measles. They concluded that the wide discrepancy between maternal reporting and card data for OPV₀ coverage was specific to that vaccine, and may have reflected poor recall for the period immediately after delivery.

In Ekiti state, Nigeria the level of compliance with childhood immunization was high (80%). The two factors which contributed significantly to mothers' compliance were the mothers' knowledge of childhood immunization and mothers' educational status (Konwea et al., 2018).

2.3 Non-Compliance to immunization regimen

Several studies have revealed a number of reasons for non-compliance to immunization among mother with children of less than 12 months in age. Misconceptions and safety concerns regarding vaccines have been identified as significant reasons for non-compliance with immunization schedules. A study by Gowda et al. (2020) found that maternal concerns about vaccine safety and side effects were associated with vaccine hesitancy. Similarly, a systematic review by Larson et al. (2014) identified vaccine safety concerns as a common theme leading to vaccine hesitancy. Trust in healthcare providers plays a crucial role in immunization compliance. A study by Lin et al. (2019) revealed that a lack of trust in healthcare providers was associated with vaccine hesitancy. Mothers who lacked confidence in healthcare providers' recommendations were more likely to delay or refuse vaccines for their children. Social networks and peer influence can impact vaccine decision-making.

A study by Opel et al. (2019) explored the influence of social networks on immunization compliance and found that mothers who had interactions with vaccine-hesitant peers were more likely to question the necessity of immunizations for their children. A study by Betsch et al. (2015) examined the impact of vaccine-related misinformation on vaccination intentions and found that exposure to vaccine myths reduced the intention to vaccinate. Misinformation spread through various sources, including social media platforms, can undermine confidence in vaccines. A lack of knowledge and information gaps about vaccines and their importance can contribute to

non-compliance. A study by Bocquier et al. (2018) found that limited knowledge about vaccines and their benefits was associated with vaccine hesitancy among parents.

2.4 Sociodemographic factors that affect maternal compliance with immunization

2.4.1 Maternal Age

Several studies have shown significant association between maternal age and immunization compliance. Some studies have revealed that the younger maternal age is often associated with lower immunization compliance rates (Smith et al., 2019). The study found that mothers under 20 years had lower rates of full immunization coverage for their children compared to the old mothers. Consistently, Khanal et al. (2016), reported that mothers below age of 20 in Nepal had lower rates of complete immunization for their children under 12 months old. Due to young age and potential social and economic challenges, teenage mothers encounter barriers to immunization compliance. According to Datar et al. (2016), the teenage mothers in the United States had lower rates of timely immunization compared to the adult mothers. Teenage mothers may face challenges in the access of healthcare services and hence, may have lower levels of knowledge and awareness about the significance of immunization.

The impact of older maternal on immunization compliance is usually less clear. However, some studies have found that older mothers have higher immunization compliance rates. According to Chiao et al. (2011), revealed that older maternal age was positively associated with complete immunization coverage for children. Similarly, a study conducted in India by Joseph et al. (2021), revealed that older mothers were more likely to have their children fully immunized compared to younger mother. This was suggested to be due to greater knowledge, experience and resources that positively influence their compliance with immunization regimen.

2.4.2 Marital Status

According to Larson *et al.* (2015), single mothers in the US had lower rates of timely immunization for their children compared to married mothers. Several challenges were highlighted to be a barrier, particularly additional responsibilities. Single mothers have limited social support, resources and even access to healthcare services.

In a study conducted on mothers in Nigeria, it was observed that married women had significantly adequate knowledge of immunization compared to their counterparts who were either single/divorced/separated. The supportive role of their partners may have also enhanced their knowledge if both partners jointly try to find better ways to better the health status of their offspring (Galadina *et al.*, 2021). Similarly, according to Ophori *et al.* (2014), married mothers had higher rates of immunization coverage for their children compared to single mothers. Married mothers may have support from their partners who assist them in accessing healthcare services and making healthcare decisions for their children.

2.4.3 Religion

In a study on religious affiliation as a driver for immunization rate, it was reported that there was higher zero-dose prevalence among children in folk religious groups compared to Christians. There was also lower vaccine coverage for groups practicing traditional religions in Burkina Faso (Santos *et al.*, 2022).

2.4.4 Level of education

In a study on global effect of maternal education on immunization it showed that the odds of child immunization were 2.3 times greater in children whose mothers received secondary education when compared to children whose mother had no education (Forshaw *et al.*, 2017).

The study concluded that maternal education is important for increasing childhood vaccination and uptake.

In another study in Nigeria, mothers with at least a primary or secondary education were found to be approximately eight times more likely to have their children fully immunized compared to mothers with no formal education. This was more likely due to changes that accompany maternal education such as changes in attitudes, traditions and beliefs, increased autonomy and control over household resources which enhance health seeking (Galadina *et al*, 2021).

2.4.5 Employment Status

A study in Iraq there was no significant association between immunization completeness and the mother's occupation (Molan, 2020). The employed mothers have higher rates of complete immunization for their children compared to unemployed mothers. The higher compliance was contributed by better financial resources and improved access to healthcare due to employment. Compared to employed mothers, unemployment is significantly associated with lower immunization coverage among mother, due to limited accessibility to healthcare facilities and lack of insurance coverage. In conclusion, according to Ma et al. (2019) self employed mothers have lower rates of immunization coverage for their children compared to formally employed mothers.

2.4.6 Household monthly income

In a study conducted in Burkina Faso, it was reported that there was an increased tendency of having children fully vaccinated in families whose income was greater than 52 USD when compared to a poor family with a lesser income. This was due to easier access to

immunization centers by families with higher income and less financial challenges when compared with families with a lower income. (Galadina et al, 2021).

2.4.7 Child gender

In a study conducted in Nigeria it was found that male children were about 3 times more likely to be immunized compared to female children. This may have been attributed to beliefs of parents that immunization will have negative impacts on their daughters when they reach the child bearing age. (Galadina et al, 2021).

2.4.8 Child age

In a study in Angola higher immunization uptake was seen in children who were 1 year of age or less compared with children who were above 1 year. This could be attributed to the lectures received by mothers towards benefits of timely childhood immunization uptake during their antenatal and postnatal care. (Galadina et al, 2021).

2.4.9 Child order of birth

A family comprising of 2 to 3 siblings were more likely to vaccinate their children compared with a family with less than 2 siblings. This may have been due to experience gained over time on the importance of immunization as well as medical complications that have occurred in children due to lack of immunization (Galadina et al, 2021)

2.5 Maternal Knowledge and Awareness of immunization

Mothers' knowledge and awareness about immunization have been identified as important factors that influence immunization compliance. Knowledge and awareness of mothers regarding the importance and benefits of immunization are crucial factors in promoting vaccination compliance for their children. Some related studies have revealed that when mothers are well-informed about immunization, they are more likely to recognize its significance and actively seek vaccination services.

The sources of information that mothers rely on can influence their knowledge and awareness of immunization. According to a study conducted by Mitua et al. (2015), revealed that healthcare workers were most common source of information on immunization (83%). Consistently, other study conducted in Ethiopia by Erhanu et al. (2017), also found that approximately 90% of the mothers had received information on immunization from the healthcare workers while mass media was the least (11%). A study by Karafillakis et al. (2016) found that healthcare professionals were the most trusted source of vaccine information for mothers. However, mothers also reported using online sources and social networks for information, which can sometimes contain inaccurate or misleading information. Mothers who had received health education from healthcare providers were more likely to have their children fully vaccinated compared to those who had not received any health education on immunization (Dako-Gyeke et al., 2016; Iliyasu et al., 2018).

According to Patel et al. (2019) found that mothers who had a higher level of knowledge regarding immunization were more likely to have their children vaccinated. In addition, this study revealed that these mothers had better understand of the preventive nature of vaccines and recognized the benefits they provide in protecting against various infectious diseases. Similarly,

according to Desalegn et al. (2021), mothers who were aware of the positive outcomes associated with immunization were more inclined to adhere to the recommended vaccination schedules for their children. Thus, the awareness of the benefits of vaccination as a significant predictor of immunization compliance. Furthermore, this knowledge is important as it helps mothers plan and prioritize their children's vaccinations, ensuring they receive the vaccines at the appropriate ages and intervals for optimal protection.

Having knowledge on the risks and consequences associated with vaccine-preventable diseases is significant for promotion of immunization. It's important for decision making process among mothers. Studies have shown that awareness of the severe outcomes linked to vaccine-preventable diseases can positively influence immunization compliance. According to Alsaid et al. (2020), mothers who had knowledge of the severe outcomes associated with vaccine-preventable diseases were more likely to comply with immunization schedules. Such knowledge is important for motivation to ensure their children received the necessary vaccines to safeguard against these diseases. Similarly, a study by Shrivastava et al. (2016) found that awareness of the complications of diseases was positively associated with vaccine acceptance. Knowledge of the recommended vaccination schedule and the importance of timely immunizations is essential. A study by Bocquier et al. (2018) emphasized the significance of accurate knowledge of the vaccination schedule in promoting compliance. Mothers who had a clear understanding of the timing and number of doses for each vaccine were more likely to adhere to the recommended schedule.

Various barriers can hinder mothers' knowledge and awareness of immunization. A study by Choudhury et al. (2021) identified factors such as low maternal education, rural residence, and lack of exposure to health promotion activities as barriers to knowledge about vaccines.

Addressing these barriers is crucial for improving mothers' understanding of immunization. Effective health education and communication strategies play a vital role in improving mothers' knowledge and awareness. A study by Oeribe et al. (2020) emphasized the importance of targeted health education programs to provide accurate and comprehensive information about immunization to mothers. Utilizing culturally appropriate communication channels and involving community leaders can enhance knowledge and awareness levels.

2.6 Conceptual Framework

The independent variables for this study are socio-demographic factors such as maternal age, marital status, religion, level of education, employment status, monthly income, child age, gender among others; maternal knowledge and awareness of immunization which includes source of information, knowledge on importance and benefits of immunization in children, knowledge on schedule and timing and reasons for non-compliance such as inadequate knowledge and awareness gap, vaccine misperceptions and myths, lack of trust in healthcare providers and vaccine misconceptions and safety concerns. The dependent variable is a variable that is affected by independent variables (predictors). It's also called outcome variable. For this study, the outcome variable is immunization regimen compliance of mothers with children under 12 months of age.

Independent Variables

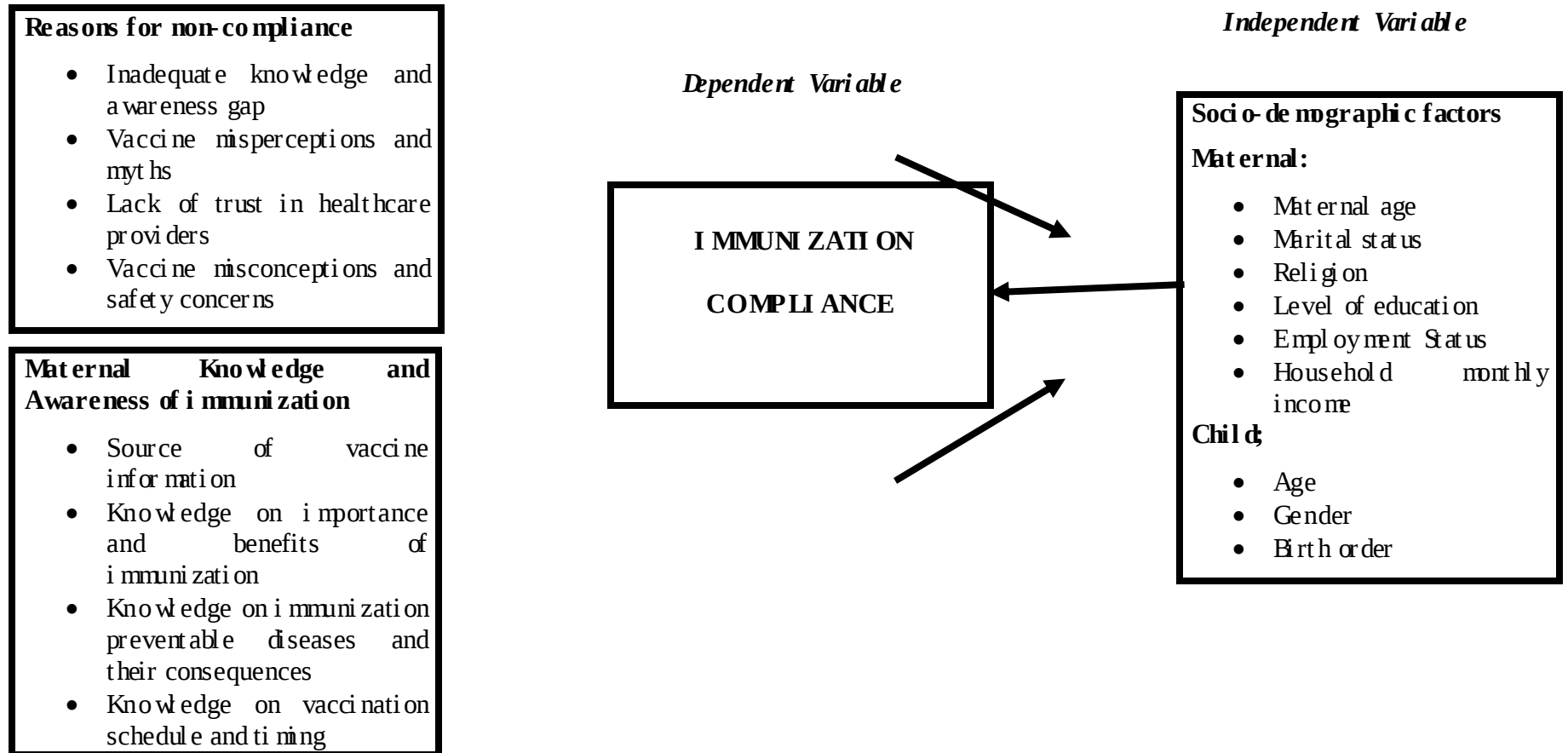


Figure 1: Conceptual framework

CHAPTER 3: RESEARCH METHODOLOGY

3.1 Introduction

This chapter outlines the overall methodology to be used in carrying out the study. It explains the design adopted, and defines the variables to be used in the study together with their measurements and expected design. The chapter also outlines the data source, sample size and the sampling technique, research design, location of study, target population, data collection instruments and data collection procedures, data analysis and presentation and ethical considerations.

3.1 Study Design

The study used is cross-sectional design. This design was helpful in collection of information that's relevant to allow maximum answering of research questions.

3.2 Location of study

The study was conducted at Kericho County Referral Hospital. Kericho County is located in South rift valley about 256 km from Nairobi, capital city of Kenya. Kericho county is located between longitude 35° 02' and 35° 40' East and between the equator and latitude 0° 23' South with an altitude of about 2,002 meters above the sea level. The county covers an area of about 2454.5 km². Kericho has a population of about 901,777 according to 2019 census. County is composed of six sub-counties.

3.3 Study population

The target population included mothers and caregivers of children under 12 months of age attending MCHC clinic at Kericho County Hospital.

3.3.1 Inclusion criteria

- i. Mothers who have children below 12 months attending to routine immunizations services.
- ii. Mothers who are willing to participate in the study.

3.3.2 Exclusion criteria

- i. Mothers who are not willing to participate in this study.
- ii. Mothers to children aged below 12 months who are sick at the time of this study.
- iii. Mothers or caregivers who are mentally sick

3.4 Sample size determination

Sample size was determined using Fischer's formula (Mugenda & Mugenda, 1999).

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

Where n= desired sample size

Z= standard deviate at 95 %level of confidence, usually 1.96

p= precision of prevalence or proportion of mothers with need for immunization, 80 %(KDHS, 2022)

q=1-p

d=degree of accuracy desired, usually 0.05

Therefore, the sample size was calculated as follows;

$$n = 1.96^2 \times 0.80 \times (1 - 0.80) / 0.05^2$$
$$= 246$$

Since the study population is less than 10,000 people the formula below was used to adjust the sample size.

$$n_f = n / \{1 + (n / N)\} \text{ where;}$$

n_f = desired sample size when the population is < 10,000

n = desired sample size when population is > 246

N = population estimate (mothers visiting immunization clinic in a month) = 500

$$n_f = 246 / \{1 + (246 / 500)\}$$

$$= 246 / (1 + 0.492)$$

$$= 246 / 1.492$$

$$= 165$$

Therefore, our sample size was 165

3.5 Sampling procedure

The study used systematic random sampling technique which involved random selection of target individuals from a sampling frame for participant aged below 12 months attending immunization clinic at Kericho County Hospital. The study population (N) was estimated at 500 immunization clients while the desired sample size (nf) was 165 respondents. The sampling interval was therefore $500/165=3.03$ whereby every 3rd client attending the immunization clinic and who met the inclusion criteria was selected as a participant.

3.6 Data Collection

Primary data was collected using structured self-administered questionnaires and the study was facility-based. Mothers and caregivers were assisted to ensure that they understand and provide desired answers to the questionnaire.

3.6.1. Data Collection Tools

Quantitative data was collected using structured questionnaires that were designed and given to the target individuals by the investigator. Furthermore, health records were also may be used.

3.6.2 Data Collection Procedure

Data collection procedure involved administration of the designed questionnaires with the issue of study to the targeted group after presentation of an introductory letter from the University of Kabianga, Kapkatet Campus. A register of all questionnaires with indicated questionnaire numbers were kept for statistical analysis of the data collected.

3.7. Statistical analysis

The collected data were coded, entered into the computer, cleaned and analyzed using Statistical Package for Social Sciences (SPSS) software. Descriptive analysis was conducted to summarize and organize the data. The socio-demographic characteristics of respondents were presented as mean $\pm$ SD and percentages. Frequency tables were used to show distribution in usage of immunization regimens and assess prevalence differences. Chi square statistic tests were used to test the association between variables and level of significance.

3.8 Ethical consideration

Approval and permission to carry out the study was sought from University of Kabianga Ethical Review Committee. Legal permission was also sought from Kericho County Hospital authority, superintendent. Informed consent was sought from all participants. Confidentiality, anonymity and privacy was guaranteed throughout the study, as collected information were kept secret and they were not shared with non-researchers. Participation was voluntary hence the study participants were informed of their right to terminate interview wherever they felt, without any penalty.

CHAPTER FOUR: FINDINGS

The response rate was 100 % as all the study participants filled completely the questionnaires.

This was achieved through close assistance of the researchers.

Table 1: Socio-demographic characteristics of study participants

Variable	Frequency	Percentage
Maternal Age (in years)		
15-24	35	21.2
25-34	80	48.5
35-44	40	24.2
45 or above	10	6.1
Religion		
Christianity	145	87.9
Muslim	18	10.9
Other e.g., Hindu	2	1.2
Marital Status		
Single	30	18.2
Married	115	69.7
Divorced/separated	15	9.1
Widow	5	3.0
Education level		
No formal education	25	15.2
Primary education	40	24.2
Secondary education	70	42.4
Tertiary education	30	18.2
Employment status		
Student	25	15.2
Unemployed	50	30.3
Employed	40	24.2

Self employed	50	30.3
Household monthly income		
< Ksh 5,000	75	45.5
Ksh. 5,001- 15,000	40	24.2
Ksh. 15,001- 25,000	35	21.2
Above Ksh. 25,000	15	9.1
Child's Age (in months)		
1-3	40	24.2
4-6	50	30.3
7-9	35	21.2
10-12	40	24.2
Gender		
Female	80	48.5
Male	85	51.5
Birth order		
First	60	36.4
Second	50	30.3
Third or more	55	33.3

The majority of the study participants (48.5%) were in the age range of 25-34 years, followed by 24.2% in the age range of 35-44 years. A smaller proportion of participants were in the age ranges of 15-24 years (21.2%) and 45 or above (6.1%). Christianity was the most prevalent religion among the study participants, with 87.9% identifying as Christians. Muslims accounted for 10.9% of the participants, while other religions, such as Hinduism, made up a smaller proportion (1.2%). The majority of participants were married (69.7%), followed by single individuals (18.2%). Divorced or separated individuals accounted for 9.1% while widows constituted 3.0% of the participants. The highest proportion of participants had a secondary education (42.4%), followed by those with primary education (24.2%) and tertiary education

(18.2%). A smaller proportion had no formal education (15.2%). The distribution of employment status among participants was relatively balanced. The largest group was unemployed individuals (30.3%), followed by those who were self-employed (30.3%) or employed in the government sector (24.2%). Students made up 15.2% of the participants. The majority of participants (45.5%) had a monthly income below Ksh. 5,000. A smaller proportion had incomes in the ranges of Ksh. 5,001-15,000 (24.2%), Ksh. 15,001-25,000 (21.2%), and above Ksh. 25,000 (9.1%).

The distribution of children's ages was relatively balanced across the age ranges. The largest group consisted of children aged 4-6 months (30.3%), followed closely by children aged 1-3 months and 10-12 months (both 24.2%). Children aged 7-9 months accounted for 21.2% of the participants. The study included a slightly higher proportion of male participants (51.5%) compared to females (48.5%). The most common birth order among the participants' children was the first child (36.4%), followed by the third child or more (33.3%) and the second child (30.3%).

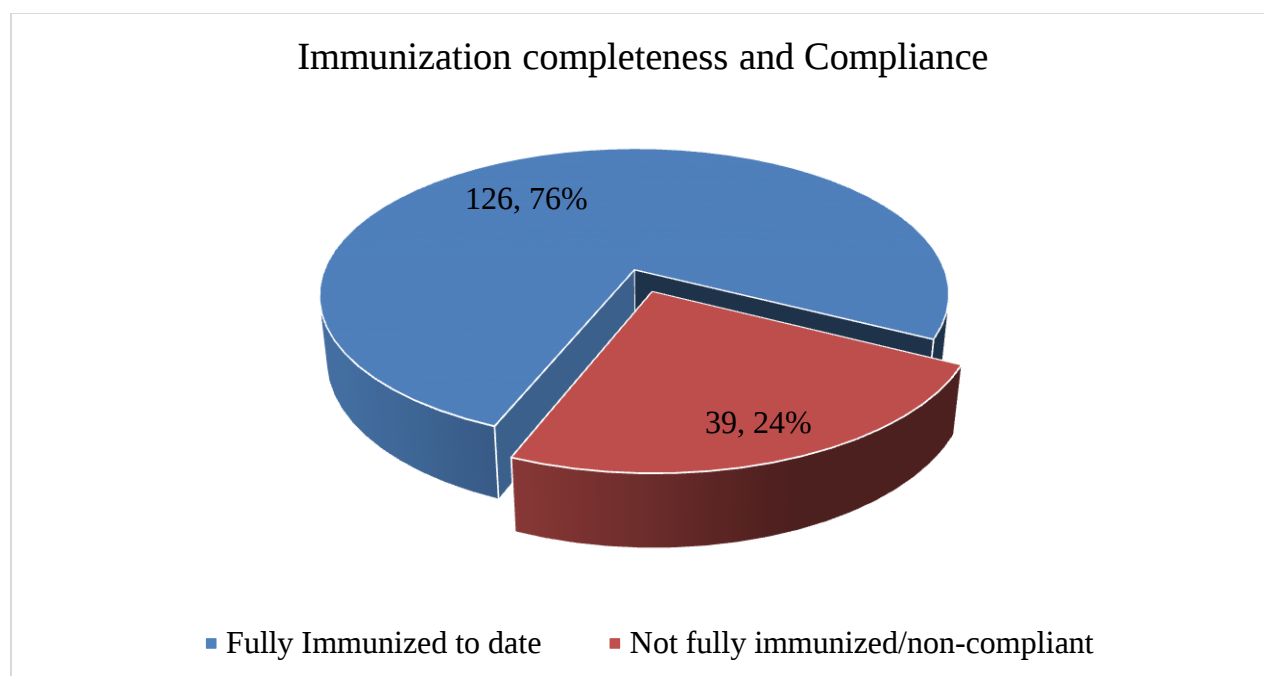


Figure 2: Immunization compliance and completeness

Out of the total sample size of 165 participants, 126 participants (76.4%) were reported as fully immunized, meaning they received all the recommended vaccines according to the immunization schedule. On the other hand, 39 participants (23.6%) were classified as not fully immunized, indicating that they missed some or all of the recommended vaccines.

Table 2: Knowledge on child immunization

Variable	Frequency	Percentage
Knowledge on immunization		
Yes	165	100.0
No	0	0.0
Source of information		
Healthcare providers	149	90.3
Community health workers	15	9.1

Fa mily/friends	1	0.6
Be nefits of i mmuni zati on		
Yes	121	73.3
No	44	26.7
Vacci nes are safe?		
Yes	118	71.5
No	28	17.0
Not sure	19	11.5
Fa miliar with chil d i mmuni zati on schedule		
Yes	75	45.5
No	90	119.5

All 165 participants (100 %) stated that they are aware of immunization, indicating a general understanding of the concept and purpose of child immunization. Among those who were aware, the majority (90.3%) reported that their primary source of information regarding immunization was healthcare providers, highlighting the important role of healthcare professionals in educating the public about vaccines. Additionally, a small percentage of participants (9.1%) mentioned community health workers as their source of information, while only 0.6% relied on family or friends for immunization-related knowledge. When asked about the benefits of immunization, 73.3% of the participants acknowledged these benefits, demonstrating a good understanding of the positive impact vaccines have in preventing diseases. However, a notable proportion (26.7%) responded negatively, indicating a lack of awareness about the advantages of immunization.

Regarding the perceived safety of vaccines, a significant majority (71.5%) of the participants believed that vaccines are safe. However, a notable proportion (17.0%) expressed doubts about vaccine safety, while 11.5% were unsure, indicating a need for further education

and accurate information to address concerns and misconceptions. In terms of familiarity with the immunization schedule, only 45.5% of the participants reported being familiar with the recommended timing and sequence of vaccinations for children. However, a concerning number (119.5%) indicated that they were not familiar with the immunization schedule, suggesting a lack of awareness or understanding of the recommended vaccination timeline.

Table 3: Reported reasons for non-compliance

Factors	Frequency (n = 39)	Percentage
Fear, negligence, forgetfulness of immunization dates	30	76.9
Fear for adverse reactions or side effects	29	74.4
Time spent too long and Lengthy contact period (number of visits)	26	66.7
The vaccine is not available	23	59.0
Vaccination centers are far from home & transportation problems	21	53.8
Health workers' behavior discourage mothers	19	48.7
Parent's work	18	46.2
Fear for adverse reactions or side effects	17	43.6
Poor knowledge about the seriousness of the disease	12	30.8
Religious or cultural reasons	8	20.5
Child been ill	6	15.4

The most common reasons cited were fear, negligence, and forgetfulness regarding immunization dates, with 30 participants (76.9%) expressing this concern. Additionally, 29 participants (74.4%) reported fear of adverse reactions or side effects as a reason for non-compliance. Logistical challenges were also mentioned as barriers to compliance. Specifically,

26 participants (66.7%) reported that the time spent at vaccination centers and the lengthy contact period required for multiple visits were burdensome. Furthermore, 23 participants (59.0%) indicated that the unavailability of vaccines contributed to their non-compliance.

Access to vaccination centers was a significant factor for non-compliance. Around 21 participants (53.8%) reported difficulties due to the distance between their homes and vaccination centers, as well as transportation problems. This highlights the need for accessible immunization services and transportation support. Participants also cited the behavior of health workers as a deterrent to immunization, with 19 participants (48.7%) reporting that they were discouraged by health workers' behavior. This emphasizes the importance of creating a supportive and respectful environment for caregivers. Work commitments of parents were mentioned by 18 participants (46.2%) as a reason for non-compliance. Balancing work and attending immunization appointments can pose challenges for caregivers and may require flexible scheduling options. Other factors influencing non-compliance included poor knowledge about the seriousness of vaccine-preventable diseases (12 participants or 30.8%), religious or cultural reasons (8 participants or 20.5%), and the child being ill (6 participants or 15.4%).

Table 4: Chi-Square test on association between socio-demographic factors and immunization regimen compliance

Variable	Fully immunized	Not fully immunized	P- Value
	N (%)	N (%)	
Maternal Age (in years)			0.093
15-24	28 (80.0)	7 (20)	
25-34	59 (73.8)	21 (26.2)	
35-44	31 (77.5)	9 (22.5)	
45 or above	8 (80.0)	2 (20.0)	

Religion			0.061
Christianity	110 (75.9)	35 (24.1)	
Muslim	15 (83.3)	3 (16.7)	
Other e.g., Hindu	1 (50.0)	1 (50.0)	
Marital Status			0.079
Single	22 (73.3)	8 (26.7)	
Married	88 (76.5)	27 (23.5)	
Divorced/separated	12 (80.0)	3 (20.0)	
Widow	4 (80.0)	1 (20.0)	
Education level			0.024
No formal education	15 (60.0)	10 (40.0)	
Primary education	29 (72.5)	11 (27.5)	
Secondary education	55 (78.6)	15 (21.4)	
Tertiary education	27 (90.0)	3 (10.0)	
Employment status			0.122
Student	18 (72.0)	7 (28.0)	
Unemployed	37 (74.0)	13 (26.0)	
Employed	31 (77.5)	9 (22.5)	
Self employed	40 (80.0)	10 (20.0)	
Household monthly income			0.205
< Ksh. 5,000	58 (77.3)	17 (22.7)	
Ksh. 5,001- 15,000	29 (72.5)	11 (27.5)	
Ksh. 15,001- 25,000	26 (74.3)	9 (25.7)	
Above Ksh. 25,000	13 (86.7)	2 (13.3)	
Child's Age (in months)			0.006
1-3	35 (87.5)	5 (12.5)	
4-6	42 (84.0)	8 (16.0)	
7-9	23 (65.7)	12 (34.3)	
10-12	26 (65.0)	14 (35.0)	
Gender			0.072
Female	63 (78.8)	17 (21.2)	

Male	63 (74.1)	22 (25.9)	
Birth order			0.198
First	53 (88.3)	7 (11.7)	
Second	35 (70.0)	15 (30.0)	
Third or more	38 (69.1)	17 (30.9)	

N = Number (frequency); % = Percentage; **bold** p-values- significant

Socio-demographic factors such as maternal educational level and child's age were significantly associated with compliance to immunization regimen (< 0.05), while other factors such as maternal age, religion, marital status, employment status, household monthly income, child gender and birth order were not significantly associated with compliance to immunization regimen (> 0.05). There was a significant association between education level and immunization regimen compliance (p-value = 0.024). Higher education levels were associated with higher percentages of fully immunized children. There was a significant association between the child's age and immunization regimen compliance (p-value = 0.006). Children in the 1-3 months age group had the highest percentage of fully immunized children, while compliance rates decreased for older age groups.

CHAPTER FIVE: DISCUSSION, CONCLUSION AND RECOMMENDATION

5.1. Discussion

The results indicate that among the sample of 165 participants, 76.4% were reported as fully immunized, while 23.6% were classified as not fully immunized. These findings highlight the compliance rate with the immunization regimen among children below 12 months in Kenya.

It is important to compare these results with findings from similar studies conducted in other settings to gain a broader perspective on immunization compliance. A study conducted in Nigeria reported a higher rate of full immunization, with 87.5% of children below 12 months being fully immunized (Onyiriuka & Emodi, 2017). Another study in Ethiopia found a lower rate of full immunization, with only 60% of children below 12 months being fully immunized (Desalegn et al., 2018).

These variations in immunization compliance rates could be attributed to several factors, including differences in healthcare infrastructure, accessibility to immunization services, awareness and knowledge about immunization, cultural beliefs and practices, and socio-economic factors. In Kenya, efforts have been made to improve immunization coverage and compliance through initiatives such as the Expanded Program on Immunization (EPI), which aims to provide routine immunization services to all children. The Kenyan government has also implemented strategies such as the integration of immunization services with other maternal and child health interventions, strengthening community outreach programs, and utilizing mobile technology to enhance vaccine tracking and reminders (Ministry of Health, 2016). However, despite these efforts, there are still challenges to achieving universal immunization coverage. Barriers such as vaccine stockouts, limited access to healthcare facilities, inadequate knowledge

about the importance of immunization, and misconceptions about vaccines persist in some regions (Bi et al., 2020). Addressing these barriers requires a multi-faceted approach involving community engagement, health education, capacity building of healthcare providers, and improved vaccine supply chain management.

Fear, negligence, and forgetfulness regarding immunization dates were the most commonly cited reasons, with 76.9% of participants expressing this concern. This finding is consistent with previous research that has highlighted the role of forgetfulness and lack of awareness about the importance of timely immunization (Khan et al., 2019). Fear of adverse reactions or side effects was another significant factor contributing to non-compliance, reported by 74.4% of participants. This fear may stem from misconceptions or misinformation about vaccine safety. It is important to address these concerns through education and counseling to improve confidence in vaccination (Dubé et al., 2013).

Logistical challenges, such as the time spent at vaccination centers and the requirement for multiple visits, were mentioned by 66.7% of participants. This finding suggests that the burden associated with accessing immunization services may hinder compliance. Similar challenges have been reported in other studies, highlighting the need for streamlined and efficient immunization service delivery (Ahmed et al., 2017). The unavailability of vaccines was reported by 59.0% of participants as a barrier to compliance. Vaccine stockouts can undermine efforts to achieve high immunization coverage and highlight the importance of robust supply chain management systems (Babirye et al., 2011). Access to vaccination centers was a significant concern for 53.8% of participants, who reported difficulties due to distance and transportation problems. This aligns with previous studies that have emphasized the need for geographically

accessible and affordable immunization services to overcome barriers related to distance (Rainey et al., 2011).

The behavior of health workers was cited by 48.7% of participants as a discouraging factor for immunization. Negative interactions or lack of empathy from health workers can negatively impact caregivers' motivation to seek immunization services. Improving health worker attitudes and communication skills is crucial for fostering a supportive environment (Higgins-Steele et al., 2015). Work commitments of parents were mentioned by 46.2% of participants, highlighting the challenge of balancing work responsibilities with attending immunization appointments. Flexible scheduling options and expanding immunization service hours may help address this barrier (Jarrett et al., 2015).

Other factors influencing non-compliance included poor knowledge about the seriousness of vaccine-preventable diseases (30.8%), religious or cultural reasons (20.5%), and the child being ill (15.4%). These findings underscore the need for targeted health education programs, culturally sensitive approaches, and addressing misconceptions about immunization (Yusuf et al., 2019). It is important to note that these findings are consistent with similar studies conducted in different settings. Studies in other countries have also identified fear, logistical challenges, healthcare worker attitudes, and lack of awareness as common barriers to immunization compliance (Brown et al., 2015; Fatiregun & Okoro, 2012). This highlights the need for comprehensive strategies to address these barriers and improve immunization coverage globally.

The study investigated various socio-demographic factors and their association with immunization regimen compliance. The factors examined included maternal age, religion, marital status, education level, employment status, household monthly income, child's age, gender, and birth order. The findings revealed that maternal educational level was significantly

associated with compliance to the immunization regimen (p -value = 0.024). Mothers with higher levels of education had higher percentages of fully immunized children. This finding is consistent with previous research conducted in other countries, which has consistently demonstrated a positive correlation between maternal education and immunization coverage. Educated mothers are more likely to have access to information about the importance of immunization and are better equipped to understand its benefits and adhere to the recommended schedule (Ahmed et al., 2017; Babirye et al., 2011; Fatiregun & Okoro, 2012).

Additionally, the child's age showed a significant association with compliance to the immunization regimen (p -value = 0.006). The study found that children in the 1-3 months age group had the highest percentage of fully immunized children, while compliance rates decreased for older age groups. This finding highlights the importance of timely immunization during the early months of a child's life. As children grow older, there may be challenges in adhering to the immunization schedule due to factors such as forgetfulness or competing priorities. This emphasizes the need for targeted interventions to ensure timely and complete immunization during different age periods (Rainey et al., 2011).

However, other socio-demographic factors such as maternal age, religion, marital status, employment status, household monthly income, child gender, and birth order were not significantly associated with compliance to the immunization regimen. These findings suggest that these factors may not have a direct impact on immunization compliance in this particular study population. Comparing these results with similar studies conducted in other settings, the association between maternal education and immunization compliance has been consistently observed (Ahmed et al., 2017; Babirye et al., 2011; Fatiregun & Okoro, 2012). The association

between the child's age and compliance has also been reported in various studies, further emphasizing the need for timely immunization (Rainey et al., 2011).

In conclusion, the study provides insights into the factors influencing compliance with the immunization regimen among mothers in Kenya. Maternal educational level and the child's age were found to be significant factors associated with compliance. These findings highlight the importance of education and timely immunization interventions to improve immunization coverage and protect children from vaccine-preventable diseases. Further research is needed to explore and address the specific barriers and challenges faced by mothers in different socio-demographic groups to improve overall immunization rates in Kenya.

5.2 Conclusion

This study investigated compliance with the immunization regimen among mothers in Kenya and examined the association with socio-demographic factors. The findings revealed that 76.4% of the participants had fully immunized children, indicating a relatively high compliance rate. However, there is still room for improvement to achieve universal immunization coverage. The study identified several barriers to immunization compliance, including fear, negligence, and forgetfulness regarding immunization dates, fear of adverse reactions, logistical challenges, vaccine unavailability, limited access to vaccination centers, and negative experiences with health workers. These barriers should be addressed through targeted interventions and strategies to improve immunization services, enhance health education, and create a supportive and respectful environment for caregivers.

Maternal educational level emerged as a significant factor associated with compliance to the immunization regimen. Higher levels of maternal education were linked to higher percentages of fully immunized children. This finding highlights the importance of education in improving

immunization coverage. Efforts should be made to provide accessible and comprehensive health education programs to increase awareness about the benefits and importance of immunization.

The child's age also showed a significant association with compliance. Timely immunization during the early months of a child's life was found to be crucial, with compliance rates decreasing as children grew older. This emphasizes the need for targeted interventions and reminders to ensure timely and complete immunization during different age periods. While other socio-demographic factors such as maternal age, religion, marital status, employment status, household monthly income, child gender, and birth order were not significantly associated with compliance in this study, it is important to consider these factors in a broader context. The findings suggest that the influence of these factors may vary across different populations and settings.

To improve immunization coverage in Kericho County, it is recommended to strengthen immunization programs and services, address the identified barriers, enhance health education efforts, and promote timely immunization during the early months of a child's life. Further research is needed to explore the specific challenges faced by different socio-demographic groups and develop targeted interventions to improve overall immunization rates. By addressing these factors and implementing comprehensive strategies, it is possible to increase immunization coverage, reduce vaccine-preventable diseases, and contribute to the overall health and well-being of children in Kericho County.

5.3 Recommendations

Based on the findings of this study, several detailed recommendations can be made to improve compliance with the immunization regimen among mothers in Kericho County:

1. **Strengthen Health Education:** Develop comprehensive health education programs that target caregivers, especially mothers, to increase awareness and knowledge about the importance of immunization. The programs should focus on providing accurate information about vaccine-preventable diseases, the benefits of immunization, and the safety and effectiveness of vaccines. Health education efforts should be culturally sensitive, taking into account the beliefs and practices of different communities, and should use clear and simple language to ensure that caregivers can easily understand the information.
2. **Tailor Information to Address Specific Concerns:** Address the most common reasons for non-compliance, such as fear, negligence, and forgetfulness, by providing targeted information and counseling. Address misconceptions about vaccine safety and side effects by offering evidence-based information and testimonials from healthcare providers and caregivers who have experienced the benefits of immunization.
3. **Improve Access to Immunization Services:** Enhance the accessibility of immunization services by reducing the time spent at vaccination centers and simplifying the immunization process. Consider setting up additional vaccination centers in areas with high populations of children below 12 months, especially in rural and underserved regions. Mobile immunization units could be deployed to reach remote areas where access to healthcare facilities is limited.
4. **Extend Service Hours and Offer Flexibility:** To accommodate the work commitments of parents, consider extending immunization service hours beyond regular working hours, including weekends and evenings. Additionally, offer flexible scheduling options to allow parents to choose a convenient time for their child's immunization appointment.
5. **Strengthen Healthcare Worker Training:** Conduct regular training programs for healthcare workers, including nurses, doctors, and community health workers, to improve

their communication skills, empathy, and overall attitude towards caregivers seeking immunization services. Emphasize the importance of providing a supportive and respectful environment to encourage caregivers to comply with the immunization regimen.

6. **Implement Robust Vaccine Supply Chain Management:** Ensure a steady and reliable supply of vaccines by implementing a robust vaccine supply chain management system. This involves regular monitoring of vaccine stocks, forecasting of vaccine needs, efficient distribution mechanisms, and timely replenishment of stocks to prevent vaccine stockouts. Engage in strategic partnerships with international organizations and vaccine manufacturers to secure a stable supply of vaccines.
7. **Utilize Mobile Technology:** Leverage mobile technology platforms to enhance vaccine tracking, reminders, and communication with caregivers. Develop mobile applications or SMS-based systems that send automated reminders to caregivers about upcoming immunization appointments. This can help overcome forgetfulness and improve compliance rates.
8. **Strengthen Integration and Coordination:** Foster integration and coordination between immunization programs and other maternal and child health interventions. This can be achieved by integrating immunization services with antenatal care and postnatal care visits, as well as other child health services. Strengthen collaboration between government agencies, non-governmental organizations, and community-based organizations to ensure comprehensive care for mothers and children and reduce missed opportunities for immunization.

5.4 Limitation of the study

One potential limitation of this study is the reliance on self-reported data. The information regarding immunization status and the reasons for non-compliance was obtained through participant self-reporting, which introduces the possibility of response bias. Participants may provide socially desirable responses or may have difficulty accurately recalling information, leading to potential inaccuracies in the data.

5.5 Suggested further study

Further research should be conducted to explore the specific barriers and challenges faced by mothers in different regions of Kenya. This research should take into account socio-economic factors, cultural beliefs, and geographical location to develop context-specific interventions that can effectively improve compliance with the immunization regimen.

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APPENDICES

APPENDIX 1; INFORMED CONSENT

Compliance with Immunization Regimen among Mothers of Children Below 12 Months in Kericho County Hospital

Researchers: Alex Kibet, Clinton Mitai, Jonathan Agengo, Mercy Chepngetich and Rony
Kiprop

Department: Nursing department

Institution: University of Kabianga, Kapkaret Campus.

Dear Participant,

You are invited to participate in a research study aimed at investigating the compliance with the immunization regimen among mothers of children below 12 months in Kericho County Hospital. Before deciding to participate, it is important that you understand the purpose of the study, the procedures involved, and your rights as a participant. Please read this consent form carefully, and feel free to ask any questions you may have before making your decision.

Study Purpose:

The purpose of this study is to understand the factors influencing immunization compliance among mothers and to identify the reasons for non-compliance with the

immunization regimen. The study also aims to assess the knowledge and awareness of mothers regarding the importance of immunization for children below 12 months in Kericho County Hospital.

Procedures:

If you agree to participate, you will be asked to complete a structured questionnaire that includes questions about your demographic information, compliance with the immunization regimen, reasons for non-compliance (if applicable), socio-demographic factors, and your knowledge and awareness of the importance of immunization. The questionnaire will take approximately 20 minutes to complete.

Risks and Benefits:

Participation in this study involves minimal risks. You may experience some discomfort or inconvenience while answering the questionnaire. However, the information you provide will contribute to valuable insights that can improve immunization programs and healthcare services for children. There are no direct benefits to you as a participant, but your contribution will help improve child health outcomes in the future.

Confidentiality:

Your privacy and confidentiality will be strictly maintained throughout the study. All data collected will be treated as strictly confidential and stored securely. The collected data will be anonymized, and no personal identifiers will be included in any publications or reports resulting from this study.

Voluntary Participation and Right to Withdraw

Participation in this study is completely voluntary. You have the right to refuse participation or withdraw from the study at any time without any negative consequences or loss of benefits. Your decision will not affect your current or future relationship with the researchers or the healthcare facility.

Contact Information:

If you have any questions or concerns regarding this study or your participation, please feel free to contact the research;

Group Leader: Alex Kbet

Tel No. 0707393184

Email: nurk00382019@students.kabianga.ac.ke

Consent:

I have read and understood the information provided in this consent form. I have had the opportunity to ask questions and have received satisfactory answers. By signing below, I voluntarily agree to participate in this study.

Participant's Signature: _____

Date: _____

Researcher's Signature: _____

Date: _____

APPENDIX 2: STRUCTURED RESEARCH QUESTIONNAIRE

INSTRUCTIONS TO RESPONDENTS

- Tick on the choices where necessary

SECTION A Socio-Demographic Factors

1. How old are you? (Age in years)

- a) 15-24[] b) 25-34[] c) 35-44[] d) above 45[]

2. What is your marital status?

- a) Married[] b) single[] c) Widowed[] d) Divorced/separated[]

3. What is your level of education?

- a) None[] b) Primary[] c) Secondary[] d) Tertiary[]

4. What is your occupation level?

- a) Employed in the public/private sector[] b) self-employed[] c) unemployed[]

5. What is your monthly income?

- a. Below KES 5,000[] b. KES 5,001 - 15,000[] c. KES 15,001 - 25,000[]

- d. Above KES 25,000[]

6. What is the age of your child in months?

- a) 1-3 months[] b) 4-6 months[] c) 7-9 months[] d) 10-12 months[]

7. What is the sex of your child?

- a) Male[] b) Female[]

8. What is the birth order of your child?

a) First [] b) Second [] c) Third or above []

9. What is your denomination?

a) Christian [] b) Muslim [] c) others []

SECTION C: Knowledge and Awareness of Immunization

1. Have you ever heard about immunization?

a) Yes [] b) No []

2. If YES, what sources of information do you rely on for guidance about your child's immunization? (select all that apply)

a) Healthcare providers (doctors, nurses) []

b) Family or friends []

c) Internet or social media []

d) Pamphlets or brochures []

e) Community health workers []

f) Other (please specify): _____

3. Are you aware of the benefits of immunization for your child?

a) Yes [] b) No []

4. Do you believe that vaccines are safe for your child?

a) Yes [] b) No [] c) Not sure []

5. Are you familiar with the immunization schedule recommended for children below 12 months?

- a) Yes [] b) No []

SECTION C Compliance with Immunization Regimen

1. Has your child obtained up to-date vaccines according to the recommended immunization schedule?

- a) Yes [] b) No []

2. If yes, do you adhere to the scheduled dates?

- a) Yes [] b) No []

3. If No, please specify the reasons for non-compliance (select all that apply):

- a) Fear, negligence, forgetfulness of immunization dates
- b) Fear for adverse reactions or side effects
- c) Time spent too long and Lengthy contact period (number of visits)
- d) The vaccine is not available
- e) Vaccination centers are far from home & transportation problems
- f) Health workers' behavior discourage mothers
- g) Parent's work
- h) Fear for adverse reactions or side effects
- i) Poor knowledge about the seriousness of the disease
- j) Religious or cultural reasons
- k) Child been ill
- l) Other (please specify): _____

4. If you have concerns about vaccines, what are the specific reasons? (Please check all that apply)

- a) Safety concerns []
- b) Efficacy concerns []
- c) Misinformation from social media or other sources []
- d) Past negative experiences with vaccines []
- e) Other (specify): _____

5. Are you aware of the consequences of non-compliance with the immunization regimen?

- a) Yes [] b) No []

6. How does your socio-economic status influence your ability to comply with the immunization regimen?

- a) Affordability of vaccines and transportation costs []
- b) Availability of health insurance coverage []
- c) Time constraints due to work or other responsibilities []
- d) Other (please specify): _____

7. Have you faced any barriers or challenges in accessing healthcare services for your child's immunization?

- a) Yes [] b) No []

8. If Yes, specify

APPENDIX 3; BUDGET

Item	Unit price	Serial number	Total (Kshs)	Description
MATERIALS/ STATIONARY				
Foldscaps	450	1	450	
Pens	20	5	100	
Files	100	5	500	
Notebook	50	5	250	
SERVICES				
Photocopying		5	500	
Printing and binding		6	500	
Food and transport		7	1000	
Research permit fee		8	200	
IREC approval fee	500	9	500	
Total			Ksh 4,000	

APPENDIX 4: WORKPLAN

Month/ Schedule	Week 1 &2	Week 3, 4 &5	Week 6	Week 7
Project proposal writing				
Proposal presentation				
Pre testing				
Data collection and analysis				
Report writing				
Final report presentation and feedback				