PREDICTORS OF IMMUNIZATION COMPLETION AMONG 12-23 MONTHS OLD CHILDREN IN KWANIA DISTRICT

SAMFAN THOMAS OMARA

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Abstract

Background Information

Immunization is one of the most cost-effective public health interventions to address the morbidity and mortality attributable to vaccine preventable diseases. However, predictors of immunization completion have not been well studied in Kwania. This study investigated predictors of immunization completion among children aged 12-23 months old in Kwania.

Methods: This was a cross sectional study design, sample size of 409 children age 12-23 months were considered. Multistage sampling technique was employed to select the study subject. Data was entered into SPSS version 23; univariate and multivariate logistic regressions models were used to identify the association between the variables. A *P*-value <0.05 was considered statistically significant at 95% CI.

Results: Out of 409 children paired with their mothers, 77.3% completed their immunization. 89% of the caregivers had health card and 91.2% at least attended ANC. Predictors of complete immunization in this study were; present of health card (AOR: 1.57, *P* = 0.01), the child age 16-20 months and above 20-23 months (AOR: 2.34, *P* = 0.01) and (AOR=4.07 p=0.00) respectively, ANC attendance (AOR: 2.01, *P* = 0.02) and positive attitude of health workers (AOR: 2.36, *P* = 0.01).

Conclusion: Immunization completion among children age 12-23 months in Kwania was 77.3%, below the national target of 90%. The child's age, health cards, ANC attendance and positive attitudes of health workers were associated with immunization completion. Therefore, the district stakeholders should mobilize the community to improve on ANC attendance and provide health cards during vaccination and innovate other strategic interventions to address the adherence to immunization completion.

Declaration

I, Omara Samfan Thomas declare that, I am the author of this paper and that any assistance I received in its preparation is fully acknowledged and disclosed in the paper. I have also cited some sources from which I used data, ideas or words, either quoted directly or paraphrased. I also certify that this paper was prepared by me specifically for the partial fulfillment for the award of degree of Master of Public Health of Uganda Christian University.

Signature ..... Date 02/04/2024

Omara Samfan Thomas (RJ19M21/042)

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This Dedication

dissertation is dedicated to God the Almighty Father who created me with wisdom and secondly, I extend it to my beloved wife Mrs. Auma Hellen, Mukimba Sopy and our children; Okello Christopher, Atim Paul, Omodo Stephen, Omara Diego Fransis Junior, Odongo Oreste Daniel, Akello Marry Andrey and Omara Valentine Senior.

Approval

This dissertation has been submitted with your approval

Supervisors 1 Angol Denis Calma

Signature  Date 01/04/2024

Supervisor 2 Akech Stella T.

Signature Stella Date 02/04/2024

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Glossary of terms

Vaccine: Is a biological preparation that improves immunity to a particular disease. A vaccine typically contains an agent that resembles a disease-causing microorganism, and is often made from weakened or killed forms of the microbe, its toxins or one of its surface proteins.

Vaccination: Inoculation with a vaccine for the purpose of inducing immunity

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

Immunization Completion: Children who received 1 dose of BCG, 3 doses of Oral Polio Vaccine (OPV)+1 dose IM PV, 3 doses of Pentavalent vaccine (DPT-Hib-HepB), 3 doses of Pneumococcal Vaccine (PCV), 3 doses of Rota and 2 dose of Measles/Rubella vaccines is said to be fully immunized. That is, a total of seven (7) vaccines and fifteen (16) doses.

Caregivers: Any person who accompanied the child for immunization at the vaccination post

Health card: Any document presented by the mother/caregivers containing the details of the immunization data of the child between 12-23 months old.

Acronyms

ANC	Antenatal Care
CDC	Center for Disease Control
DHIS 2:	District Health Information System 2
DPT-Hib-Hep:	Diphtheria Pertussis Tetanus Haemophilus Influenza B and Hepatitis B
EPI:	Expanded Program for Immunization
MOH:	Ministry of Health
MR:	Measles/Rubella
OPD:	Outpatient Department
PCV:	Pneumococcal Conjugate Vaccine
RI:	Routine immunization
UDHS:	Uganda Demographic Health Survey
UNEPI:	Uganda National Expanded Program for Immunization
VHTs:	Village Health Teams
VPDs:	Vaccine Preventable Diseases
WHO:	World Health Organization

CHAPTER ONE: INTRODUCTION

1.0 Background

Globally, Immunization had been found as one of the most cost-effective and successful public health interventions in preventing morbidity and mortality attributable with vaccine preventable diseases among children under the age 5 years. Many countries in the world and Kwania report low immunization completion rate among 12-23 months old children, however the predictors which contribute to this low completion rate are not clearly understood and the situation is further worsened by the COVID-19 pandemic and its restrictions which has strained the health care systems making over 23 million children missing out on vaccination in 2020, with a notable increase of 3.7 million infants missing vaccines from 2019 base-line, this is so far the highest number ever recorded in the dropped in the immunization completion since 2009 (WHO 2021).

Much as global progress had been made to ensure vaccines universal completion of 85%, the difficulty still exists in reaching the target population, especially in sub-Saharan Africa and South Asia (WHO 2021).

WHO introduced immunization in 1974 as one of the most cost effective public health intervention to prevent infant mortality associated with Vaccine-Preventable Diseases (VPDs) and its data indicates that, it prevents over 4 million disabilities and deaths of children under 5 years annually (CDC 2019), however in Sub-Saharan region, some parents still exempt their children from receiving the basic vaccines for reasons such as; safety and while others simply do not have the means to access them (CDC 2019).

Immunization completion rate among 12-23 months old children in Uganda had been on the increase from 52% in 2011 to 55% 2016 (UDHS 2011, 2016). However, an estimated 45% of these children did not complete their immunization schedules in 2016, translating into 870,750 unvaccinated children within the country. It is also reported that 10% of deaths among children less than five years of age, are caused by measles (MOH-2019).

Uganda adopted a well-designed primary health care of National Expanded programme on Immunization (UNEPI) as a strategy to improve immunization coverage and completion but the country still experiences the repeated outbreak of Measles and Rubella; a case in point in October 2019, this vaccine preventable diseases were reported in 66 and 23 districts in the country respectively (DHIS 2). This triggered the Ministry of health to conduct mass Measles-Rubella campaign in order to reduce the morbidity and mortality associated by this scourge. The repeated outbreak if not well handled, can undermine the effort of the Ministry of Health and Kwania district local Government in the attainment of Sustainable Development Goal 2030 (SDGs 2030). However, many districts still report low immunization completion rate with overall country's completion rate of only 55% which is associated with extremely high infant mortality rate of 43 deaths per 1,000 live births (UDHS 2016), this achievement is lower than the Global Action for Vaccine 2020 (GVAP 2020) target set at 90% (CDC 2019). Therefore, the predictors of this low immunization completion, need to be discovered and addressed so that, the recurrent outbreak and infant deaths due to VPDs are avoided.

In Lango sub-region in northern Uganda, the completion is only 50% of which Kwania district Immunization completion status is only at 68% which is below the average national targets of 90% (MOH-2021). There is also insufficient data and any published study which had been done with the main aim of establishing these predictors that are associated with low immunization completion. Therefore, this study investigated the predictors associated with immunization completion with the intended primary aim of improving immunization completion hence reducing infant mortality rate which are attributable to VPDs among 12-23 months old children in the district.

1.1 The general objective of the study

To determine the predictors of immunization completion among 12-23 months old children with the primary aim of improving immunization completion in Kwania district.

1.2 Specific objectives of the study

1 To determine the child's individual related predictors of immunization completion among 12-23 months old children in Kwania district.

2 To determine the maternal/caregiver socio-cultural predictors of immunization completion among 12-23 months old children in Kwania district

3 To determine health facility related predictors of immunization completion among 12-23 months old children in Kwania district.

1.3 Research questions

1. What are child's individual related predictors of immunization completion among 12-23 months old children in Kwania district?

2. What are the maternal/caregivers socio-cultural related predictors of immunization completion among 12-23 months old children in Kwania district?
3. What are the health care system related predictors of immunization completion among 12-23 months old children in Kwania district?

1.4 Statement of the problem

Immunization had been proven as one of the most cost-effective public health interventions and prevented over 4 million deaths annually attributable to Vaccine Preventable Diseases (VPDs) among children less than 5 years of age (WHO 2020). Despite the routine and supplemental immunization activities being adopted by Ministry of Health and Kwania district Local Government as the main interventions to improve immunization completion and address the scourge attributable to VPDs, the district continuously reported low immunization completion status. The predictors of this low performance have not been clearly understood because of insufficient data. The information gap undermines the development of appropriate strategies for improvement of immunization completion, and yet if these infants failed to complete their immunization schedules, they become more at risk of dying from VPDs.

It was against this gap that a study to investigate predictors of immunization completion among children aged 12-23 months old was developed.

1.5 Study justification

The predictors that contribute to immunization completion in Kwania district are poorly understood. Therefore, the current study was to generate data on these aspects, which are useful for implementers and policy developers within the district, and possibly at

national level in addressing the possible gaps and developing possible interventions to improve immunization completion in Kwania district.

1.6 Significance of the Study

The information that are obtained from this study are relevant in planning by the Kwania district local government and development partners in developing, implementing, and monitoring immunization services delivery at the district. It may also be helpful to future researchers from Uganda Christian University and other institutions as a source of information for their research work.

1.7 Scope of the study

This survey was conducted on immunization completion among children 12-23 months old children during the month of January/2023 to March/2023 in Kwania district.

1.8 Conceptual framework

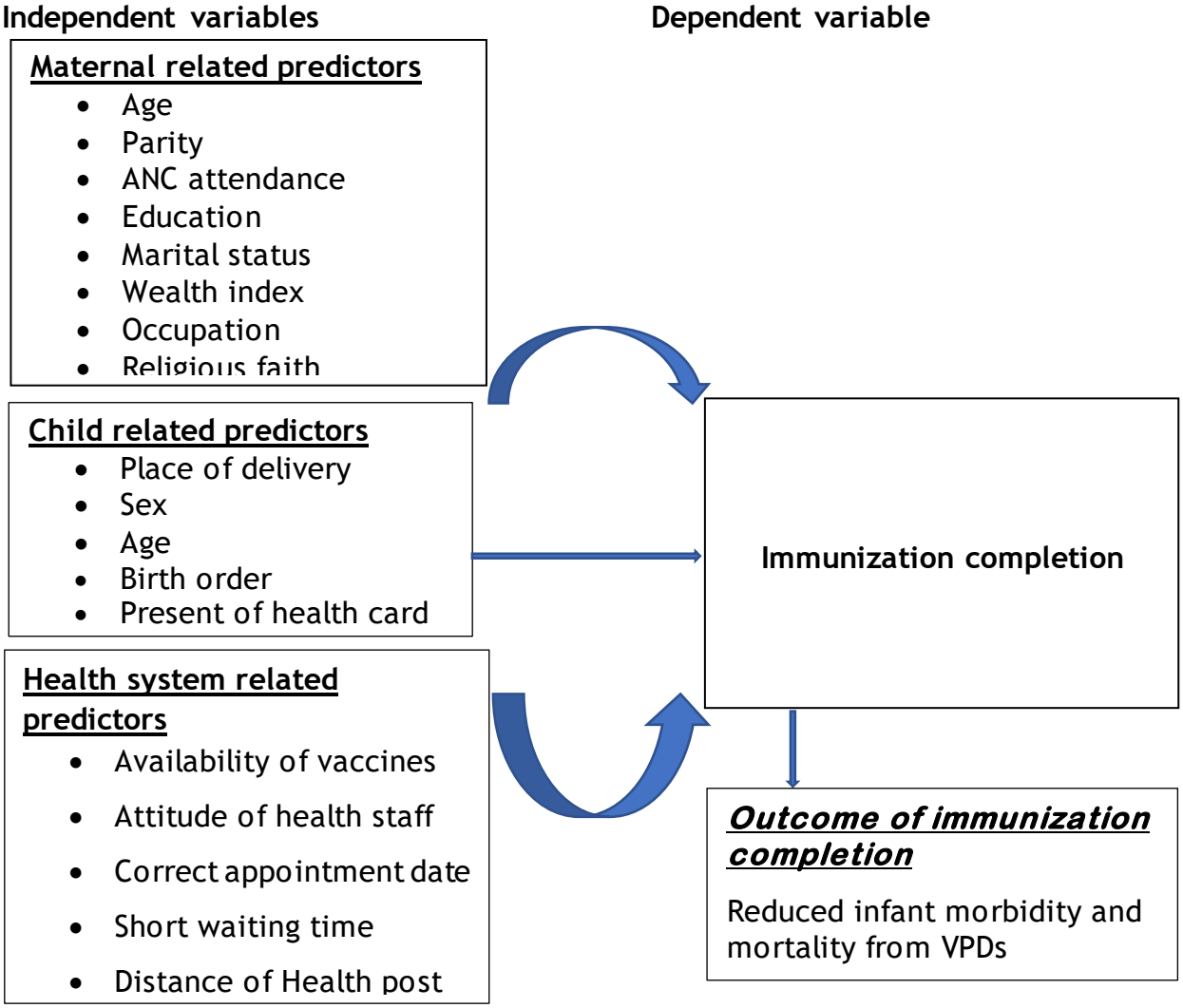

*Figure 1: **Conceptual frame work, Source: The Author/Researcher***

The dependent variable is the immunization completion, meanwhile the maternal socio-cultural characteristics (age, parity, ANC attendance, education, marital status, occupation and religion), child's biological characteristics (age, sex, birth order, present of the health card, and place of delivery) and health system related predictors were the independent variables. The expected primary and secondary outcome were improved immunization completion and reduced infant mortality due to VPDs.

CHAPTER TWO: LITERATURE REVIEW

2.0 Introduction

This chapter presents the literature on related studies on predictors of immunization completion as per the set objectives of this study. The major purposes of reviewing the literature were to establish what other studies have found out, as far as the variables under study have impacted on immunization completion among 12-23 months children.

2.1 The child's individual related predictors to Routine Immunization completion among 12-23 months old children

This review looked at researches that had been carried out in regards to child's individual related characteristics and immunization completion. The child's individual related characteristics included; age, sex, birth order, present of health card, and place of delivery. In the study done in Gomba district in North-Western Uganda to determine the factors influencing completion of immunization schedule, found that, immunization completion status was correlated with the age of the child, sex of the child, place of delivery of current child, and number of siblings in the family (Stella 2018). In a case-control study on factors associated with complete childhood immunization in Arbegona district, southern Ethiopia, birth order was significantly associated with immunization completion, being born second to fourth in the family had the higher chances of immunization completion as compare to the counter part of being born fifth or later in the family (Abel Negussie 2016). This finding was similar to a cross-sectional descriptive study on comparison of vaccination status of children born in health units and those born at home found out that the highest percentage of children up to date with their vaccination (72%) occurred among the birth ranks 1-3. An increasing birth rank appears to be matched with a declining percentage of children who are up to date with

vaccination. This may be a reflection of reducing family resources available to an individual child. On the other hand, family spacing may re-enforce child vaccination in that, the parents would have the time, energy and resources to take the child for vaccination. The prim gravida may be naive of childhood vaccination but with subsequent pregnancy and maternal peer interactions can make the second to fourth child have higher chances of being vaccinated. A cross sectional study on vaccination completion and immunization timeliness among children aged 12-23 months in Senegal found out that female children were more likely to have correctly timed vaccinations with MCV, Penta 3 and Polio 3 (Mouhamed Abdou Salam 2017). However similar study done in Nigeria showed no any significant sex difference in the immunization completion rate among the age group under study ((Antai 2009). The value for girl child as a source of family income in Senegal can influence the mothers/caregivers to provide more attention to the health of girl child than the boy and this can be compared to the Nigerian counterpart where both sexes are all given similar treatment as per as the immunization uptake is concern. Some societies have equal opportunity for both sexes but in other society, quotas are given to parents who give birth to a specific prepared sex of the child.

2.2 The maternal/caregivers' socio-cultural related predictors to immunization completion among 12-23 months old children

The maternal/caregiver's socio-demographics include; gender, age, parity, ANC attendance, level of education, wealth index, employment status, religion and marital status. In the study done in Gomba district in North-Western Uganda to determine the factors influencing completion of immunization schedule, found that, immunization

completion was correlated with Socio-demographic factors such as; age and marital status of the caregiver (Stella 2018). This finding was similar to the study carryout in Amach Sub- County, Lira district Northern Uganda which was conducted to determine socio-cultural factors associated with complete routine immunization of children 12-23 months old which found that; age, occupation, education, religion, family structure and gender were associated with complete routine immunization, meanwhile marital status and wealth level were not statistically associated with complete routine immunization. Another study which was done in Eastern Uganda on exploring the predictors of vaccination completeness in the first year of life which found that maternal age above 20 years, attendance of antenatal care and delivery at the health facility were a significant positive predictors of immunization completeness in the first year of life (Sematimba 2015). During Antenatal Care, mothers are always given Tetanus Toxoid Diphtheria (Td) vaccine which protects them and the unborn child from tetanus and also health education on childhood immunization which are always conducted during ANC provide mothers/caregivers with adequate information on the importance of vaccination in disease prevention in children under 5 years. In another study carried out in Italy on childhood immunization revealed that, the number of unvaccinated children against measles, mumps and rubella increased with time. Very old and very young mothers (over 35 and below 25 years) were less likely to have their children fully immunized (Anello 2017). Similar findings were obtained in a case–control study on factors associated with complete childhood immunization in Arbegona district, southern Ethiopia: where complete immunization status of children was significantly associated with younger maternal age (Abel Negussie 2016). Poor compliance to immunization among young mothers could also be attributed to lack of experience with nurturing of

children, inadequate resources for managing child health, social reconstructions and inadequate knowledge about the importance of childhood vaccination. The elderly mothers could be more complacent about the possibility of their children being highly affected by the vaccine preventable diseases and also love for the babies who are born towards menopause in which in the local language of the study population, such children are referred to as the child of the bone '*atin cogo'* meaning the loveliest child. In another, study survey conducted among migrant mothers, showed high completion of immunization among mothers with adequate levels of education (Hu, Li et al. 2017). Findings showed that immigrants who had adequate knowledge about vaccination fully immunized their children. This was because they could easily read and understand the information displayed in immunization posts, take timely decision to seek health care and also due to increased access to sources of information such as radio, newspapers and local self-help groups. This enabled them to know when to come back for next immunization schedule. Many children whose mothers had lower levels of education had low immunization completion rate as compared to their counterpart with tertiary institutional education. Similar results were reported in a study carried out in China where low maternal education was associated with lack of adequate information on the importance of vaccination (Lei Cao 2018). The literature that attributes maternal educational level as a predictor of full immunization completion attributes this to changes that accompany maternal education, such as attitudes, traditions, and beliefs, increased autonomy and control over household resources, which enhance health care seeking behavior and demand for childhood immunization. In a study on vaccination completion and immunization timeliness among children aged 12-23 months in Senegal, reported that children of mothers that were not administered vaccines within the

recommended age ranges were associated with maternal poor education level, low socioeconomic status and living in rural areas, with a primary education level having 22 times more likely to receive the Penta 3 vaccines, higher at a given age compared to children born to women with no education at that age (Mouhamed Abdou Salam 2017). This finding is similar to the study done on determinants of immunization status among 12-23-month-old children in Indonesia, which reported that having an older mother, and having more educated mothers were associated with a higher probability of a child's receiving full doses of immunization schedules (Holipah, Maharani et al. 2018). Other study which was carried out on factors influencing childhood immunization in Uganda, reported that children whose mothers were in agriculture and blue-collar jobs reduced the probability of receiving the 3 doses of DPT-Hib-Hep by 8% and 5% respectively compared to the counterparts whose mothers had white-collar jobs (Bbaale 2013). Similarly, children whose fathers were in agriculture and blue-collar jobs reduced the probability of being fully immunized against measles by 8-10% and 11-15% respectively. Sixty percent (60%) of children whose mothers had a white-collar job were fully immunized compared to 57% of children whose mothers were in blue-collar jobs (Bbaale 2013). Failure to understand why, where, who, when and what about immunization, is directly related to missing of the immunization schedules as reported in studies done in Nigeria and Uganda (Nankabirwa, Tylleskär et al. 2010). In another study on Individual and community-level determinants of child immunization in the Democratic Republic of Congo, its analysis revealed that, four Antenatal Care (ANC) visits, institutional delivery, and Postnatal Care (PNC) service utilization were statistically significantly associated with the full immunization completion (Pawan Acharya 2019). Similar findings were obtained in a study conducted in Ethiopia-Dabat

demographic and health survey site on complete childhood vaccination and associated factors among children aged 12-23 months which found that ANC follow-up during pregnancy and delivery in the health facility were associated with immunization completion. A study on Comparison of vaccination status of children born in health units and those born at home reported that a child born at a health unit was significantly more likely to have had BCG scar than a child born at home (Odiit and Amuge 2003).

2.3 Health system related predictors to immunization completion among 12-23 months old children

In Uganda, Health care system starts from the Village level up to National Referral Hospital, with the main aim of attaining Universal Health coverage on the basis of the 5 Km working distance to access health services. In the study done in Gomba district in North-Western Uganda to determine the factors influencing completion of immunization schedule, analysis revealed that, completion of immunization was significantly correlated with experience of side effects following immunization and other health related characteristics such as receiving health education talks during each visits to the health facility and also individual awareness of the time of starting and ending immunization (Stella 2018). In the study done to identify barriers to effective uptake and provision of immunization in Hoima, a rural district in North-Westem Uganda, found that, access to immunization centers is difficult due to poor road terrain which affects the effectiveness of the outreach program, timely delivery of immunization logistics (refrigerator, gas and vaccines), these factors highly correlate with immunization completion (Oliver Ombeva et al 2019). Similar results were obtained in the study carried out to explore the predictors of vaccination completeness in the first year of life in Eastern Uganda, which revealed that, shorter distance

between home and health facility highly correlate with immunization completion in the first year of life (Sematimba 2015). Most of the mothers who are near health post always incurred less time and money for transport to receive health services hence higher chance of immunization completion. In a cross sectional study which was done on factors associated with full immunization completion amongst children aged 12–23 months old children in Zimbabwe, reported that children whose mothers indicated that the distance to the health facility was no big problem were more likely to have their children fully vaccinated (68%) as compared to children whose mothers indicated that the distance was a big problem (62%) (Mukungwa 2015). Rahji and Ndikom, (2013) reported that 60.8% agreed with the statement that health worker's behavior discouraged compliance. This is in line with findings by Babalola and Adewuyi (2005) that cited health provider's attitudes and long waiting period as few reasons by mothers for not taking additional immunization for their children. Indeed a few women were frustrated because they had visited the facility more than one time with no vaccines on ground, absence of service providers or disrespectful providers. Similar findings were reported by Oku et al., (2017) who stated that caregivers had varying opinions regarding the way in which health workers communicate with them. Some described health workers as being warm and friendly and treating them with respect. However, a few caregivers described the impolite behavior of health workers towards women with low levels of education, teenage mothers and mothers who arrived late or forgot their vaccination cards. They explained that this behavior could undermine trust in the health workers and could also discourage caregivers from listening to health education messages. One caregiver explained that once a mother is treated inappropriately, she may become resistant to any information delivered by the health worker and may

resolve not to return to the health facility to continue with her child's vaccination. Another study in Western Uganda Hoima district on geographic location of health facility and immunization program performance in Hoima district, western Uganda: a health facility level assessment also found similar results (Nicholas Magombo, Fred Bagenda, Bajunirwe Francis 2020). Positive attitude and humility of health workers encourages the caregivers to return to complete their immunization schedules of their children. Unavailability of vaccines is one of the most common barriers to immunization adherence in this study. This not only hinder mothers to comply with the present vaccination schedule but this may prevent mothers from coming back in the future as mothers may think of similar embarrassment on the next appointment. Another study which was done on Immunization completion and factors associated with complete vaccination in children aged 12 to 59 months in health structures in Lome Nigeria, found that absence of health card was associated with complete immunization (Zida-Compaore, Ekouevi et al. 2019). In the study carried out on Maternal Knowledge and Attitudes towards Childhood Immunizations completion in Sheema rural district in Uganda; 93.5% of the women were able to state that childhood immunizations protect children from diseases. The women who were not able to point out this were significantly more likely to have an under-vaccinated child. When asked why vaccination rates was low in their community, the two most common responses were fear of side effects of vaccines and ignorance (Vonasek BJ 2016). The study to identify the reasons for complete vaccination and factors for missed opportunities among rural Nigerian children found that long distance walking (17.5%) and long waiting time at the health facility (15.2%) was stated as the most common reasons for child's immunization completion (Department of Epidemiology and Community Health 2011). The study on

utilization of outreach immunization services among children in Hoima District, Uganda found the use of outreach services was associated with reports that the time of outreach sessions was convenient, the caretaker knew the benefits of childhood immunizations and were able to mention at least four vaccine preventable diseases (Oryema, Babirye et al. 2017). They consider it convenience because selection of the vaccination posts and immunization schedules are always planned jointly with community members.

Maternal socio-cultural variables were commonly the age, parity, ANC attendance, education level, marital status, occupation and religious affiliation. Child's biological variables were the age, sex, birth order, present of the health card and place of delivery of the child and the common health system related variables were availability of vaccines, attitude of health staff, correct appointment date, short waiting time and distance to immunization post.

2.4 Summary of the literature

The literature search strategies I used in this study; included many search engines and majority of the literature reviewed were within the last five years for areas with adequate literature (2017-2022); however, in other areas where there was paucity of data, my reviews were extended beyond five years. The review revealed several studies conducted in Northern Uganda, at national and global level on RI completion among children age 12-23 months old. The theme was categorically grouped under child's related predictors, maternal/caregivers' socio-cultural related predictors and health system related predictors. Most of the studies conducted in this field are either hospital or community based and do not have adequate data and external validity to be generalized to the general populations. The studies that were conducted in Uganda

were mostly done in the Eastern and Western part of the country with great disparities in their socioeconomic, cultural/religious background with the North. Some similar studies which had been done in northern Uganda have encountered the same challenges of external validity, sample size, and study populations/settings. However, this particular study used data that was very representative and had the required external validity to generalize the findings. It was also a community-based study that covered large areas of the district (Inomo, Atongtidi and Abongomola Sub-County). It is these gaps that this study intended to fill. The study aimed to add to the existing literature, and possibly to help Kwania district EPI stakeholders address the challenges to RI as this will lead to the improvement in the completion of RI and hence reduction in morbidity and mortality attributable to VPDs among children under-fives in Kwania and neighboring districts.

CHAPTER THREE: METHODOLOGY

3.0 Introduction

This chapter presents the methodology that was used during the study. The method was divided into; Study design, study setting, source of information, , study population, sampling size determination/procedure, selection criteria (Inclusion and Exclusion), study variables, measurements (data collection protocol, data quality, measurement, analysis and ethical approval.

3.1 Study design

This was a quantitative descriptive cross-sectional community-based study to investigate the predictors of immunization completion among 12-23 months old children and their mothers/caregivers. The design was selected because it provides a snapshot of a population at a single point in time and usually inexpensive and easy to conduct.

3.2 Study site and setting

This study was conducted in Kwania District, located in Northern Uganda. The aerial distant of this district from Kampala, the capital city of Uganda is about 284 km. It is bordered by the Districts of Kole in the North, Dokolo in the East, Apac in the West and Amolatar in the South through Lake Kwania and Kyoga. The district has an estimated population of 222,728 (projected from 2014 census) with a projected growth rate of 3.6%; consisting of about 52,000 households, 44,880 women of child bearing age and 6,681 children age 12-23 months old children (3%). Majority of the population comprises of Langi who are peasant farmers and mobile migrant [fisher forks] along Lake Kwania and Lake Kioga with Luo as the commonly spoken language. It has 11 sub counties, 49 parishes and 447 villages; served by one health sub district, 10 public H/C IIIs, 1 Private not for Profit H/C III and 4 public H/C IIs and also 1 Private not for Profit H/C II. The

site was preferred, because only 68% of children reported to have completed their vaccination in previous FY 2020/2021.

3.3 Sources of information

3.3.1 Primary information

Quantitative data was obtained directly from the mothers/caregivers using WHO modified structured questionnaires.

3.3.2 Secondary data

It was collected from child immunization cards, journals, DHIS 2, health surveys and research reports.

3.4 Study population, sampling size determination and procedure

3.4.1 Study population

Children 12-23 months old paired with their mothers/caregivers as respondents.

3.4.2 Sample size determination

The sample size was determined using the Kish Leslie formula given below, (Kish Leslie, 1965). This formula was used because it is appropriate for determining proportions of a variable in a given population. N=Z2 × p (1-p)]/d2. Where N is the sample size, Z= 1.96 is the certainty wanted to be expressed in the percentage point of the normal distribution corresponding to the 2-sided level of significance, d= 5% is the level of allowable marginal error, P= 55% is the National immunization completion rate of Uganda (UDHS 2016).

Therefore; N = (1.96)2 × 0.55× 0.45]/ (0.05)2 = 380.

Therefore, the study required a total of 380 respondents

A non-response rate of 10% (38) was added, giving a total sample of 418. Therefore, 418 respondents (mothers/caregivers) with at least one child of aged 12–23 months old was planned to be selected and interviewed.

3.4.3 Sampling procedure

In the first stage, 3 Sub-counties which included Abongomola, Atongtidi and Inomo were purposively selected based on their immunization performance ranking and 10 villages from each sub-county were selected using probability proportional to the number of households in the village, as per Uganda National Household and Population Census 2014 (Bennett et al Cluster survey sampling method WHO '30 × 7' cluster's Survey model)

In the second stage, by use of random numbers, the first household was randomly sampled within each selected village, and identified as the starting point. Using the systemic sampling method and the sampling frame, the next household interval was determined from the reference point. The interviewer was then preceded to the household directly to the left of their reference and interviewed the eligible mothers/caregivers. If there was no eligible respondent in the next household, then it would become the reference point again and this interval was followed until all 14 respondents were obtained in each village. However, if the required number of eligible children was not met, then the next village was considered for an additional interview. In the third stage of sampling, in each selected household, only one eligible child was selected based on a random number table. Overall, in each sub-county, at least 10 villages and 140 households were visited.

3.5 Selection criteria

3.5.1 Inclusion criteria

The study focused on children between the age 12-23 months paired with their mothers/caregivers as respondents. (The age group was selected because of the potential for confusion with booster immunizations doses).

3.5.2 Exclusion criteria

Mothers/caregivers who were critically ill, refused to participate and those who were unable to provide adequate information on their children immunization records were excluded from the study.

3.6 Study variables

3.6.1 Dependent variable

The dependent variable was immunization completion

3.6.2 Independent variables

The independent variables were; child individual related predictors (age and birth order, Place of birth, sex, and availability of health card), maternal socio-cultural related predictors (maternal age, parity, marital status, educational status, occupation, wealth index and religious faith), and health system related predictors (distance from immunization point, attitude of health workers, availability of vaccines, convenience time for immunization and short waiting time)

3.7 Measurements

3.7.1 Data collection protocol and tools

Quantitative data was collected by 5 trained research assistants who were qualified health workers using face to face interview approaches using a modified WHO-EPI structured questionnaires. The questionnaires included child's individual, mother/caregivers' and health system related predictors that contribute to immunization completion amongst 12-23 months old children. The data collection tool was first written in English and later translated into Luo language which is more spoken in the study area then translated back to English to check for consistency of the meaning. Information on child's immunization completion was obtained from

Immunization cards and for those mothers/caregivers without immunization card; verbal reports were used to obtain the information on immunization status. Each respondent was asked if he/she had ever taken his/her child for immunization, if yes, he/she was asked to present the health card of the child for scrutiny for immunization completion. For those without the card, they were supported to recall the history of the child's immunization but if the child had not received any antigens, the mothers/caregivers were counseled on the benefits of immunization. Each individual interview was made to take around 20 to 30 minutes.

3.7.2 Data quality

Quality control measures were put in place to ensure validity by pretesting questionnaires on 5% (21) of the respondents, translating questionnaires into Luo since majority of the study population are Luo speakers and training the research assistants who are qualified and experienced health workers who had been participating in Lot Quality Assurance Survey. Data entered into the study databases were regularly reviewed for inconsistencies and missing information and data checks was carried out internally within the electronic data-handling environment.

3.7.3 Data management

Information collected from the participants was coded and kept in safety lockers under lock and key, stored in a computer with a secret password and was only be accessible by the principal investigator and supervisors only.

3.7.4 Data analysis

Datacoded, and analyzed using SPSS Statistical Software version 23. Descriptive statistics for categorical variables was summarized in terms of tables, frequencies, and

percentages. Continuous variables which were normally distributed were summarized in terms of means and standard deviation.

The immunization completion rate was calculated as frequency and percentages of children that have received all the recommended doses of vaccine as per the UNEPI schedule. The main outcome measures were immunization completion. Bivariate analysis was conducted to identify the association between independent variables and dependent variable, while multivariate data analysis was conducted to identify independent predictors of immunization completion. Odd and Adjusted Odds Ratio (OR and AOR) at a 95% confidence interval (CL) was used to estimate the strength of relationship between the independent variables and the dependent variables. All variables with a p-value ≤ 0.2 at the bivariate level was significant and added one at a time into the multi logistic regression analysis until the final model was generated. The forward adjustment was made to the model to control for confounders, adjusted odds ratio and its 95% CL was reported, and measures of independent association between independent variables dependent variable with a p-value <0.05 was considered statistically significant to complete immunization.

3.8 Ethical approval

Ethical approval was obtained from the Research and Ethics Committee (REC) of Uganda Christian University Faculty of Public Health, Nursing, and Midwifery. Further consent was sought from District Health Officer Kwania. Mother/caregivers were provided with written or verbal informed consent prior to the interview. The information provided to caregivers covered study objectives, risk/benefit and its management, voluntariness, and option of opting out anytime during participation. The participants were assured of confidentiality as the mother/caretaker was provided with enough privacy during

one-to-one discussion and information obtained was coded and entered in a computer with a confidential password.

CHAPTER FOUR: PRESENTATION OF RESULTS

4.0 Introduction

This chapter presents the findings obtained during the study. This study was carried out in Kwania district in which 3 sub-counties were purposely sampled. In each sub-county, 10 villages were randomly sampled using simple random method and 140 households were systemically selected from each sub-County and a total of 409 respondents were interviewed using WHO EPI modified structured questionnaires.

4.1 General characteristics of the study respondents and study population

The mean age of respondents was 26.2 years and standard deviation of ±6.7 and most of them were within the age of group 20-34 years (53.3%). Majority of the respondents were less than parity 4 (79%). Of these, 83.1% were married. Majority of them were classified as poor 69.4%. Over 77.5% of the caregivers' attained primary education and 93.2% of them were peasant farmers. Among the caregivers, 58.2% were protestant. Out of 409 study population paired with their caregivers, 77.3 % completed their immunization schedules of which 51.2% were male and 48.8% female, while 11% of them did not have an immunization card. Majority (91.2%) them were delivered at health facility (***table 1)***.

Table 1: Socio-demographic characteristics of respondents and study population (N=409)

Variables	Category	Frequency	Percentages (%)
Maternal characteristic			
Maternal age (years)	less than 20	89	21.8
	20-34	218	53.3
	above 35	102	24.9
Parity	First delivery	137	33.5
	2-4	186	45.5
	Above 4	86	21.0
Marital status	Single	47	11.5
	Married	340	83.1
	Widow	10	2.4
	Divorce	12	2.9
Wealth index	Poor	284	69.4
	Middle	109	26.7
	Rich	6	1.5
Educational status	None	17	4.2
	Primary	316	77.3
	Secondary	60	14.7
	Tertiary	16	3.9
Occupation	Civil servant	8	2.0
	Peasant farmer	381	93.2
	Business	20	4.9
Religion	Catholics	105	25.7
	Protestant	238	58.2
	Muslim	2	0.5
	SDA	30	7.3
	PAG	25	6.1
	Others	9	2.2
Child individual characteristics			
Age (months)	12-15	129	31.5
	16-20	123	30.1
	21-23	157	38.4
Birth order	First	134	32.8
	Second	123	30.1
	Third	60	14.7
	4 above	92	22.5
Sex	Male	210	51.3
	Female	199	48.7
Present of health card	Yes	364	89.0
	No	45	11.0
Child's delivery place	Home	29	7.1
	Health unit	373	91.2
	On the way	7	1.7

4.2 Bivariate analysis of mother/caregivers' social demographic and study population characteristics associated to Immunization completion

A bivariate analysis was conducted to show the association between demographic/ individual characteristics and immunization completion (table 2). The study results revealed that marital status and educational level were associated with immunization completion with (AOR 1.93 p=value 0.023) and (AOR 2.71, p=value 0.015) respectively. Mothers who are married were 1.93 times more likely to complete immunization as compared to single mothers, meanwhile caregivers who attained secondary education and above were 2.71 times most likely to complete the immunization schedules. In the bivariate analysis of child's related predators to immunization completion, the age of the child 16-20 months (COR 2.54, p=0.00), 21-23 (COR 2.93, p=0.00), present of health card (COR 2.54, p=0.03) and place of delivery (COR 0.37, p=0.01) were all statistically significant to immunization completion. Children who were 21-23 months were 2.93 more chances of completing immunization as compared to the younger one. Meanwhile mothers who presented health card had double chances of completing the immunization schedules. Delivery from home had very small odd (COR 0.37), they are less likely to complete their immunization schedule. Meanwhile, birth order and sex of the child did not show any significant association to immunization completion ***(table 2***).

Table 2: Bivariate analysis of social demographic of mothers/caregivers' and child's predictors associated to Immunization completion (N= 409)

Variables	Category	Complete (F, %) N=316	Incomplete (F, %) N=93	COR 95%CI	P-value
Maternal age (years)	less than 20	63 (19.9)	26 (27.9)	1.0	
	20-34	172(54.4)	46 (49.5)	0.65 (0.37-1.14)	0.130
	above 35	81 (25.6	21 (22.6%)	1.03 (0.58-1.84)	0.916
Parity	First delivery	107 (33.9%)	31(22.6%)	1.0	
	2-4	145(45.9(	41(44.1%)	0.99 (0.58-1.69)	0.975
	Above 4 deliveries	64 (20.3)	22(23.7%)	0.82 (0.43-1.53)	0.527
Marital status	Single	46(14.6)	23 (24.7%)	**1.0**	
	Married	270 (85.4%)	70 (75.3%)	1.93 (1.10-3.39)	0.023
Wealth index	Poorest	21 (6.7%)	11 (11.8%)	1,0	
	Poor	195 (61.7)	57 (61.3%)	1.79 (0.82-3.94)	0.146
	Middle	91 (28.8%)	18 (19.4%)	2.65 (1.09-6.43)	0.032
	Richer	3 (1.0%)	3 (3.2%)	0.52 (0.09-3.04)	0.471
Educational status	Primary& below	249 (78.8%)	84 (90.3%)	1.0	
	Secondary& above	67 (21.2%)	9 (9.7)	2.51 (1.20-5.26)	0.015
Occupation	Civil servant	7 (2.2%)	1 (1.1%)	1.0	
	Peasant farmer	290 (91.8%)	91 (97.9%)	0.46 (0.05-375)	0.464
	Business	19 (6.0%)	1 (1.1%)	2.71 (0.15-49.53)	0.500
Age (months)	12-15	83(26.3)	46 (49.5)	1.0	
	16-20	101 (32.0)	22 (23.7)	2.54 (1.42-4.57)	0.002
	21-23	132(41.8)	25 (26.9)	2.93 (1.67-5.12)	0.000
Birth order	First	105 (33.2)	29 (31.2)	1.0	
	Second	93 (29.4)	30 (32.3)	0.86 (0.48-1.53)	0.601
	Third	45 (14.2)	15 (16.1)	0.93 (0.41-1.69)	0.606
	4 above	73 (23.1)	19(20.4)	1.06 (0.55-2.03)	0.858
Sex	Male	164(51.9)	46(49.5)	1.0	
	Female	152 (48.1)	47 (50.5)	0.91 (0.57-1.44)	0.680
Card present	Yes	287 (90.8)	77 (82.8)	2.06 (1.06-3.97)	0.032
	No	29 (9.2)	16 (17.2)	1.0	
Place of delivery	Home	295(93.5)	78 (83.9)	1.0	
	Health unit	21 (6.5)	15 (16.1)	0.37 (0.18-0.75)	0.006

4.3 Health system related predictors to immunization completion

Results in Table 5 revealed that, majority of the study population received their vaccination from the health units (80.4%) and those at outreaches were 19.6%.

Greater proportion (75%) of respondent resides within less than 5 km to immunization post. Of these, 46.2% reported travelling by foot to immunization post. Majority of the children were delivered by a nurse (88.8%) and over 91.1% of them were delivered in the health unit. It was revealed that 91.4% of mothers received health education immediately after birth. The study also revealed that 85.2% of respondents reported receiving vaccination immediately after birth. Majority (91.2%) of the respondents attended Antenatal Care. Motivational factors reported by respondents such as availability of vaccines, positive attitudes of health workers and appropriate appointment date for immunization were 86.3%, 70.2% and 53.3% respectively.

Table 3: Health system related predictors to immunization completion *(N=409)*

Independent variable	Category	Frequency	Percentages (%)
Immunization post	Health unit	329	80.4
	Outreach	80	19.6
Distance to immunization post (km)	Less than 1	169	41.3
	1-5	139	34.0
	Above 5	101	24.7
Means of transport	Foot	189	46.2
	Bicycle	180	44.0
	Vehicle	16	3.9
	Bodaboda	24	5.9
Delivery assistants	Doctor	19	4.7
	Nurse	363	88.8
	TBA	27	6.6
Health education about vaccination after birth	Yes	373	91.4
	No	35	8.6
Immediate vaccination after birth	Yes	346	85.2
	No	60	14.8
ANC attendance	Yes	373	91.2
	No	36	8.8
Availability of vaccines	Yes	353	86.3
	No	56	13.7
Positive attitudes of health workers	Yes	287	70.2
	No	122	29.8
Availability of health workers	Yes	259	63.3
	No	150	36.7
Appropriate appointment date	Yes	218	53.3
	No	191	46.7
Short waiting time	Yes	202	49.4
	No	207	50.6

4.4 Bivariate analysis of Health system related predictors to immunization completion

In this study at the bivariate level, means of transport by bicycle (COR 1.72, p=0.03), the respondents who reported travelled by bicycle had 1.72 chances of immunization completion as compared to other means. Health education after birth (COR 3.69, p=0.00) was statistically significance with 3.69 chances of completing the immunization schedules as compared to those who said no. Immediate vaccination after birth was statistically significance with (COR 2.5, P=0.02) meaning that respondents who received immediate vaccination after birth had 2.5 chances of immunization completion. Skilled delivery attendance with (COR 2.37, P=0.02) was also statistically significance, respondents who was attended by skilled health worker was more likely to complete the immunization schedules as compared to TBA and relative. Mother who attended Antenatal care were more likely to complete the immunization schedules as presented with these values (COR 2.37, P=0.02). availability of vaccines (COR 3.07, P=0.00), Positive attitudes of health workers (COR 3.94, P=0.00), availability of health workers (COR 0.00, P=0.00), appropriate appointment date (COR 1.91, P=0.01) and short waiting time (COR 1.86, P=0.01) were all statistically significant with immunization completion, while distance to immunization post and means of transport were not statistically significant.

Table 4: **Bivariate analysis of Health system related predictors to immunization completion *(N=409)***

Independent variables		Dependent variables (Immunization completion)		COR 95%CI	P=value
		Complete (F, %) N=316	Incomplete (F, %) N=316		
Distance to immunization post (km)	Less than 1	127 (40.2)	42 (45.2)	1.0	
	1-5	106 (33.5)	33 (35.5)	0.94 (0.56-1.59)	0.821
	Above 5	83 (26.3)	18 (19.4)	1.44 (0.76-2.73)	0.273
Means of transport	Foot	139 (44.0)	50 (53.8)	1.0	
	Bicycle	149 (47.2)	31 (33.3)	1.72 (1.04-2.86)	0.033
	Vehicle	10 (3.2)	6 (6.5%)	0.60 (.21-1.73)	0.345
	Bodaboda	18 (5.7)	6(6.5)	1.08 (0.41-2.87)	0.879
Delivered	TBA	14 (4.4)	13 (14.0)	1.0	
	Doctor/nurse	288 (91.1)	75(80.7)	0.44 (0.33-0.84)	0.02
Health education about vaccination after birth	No	18 (5.7)	17 (18.3)	1.0	
	Yes	297 (94.3)	76 (81.7)	3.69 (1.82-7.50)	0.000
Immediate vaccination after birth	No	37 (11.8)	23 (25.0)	1.0	
	Yes	277 (88.2)	69 (75.0)	2.50 (1.39-4.47)	0.002
ANC attendance	No	22 (7.0)	14 (15.0%)	1.0	
	Yes	294 (93.0)	79 (85.0)	2.37 (1.19-4.84)	0.018
Availability of vaccines	No	32 (10.1)	24(25.8)	1.0	
	Yes	284 (89.9)	69 (74.2)	3.07 (1.71-5.57)	0.000
Positive attitudes of health workers	No	72 (22.8)	50 (53.8)		
	Yes	244(77.2)	43 (46.2)	3.94 (2.43-6.40)	0.000
Availability of health workers	No	99 (31.1)	51(54.8)	1.0	
	Yes	217 (68.7%)	42 (45.2%)	2.66 (1.66-4.27)	0.000
Appropriate appointment date	No	129 (40.8)	62(66.7)	1.0	
	Yes	187 (59.2)	31 (33.3)	1.91 (1.19-3.09)	0.008
Short waiting time	No	149 (47.1)	58 (62.4)	1.0	
	Yes	167 (52.9)	35(37.6)	1.86 (1.16-2.98)	0.010

4.5 Binary Logistic regression model, predictors associated to immunization completion of children 12-23 months old in Kwania district

Multivariate regression shown in the table below shows that the predictors to immunization were age of the child present of health card (AOR: 1.57, $P = 0.01$), the child age 16-20 months and above 20-23 months (AOR: 2.34, $P = 0.01$) and (AOR=4.07 p=0.00) respectively, ANC attendance (AOR: 2.01, $P = 0.02$) and positive attitude of health workers (AOR: 2.36, $P = 0.01$) (***table 5)***.

Table 5: Binary Logistic regression model, predictors associated to immunization completion of children 12-23 months old in Kwania district.

Variable	Category	COR 95%CI	p-value	AOR 95%CI	p-value
Marital status	Singled	**1.0**		1.0	
	Married	1.93 (1.10-3.39)	0.023	1.45 (0.73-2.83)	0.29
Wealth index	Poor	1,0		1.0	
	Middle	1.79 (0.82-3.94)	0.146	2.21 (0.84-5.81)	0.11
	Rich	2.65 (1.09-6.43)	0.032	2.40 (0.78-7.32)	0.128
	Richer	0.52 (0.09-3.04)	0.471	0.47 (0.06-3.78)	0.49
	Richest	0.79 (0.18-3.38)	0.746	0.94 (0.19-6.11)	0.94
Education	Primary & below	1.0		1.0	
	Secondary & above	2.51 (1.20-5.26)	0.015	1.82 (0.74-4.48)	0.19
Child age (months)	12-15	1.0		1.0	
	16-19	2.54 (1.42-4.57)	0.002	2.34 (1.19-4.60)	0.01
	20-23	2.93 (1.67-5.12)	0.000	4.07 (2.08-7.95)	0.00
Health card	No	1.0	0.032	1.0	
	Yes	2.06 (1.06-3.97)		1.57 (169-3.55)	0.01
Place of delivery	Health unit	1.0		1.0	
	Home	0.37 (0.18-0.75)	0.006	1.37 (0.42-4.50)	0.60
Distance to immunization post (km)	Less than 1	1.0		1.0	
	1-5	0.94 (0.56-1.59)	0.821	0.94 (0.56-1.59)	0.821
	Above 5	1.44 (0.76-2.73)	0.273	1.44 (0.76-2.73)	0.273
Means of transport	Foot	1.0		1.0	
	Bicycle	1.72 (1.04-2.86)	0.033	1.23 (0.67-2.10)	0.65
	Vehicle	0.60 (.21-1.73)	0.345	0.35 (0.09-1.31)	0.50
	Bodaboda	1.08 (0.41-2.87)	0.879	0.82 (0.251-2.77)	0.76
Delivered	TBA	1.0		1.0	
	Nurse/doctor	0.44 (0.33-0.84)	0.02	0.45 (0.53-4.06)	0.45
Health education about vaccination after birth	Yes	1.0		1.0	
	Yes	3.69 (1.82-7.50)	0.000	2.3 (1.27-8.41)	0.18
Immediate vaccination after birth		1.0		1.0	
	Yes	2.50 (1.39-4.47)	0.002	1.45 (0.59-3.56)	0.41
ANC attendance	No	1.0		1.0	
	Yes	2.37 (1.19-4.84)	0.018	2.01 (1.02-4.87)	0.02
Availability of vaccines	No	1.0		1.0	
	Yes	3.07 (1.71-5.57)	0.000	21.82(0.84-4.00)	0.13
Good attitudes of health workers	No	1.0		1.0	
	Yes	3.94 (2.43-6.40)	0.000	2.36 (2.43-6.40)	0.000
Availability of health workers	No	1.0		1.0	
	Yes	2.66 (1.66-4.27)	0.000	1.32 (0.68-2.60)	0.42
Short waiting time	No	1.0		1.0	
	Yes	1.86 (1.16-2.98)	0.010	1.14 (0.61-2.10)	0.69

CHAPTER FIVE: DISCUSSION OF FINDINGS

5.0 Introduction

The study focused on the predictors associated with immunization completion among children aged 12-23 months in Kwania district. A cross-sectional survey method was used to recruit participants who are aged 12-23 months old paired with their mothers/caregivers at their respective households.

5.1 Results

Out of 409, 77.3% fully completed their immunization schedules and 80.4% of the children received the vaccine from the health facility, this may be explained by the fact that in Kwania district, local health centers are the backbone of the primary health care approach and offer a range of preventive and curative services including immunization programs. Opportunity for getting the vaccines is high because, children get vaccinated during static session and anytime they visit health facility.

However, this figure 77.3% completion is still much below the reported global target of 84% and national immunization target of 90% set by the Ministry of Health Uganda.

From the exploratory analysis, mother/caregivers' characteristics were not statistically significantly associated with immunization completion. This was in disagreement with earlier studies done in Eastern Uganda on exploring the predictors of immunization completeness in the first year of life; where social-demographic covariates were consistently associated with complete immunization status. This could be due to the variations in study designs, sample size and cultural background of the respective respondents. This means that, other factors could be responsible to explain this dissimilarity in the findings.

This study found that, age of the child was statistically significant to immunization completion, age 16-19 months 2.34 times more likely to complete the immunization while age extreme 20-23 months old was 4.07 times more likely to complete the immunization schedules (Ahmed, Ishtiak et al. 2023). Similar to finding on metanalysis study done on factors influencing completion of immunization schedule in Gomba district in North-Western Uganda, which found that, the age of the child had was positively correlation with immunization completion.

The survey also found out that, the present of immunization cards had a significant association with immunization completion and children whose mothers/caregivers presented health card had over 1.5 times likelihood of immunization completion. This is similar to cross-sectional cluster survey on immunization dropout rate and data quality among children 12–23 months of age in Ghana, which showed similar result. Similar study on trends in vaccination completion and coverage among children aged 12-23 months: an analysis of the Uganda Demographic Health Survey data from 1995 to 2016 also found that possession of a child health card was associated with immunization completion across all the sub-regions in Uganda (Okello, Izudi et al. 2022). The present of immunization cards were found in a higher percentage of children who completed their immunization schedules (90.8%) compared to the non-completers (82.8%). This signifies the need of prompt documentation and record-keeping during immunization session and also maternal awareness on the importance of child immunization in upbringing and naturing of the child. Studies conducted by Ratta, Meshram Naveen, et al also had similar result(Ratta and Meshram 2020).

In this study, Antenatal care attendance was statistically significant and highly associated with immunization completion and mothers who reported ANC attendance had twice chances of completing immunization schedules. This finding is similar to the community-based study on exploring the predictors of vaccination completeness in the first year of life in Eastern Uganda which also reported that ANC attendance by mothers/caregivers had a significant statistical correlation with immunization completion). In another study on Individual and community-level determinants of child immunization completion in the Democratic Republic of Congo, its analysis revealed that, Antenatal Care (ANC) visits, significantly associated with immunization completion (Pawan Acharya 2019). Similar result was also reported in in Ethiopia (Kinfe, Gebre et al. 2019).

The positive attitudes of parents/caregivers were statistically significant to immunization completion and having 2.36 times likelihood of completing the immunization schedules. Similar finding was obtained in a study conducted in Lira city Northern-Uganda on predictors of adherence to routine immunization schedule among caretakers of children aged 10 to 18 Months (Abor Jasper 2022) and Another study in Western Uganda Hoima district on geographic location of health facility and immunization program performance in Hoima district, western Uganda: a health facility level assessment also found similar results. The attitudes of health workers greatly influence on adherence of immunization completion. Positive attitude and humility of health workers encourages the caregivers to return to complete their immunization schedules (Nicholas Magombo, Fred Bagenda, Bajunirwe Francis 2020). Similar result

Was obtained in Nigeria on study done on perceptions and experiences of childhood vaccination communication strategies among caregivers and health workers which found that positive health worker attitudes improve on immunization (Oku et al 2017).

CHAPTER SIX: CONCLUSION

6.1 Summary

Study finding showed that, immunization completion among children age 12-23 months in Kwania district was 77.3%, below the Global Vaccine Plan (90%) and MOH national target of 90%. The child's age, health cards, ANC attendance and positive attitudes of health workers were associated with immunization completion.

6.2 Study limitations

This study has some limitations. First of all, the information on child's immunization status was obtained from either the health card or by maternal recall of vaccinations records as recommended by the World Health Organization. However, because of potential shame and social stigma, mothers of children who don't have the detail vaccination data recorded on their immunization cards might have been more tempted to report a vaccination for their children introducing a potential subject bias. Consequently, the level of immunization completion may be lower or higher than the prevalence reported in this study. Secondly, information on immunization and certain socio-demographics characteristics was collected at the same time; therefore, it may be difficult to establish a causal relationship between these characteristics and the child immunization status. Thirdly, in this study, based on the birth history, only living children were included, therefore the generalizability to all children, living and dead remains unclear.

6.3 Recommendation

Based on the above facts' findings; I therefore recommend that, the district stakeholders should mobilize the community to improve on health seeking behaviors of mothers of reproductive age on ANC attendance and provide child health cards during vaccination

session and develop other innovative strategies to address adherence to immunization completion among children 12-23 months in Kwania.

6.4 Suggestions for further Research

This study was conducted in the community using quantitative descriptive study design other studies on immunization completion can be done using difference study designs and study settings in order to established more facts about the immunization completion among children 12-23 months in Kwania district.

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UGANDA CHRISTIAN UNIVERSITY

APPENDICES

APPENDIX A: INFORMED CONSENT FORM FOR PARTICIPANT INTERVIEW

Part A: Information Sheet

Participant ID number……...

Title: Predictors of immunization completion among 12-23 months old children in Kwania district

Principal investigator: Omara Samfan Thomas

Supervisors:

1. Akech Stella Immaculate
2. Angol Calmax Denish

Study site: Kwania District

Introduction and purpose of this study

My friend I greet you in the name of Christ, my name is Omara Samfan Thomas and I am student of Uganda Christian University pursuing a Master of Public Health. I am conducting a study to understand the predictors to immunization completion. The purpose of this study is to find the child's individual, maternal socio-cultural and health system related predictors to immunization completion among children aged 12-23 months in Kwania district.

What will happen if you take part in this study?

We are asking you to participate in an interview today. The questions will include: your socio-demographic data, child's individual related predictors and your feel about health service delivery. We will ask about only what you think. There are no rights or wrong

answers to questions we will ask. If you agree to take part in the study, you will be asked to complete the interview. The interview will take about 15-20 minutes.

Why are you being asked to take part in this research?

We are asking you to participate in this study because you are member of Kwania community and you have ben randomly selected among those to participate.

Are there any possible risks to you?

We think that there are few risks to you if you participate in this interview. We will not tell anyone about your participation in this interview. We are conducting this interview in a private place to minimize this risk. There is a chance that you may feel uncomfortable by some of the questions in the interview. You can skip any question you do not want to answer. You can also stop the interview at any time you feel uncomfortable. We will not tell anyone that you were in the study or what you told us, but there is a chance that other people might find out that you were in the study.

Are there any possible benefits to you?

There are no direct benefits to you for being in this study. However, the information you will tell us may help to improve our immunization services among our children.

What if you decide not to join this study?

You are free to refuse to be in this research study. You are free to stop taking part in the research at any time. There will be no penalty if you choose not to take part in this study. You may leave the research study at any time even after providing consent. Participation in the study will not affect any services you receive.

Confidentiality

We will do our best to protect the information about your participation and interview you in a private place using a participant number instead of your name and in the research report, no any reference will be made in your name. We shall ensure that any information we include in the report does not identify you. The data collection tools may be reviewed by other researcher, and the ethics review committees. I may share the information you provide with other people but your name.

Compensation

There are no costs to you for participating in this study other than the time you will spend in the interview and no transport cost, as we move to follow you from home.

What if you have a problem or have questions?

If you have questions about the research, contact: **0772973935/0752899037**

What are your rights as a participant?

This proposal has been reviewed and approved by Uganda Christian University REC, the committee that ensures that the study participants are protected from harm.

Do you have any questions?

Part B: Certificate of Consent

I have read the foregoing information, which has been read to me. I have had the opportunity to ask questions about it and any questions I have asked have been answered to my satisfaction. I consent voluntarily to be a participant in this study.

[Participant should tick appropriate boxes below]

I consent voluntarily to be a participant in this study Yes □ No □

I consent voluntarily to have the interview audio-recorded. Yes □ No □

_____

Printed Name of Witness

_____ **Date:** _____

Thumbprint/Signature of participant

If participant cannot read the form herself/himself, a witness must sign below:

I was present while the informed consent form was presented to the volunteer. All the volunteer's questions were answered.

_____

Printed Name of Witness

_____ **Date:** _____

Signature of Witness

Part C: Statement by the researcher/person taking consent

I certify that the nature and purpose, the procedures, the potential benefits, and possible risks associated with participating in this research have been explained to the above individual, and she/he has provided verbal/written consent to take part in the interview.

_____

Print Name of Researcher/person taking the consent

_____ **Date:** _____

Signature of Researcher /person taking the consent

Uganda Christian University

APPENDIX B: RESEARCH QUESTIONNAIRES

Section A: Maternal/caregiver's socio-demographic information

(T*ick inside the box for the appropriate response*)

Name of respondent……**ID Code**……

Do you have a child who is 12-23 months old Yes? ☐ No? ☐

(If no, thank the mother and proceed to the next household)

Have you ever taken your child for vaccination Yes? ☐ No? ☐

(If no counsel the mother on importance of immunization completion)

If yes, where was it from: *Outreach* ☐ Health facility ☐

(a) Maternal age at birth in years ☐ Unknown ☐

(b) Number of ANC Attendance until delivery of this child ☐

(c) Marital status of the mother

1. Single ☐ 2. Married ☐ 3. Window ☐ 4. Divorced ☐ 5. Unknown ☐

(d) Parity ☐

(e) Wealth index

1. Poorest ☐ 2. Poor ☐ 3. Middle ☐ 4. Richer ☐

(f) Level of education

1. None ☐ 2. Primary ☐ 3. Secondary ☐ 4. Tertiary/institution ☐

(g) Maternal occupation

1. Civil servant ☐ 2. Peasant farmer ☐ 3. Business woman ☐ 4. Other specify ……

(h) Religious affiliation

1. Catholic ☐ 2. Protestant ☐ 3. Muslim ☐ 4. SDA ☐ 5. Others

specify……

Section B: The child's individual predictors on immunization completion status

Name of the child…… ID Cod…….……

(a) Present of health card Yes ☐ No ☐

(b) Age of the child in months ☐

(c) What is the birth order of your child? ☐

(d) Sex of the child, Male ☐ Female ☐

(e) Where was your child delivered from?

1. Home ☐ 2. Health unit ☐ 3. On the way ☐

Section C: Health system related predictors to low immunization completion among 12-23 months old children

(I) How long did you take to reach the immunization post in Km ☐

(ii) What mean of transport do you use to get into vaccination post?

1. Foot ☐ 2. Bicycle ☐ 3. Board vehicle ☐ 4. bodaboda

(iii) During delivery, who helped you to deliver your child?

1. Doctor ☐ 2. Nurse ☐ 3. Traditional Birth Attendance ☐ 4. Relative

(iv) Did the health worker teach you about vaccination after delivery? Yes ☐ No ☐

(v) Did the health staff vaccinate your child immediately after delivery? Yes ☐ No. ☐

(vi) Have your child completed all the immunization recommended doses? Yes ☐ No ☐

(*Verify by checking the health card or help the mother to recall and* tick appropriate box)

Immunization type	**Completed**	**Uncompleted**
BCG		
DPT-Hib/Hept		
Polio		
Measles-Rubella		

(vii) Which of the following do you think can make you complete the immunization schedule of your child? (Without probing, record all reasons mentioned) ***(Tick all that applies***)

1. Availability of vaccines ☐
2. Positive attitude of the health workers ☐
3. Appropriate appointment date ☐
4. Short waiting time ☐
5. Availability of health workers ☐
6. Others ☐

Thanks for your time

End of interview

APPENDIX C: REC APPROVAL NOTICE

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11th October 2022

Omara Samfan Thomas,
C/o, Uganda Christian University,
P. O. Box 4, Mukono
Tel. +256 751035135
omarasamfan@gmail.com

UG-REC-026 APPROVAL NOTICE

To: Omara Samfan Thomas, Principal Investigator
Re: UCU-REC Application entitled; ***Predictors of Immunization Completion Rate Among 12-23 Months Old Children in Kwania District in Northern Uganda.***

Application Number: **UCUREC-2022-396-3**
Version: 4.0

Type: [ ] **Initial Review**
[ ] Protocol Amendment
[ ] Letter of Amendment (LOA)
[ ] Continuing Review
[ ] Material Transfer Agreement
[ ] Other, Specify:

I am please to inform you that the **UG-REC-026;** UCUREC approved the above referenced application.

Approval of the research is for the period from 11th October, 2022, to 11th October, 2023.

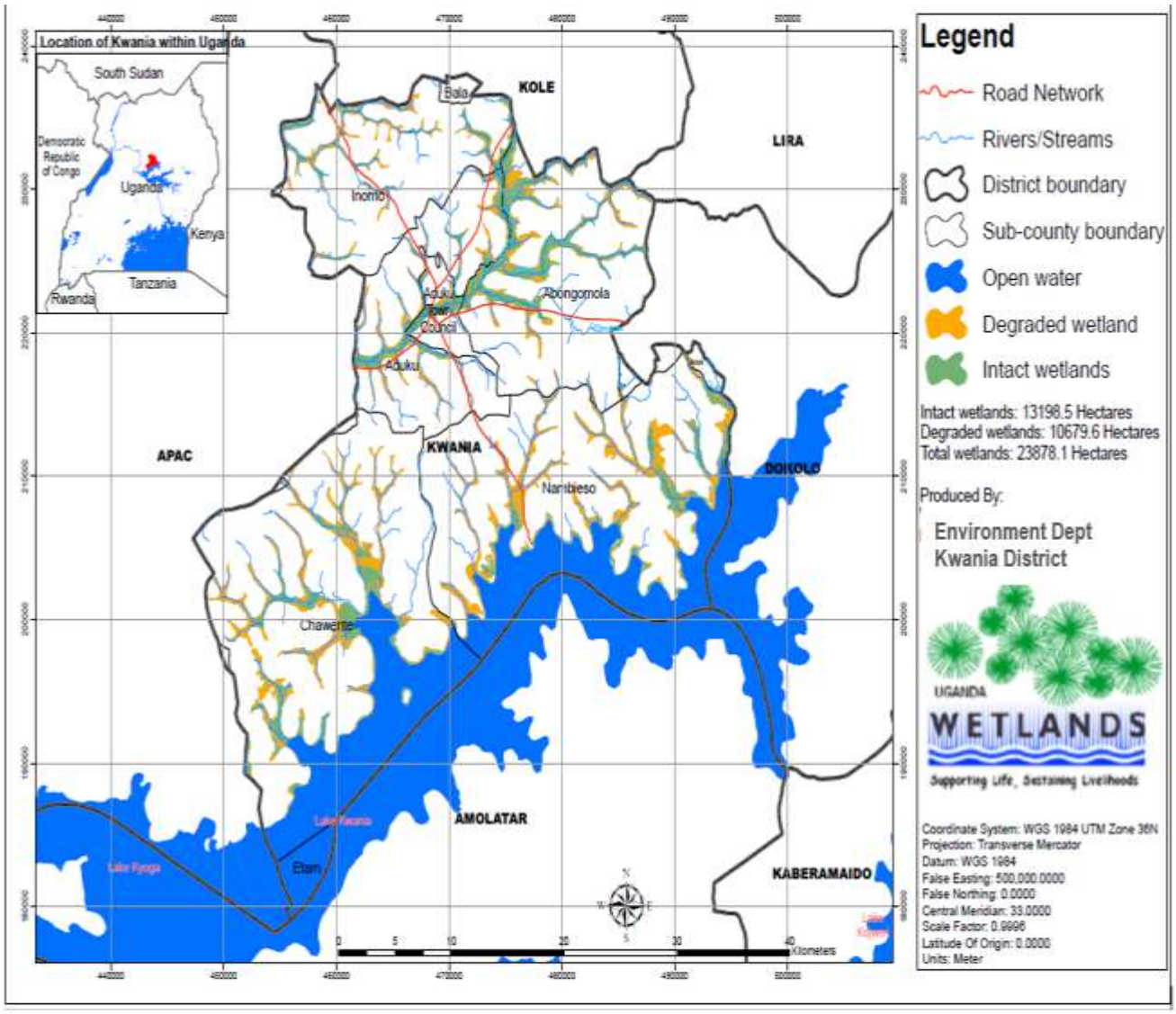
This research is considered minimal risk category.
As Principal Investigator of the research, you are responsible for fulfilling the following requirements of approval:

1. All co-investigators must be kept informed of the status of the research.
2. Changes, amendments, and additions to the protocol or the consent form must be submitted to the REC for re-review and approval **prior** to the activation of the changes. The REC application number assigned to the research should be cited in any correspondence.

UGANDA CHRISTIAN UNIVERSITY
APPROVED
11 OCT 2023
RESEARCH ETHICS COMMITTEE

UGANDA CHRISTIAN UNIVERSITY

APPENDIX D: MAP OF KWANIA DISTRICT SHOWING THE STUDY AREA



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Appendix: E REGULAR SUPERVION REPORT

Supervisor's Name: Miss Akech Stella Immaculate

Student's Name: Omara Samfan Thomas Reg No: RJ19M21/042

Date of Submission of Work to Supervisor: 25/03/2024

Date of Meeting that Discussed the Work: Throughout the period of one year

SUPERVISORS COMMENTS ON STUDENT'S WORK AND RECOMMENDATION FOR ACTION

I have supervised Mr. Omara Samfan Thomas from the time of concept to drawing of inferences; the research title, concept and throughout the research process.

The process involved the following:

- Harmonizing the topic
- Formulating study objectives
- Research proposal development
- Data collection
- Data analysis
- Dissertation/Report writing

He had been a very committed student throughout the process of the development of this thesis. To the best of my interest, he has conceptualized the concept of research work. He has acquired reasonable research knowledge and skills that will help him to develop want to do more research work in the future because of the interest and confidence inculcated in him. I' m satisfied with his work at this level of a thesis development.

Thanks.

STUDENT'S SIGNATURE

SUPERVISOR'S SIGNATURE

Cc Head of Department
Cc Co-supervisor (if there is one)

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APPENDIX: F REGULAR SUPERVISION REPORT

Supervisor's Name: Mr. Denish Calmax Angol

Student's Name: Mr. Omara Samfan Thomas **Reg No:** RJ19M21/042

Date of Submission of Work to Supervisor: 25th March 2024

Date of Meeting that Discussed the Work: The discussion of this research project took over a year. There have been regular meetings whenever to student is within Lira

SUPERVISORS COMMENTS ON STUDENT'S WORK AND RECOMMENDATION FOR ACTION

This student (Omara Samfan Thomas) was previously my undergraduate student when he pursued his BSc. Public Health at Lira University. Therefore, the process of this research supervision commenced when the student presented his different research concepts, and the discussion started.

The process continued during the development of the full proposal, which involved: discussing the research objectives, questions, statement of the research problem, conceptual framework, and development of methods and materials. This went on fruitfully.

The student then sought approvals as prescribed by the institution's guidelines, and thereafter went for field data collection.

Analysis of the data was successfully carried out by the student and the results were presented for discussion with the supervisor. The student demonstrated outstanding ability in data analysis.

Throughout the process, the student has gained much confidence in handling research work, and I believe he can now operate as an independent researcher with further mentoring.

In spite of the inevitable delay encountered, it is with great pleasure to see that the student is through with this research project, which is a partial fulfilment for the award of Degree of Masters of Public Health of Uganda Christian University Mukono Uganda.

Samfan.

STUDENT'S SIGNATURE

SUPERVISOR'S SIGNATURE

Cc Head of Department
Cc Co-supervisor (if there is one)

Version: Dec 2006

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Appendix: G DISSERTATION CORRECTION COMPLIANCE REPORT BY THE CANDIDATE (POST VIVA FORM)
Date: 23rd, March, 2024

Name of Candidate: Omara Samfan Thomas **Reg. No: RJ19M21/042**

Title of dissertation: Predictors of immunization completion among 12-23 months old children in Kwania district

SN	COMMENTS BY EXTERNAL EXAMINER	ACTION TAKEN	INDICATOR
1	Sample size should be stated in terms of the numbers of children that were involved in the study	Sample sized corrected and stated 409	Addressed under abstract, found on page i
2	Conclusion under the abstract is a form of recommendation and not the Conclusion. Stated as, the district should strengthen information on immunization at any opportunity, create awareness about the importance of Antenatal Care, provide immunization cards during immunization session and promote positive attitudes of	Then conclusion corrected as; Immunization completion among children age 12-23 months in Kwania was 77.3%, below the national target of 90%. The child's age, health cards, ANC attendance and positive attitudes of health workers were associated with immunization completion. Therefore, the district stakeholders should mobilize the community to improve on ANC attendance and provide health cards during vaccination and	Addressed under abstract, found on Page i on the ***conclusion***

	health workers in order to improve the adherence of immunization completion.	innovate other strategies to address adherence to immunization completion	
3	The general objective should be made action oriented to address the question of "and then what?" at the end of the general objective. Earlier on was written as; To determine the predictors of immunization completion among 12-23 months old children and their mothers/caregivers in Kwania district	The general objective was rewritten as; To determine the predictors of immunization completion among 12-23 months old children with the primary aim of improving immunization completion in Kwania district.	Addressed under general objective (1.1) page 3
4	The conceptual frame work is well explained. However, there is need to write a summary at the end of literature showing the Research gap.	The summary had been written at the end of literature review showing the research gap	Address under summary of literature review (2.4) page 16-17
5	Reasons for the choice of the type of study design should be presented in the report. As was written as This was a quantitative descriptive cross-sectional community-based study to investigate the predictors of immunization completion among 12-23 months old children and their mothers/caregivers.	Corrected as follows This was a quantitative descriptive cross-sectional community-based study to investigate the predictors of immunization completion among 12-23 months old children and their mothers/caregivers. The design was selected because it provides a snapshot of a population at a single point in time and usually inexpensive and easy to conduct.	Was addressed under study design (3.1) page 16
6	Under sampling procedures, use appropriate past tense in the write up all through. The same applies to statements under 3.5.1. '' If there is no eligible respondent in the next household, then it becomes the reference point again and this interval was followed until all 14 respondents are obtained in each village	Corrected as; If there was no eligible respondent in the next household, then it became the reference point again	Addressed under sampling procedure (3.4.3) page 18

	of respondents but if the required number is not met,		
7	Use of appropriate past tense in the write up in problem statement Kwania still report low completion of schedules and yet if these infants fail to complete their immunization schedules	This was corrected as; the district continuously reported low completion status and If these infants failed to complete their immunization schedules, they become more at risk of suffering and dying from VPDs.	Addressed under problem statement (1.4) page 4 and sampling procedures (3.4.3) page 18
8	Under 3.7.1, "the interviewees were asked if he/she had ever__''. Pay attention to grammar and where plural use is needed.	The grammar was corrected as; each respondent was asked if he/she had ever taken his/her child for immunization, if yes, he/she was asked to present the immunization card of the child for scrutiny for immunization completion.	Addressed under (3.7.1) page 20
9	Table 1 and 2 should state age in terms of years or months and not left blank	Maternal age was corrected Children's age in months	Addressed under (table 1) page 24 and 25 respectively
10	Under 5.1, the percentage of children who received the vaccine should be appropriately written and was written as 80.4 of the children received the vaccine from the health facility	Corrected as; 80.4% of the children received the vaccine from the health facility	Addressed under (5.1) page 33

SN	COMMENTS BY INTERNAL EXAMINER	ACTION TAKEN	INDICATOR
1	You should provide a brief synopsis of your dissertation components in a well planned power point	A brief synopsis of the dissertation was provided	Viva presentation
2	Specific objective #1; To determine the immunization completion rate, as it is already known, remove it	It was removed and amended	Addressed under specific objective (1.2) page 3

SN	COMMENTS BY VIVA VOCE PANNEL	ACTION TAKEN	INDICATOR
1	Include literature closer to the study area in the discussion section.	The literature had been modified and made closure to the study, Similar study finding in Lira city had been city and Hoima district	Addressed under Literature review page (7-18)
2	The student needs to update his literature to align with the data.	Literature updated and a aligned with data	Addressed under Literature review page (7-18)
3	The student was advised to make corrections with the supervision	Both student and supervisors sat and made corrections together	All areas commented at various handled

Omara Samfan Thomas ..... Samfan ..... Angol Denish Calma ....

Candidate's Name **Signature** **Supervisor's Name** **Signature**

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APPENDIX: H DISSERTATION CORRECTION COMPLIANCE REPORT BY THE CANDIDATE (POST VIVA FORM)

Date: 23rd, March, 2024

Name of Candidate: Omara Samfan Thomas **Reg. No: RJ19M21/042**

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	health workers in order to improve the adherence of immunization completion.	innovate other strategies to address adherence to immunization completion	
3	The general objective should be made action oriented to address the question of "and then what?" at the end of the general objective. Earlier on was written as; To determine the predictors of immunization completion among 12-23 months old children and their mothers/caregivers in Kwania district	The general objective was rewritten as; To determine the predictors of immunization completion among 12-23 months old children with the primary aim of improving immunization completion in Kwania district.	Addressed under general objective (1.1) page 3
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	of respondents but if the required number is not met,		
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2	The student needs to update his literature to align with the data.	Literature updated and a aligned with data	Addressed under Literature review page (7-18)
3	The student was advised to make corrections with the supervision	Both student and supervisors sat and made corrections together	All areas commented at various handled

Omara Samfan Thomas ..... Samfan. ..... Akech Stella T. ..... Stella .....

Candidate's Name **Signature** **Supervisor's Name** **Signature**