UTILISATION OF IMMUNISATION SERVICES AMONG INFANTS AGE 0-12 MONTHS IN JUBA CITY

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UGANDA CHRISTIAN UNIVERSITY

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Declaration

I declare that this study is entitled ''utilization of immunization services among infants 0-12 months in Juba city'' is my work and has not been submitted to any other institution for an award of any other degree.

Signed ....Date 12/10/2023

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Supervisor's Approval

This research work has passed under my supervision, and I have approved it for submission to the UCU REC committee.

Signed……………………………………………………..………….Date……………..

Mr. Ambayo Peter Otte Nyumbe (MSC, ICHD/MPH)

Dedication Statement

I dedicate this research paper to my wife, sons, daughters, and family for their endurance during my studies.

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Acronyms

AFENET	African Field Epidemiology Network
BCG	Bacillus Calcumate Gurain
BPHS	Basic Package of Health Services
CDC	Center for Disease Control
cMYP	Comprehensive Multi-Year Plan
CPA	Comprehensive Peace Agreement
EPI	Expanded Programme of Immunization.
GAVI	Global Alliance for Vaccines and Immunization
GVAP	Global Vaccine Action Plan
IA	Immunization Agenda.
MMR	Measles, Mumps and Rubella
MOH	Ministry of Health
NGO	Non-Governmental Organization
NIDS	National Immunization Days.
NIP	National Immunization Program.
Penta	Pentavalent (Diphtheria Tetanus Pertussis, HepB and Haemophilus)
PHCC	Primary Health Care Centre
PHCU	Primary Health Care Unit
RSPI	Regional Strategic Plan for Immunization
SAM	Severe Acute Malnutrition.
SIAs	Supplementary Immunization Activities.
SSHS	South Sudan Household Survey.
STATA	Package for Social Scientists (Statistic and Data).
UN	United Nations
UNICEF	United Nation Children Emergency Fund.
USAID	United State Agency for International Development
VPD	Vaccines Preventable Disease
WCBA	Women of Child-Bearing Age
WHO	World Health organization

Operational Definitions

BCG: This is an abbreviation (Bacillus Calcumate Gurain) for Vaccination against tuberculosis administered intradermal at birth.

Compliance: This is defined or conceptualized to receiving the required number of doses of vaccines at the appropriate age as shown in the immunization schedule table and recorded in the child's record card.

Expanded Programme on Immunization: This is a World Health Organization with an agenda of ensuring all children are immunized with all vaccines approved by WHO all over the globe.

Immunization: A process where one is protected from diseases through provision of vaccines.

Maternal Child Health Services: Refers to various facilities and programs offered to mothers and children to protect them from diseases that may endanger their life's and hinder them from realizing good health outcomes. This includes care during pregnancy and until after delivery and care of the child during the child's early years of life.

Oral Polio Vaccine: This is a vaccine used throughout the world to provide immunity to the virus that causes poliomyelitis (polio).

Vaccination schedule: These are services of vaccination which are age and time specific provided as per WHO guidelines to achieve maximum effectiveness after completing all the doses in the National child immunization schedule.

Vaccine: an antigen introduced into a child's body through injectable or oral route to offer protection against childhood killer diseases.

Abstract

Vaccine-Preventable Diseases (VPDs) still kill more than half a million children less than five years of age in Africa every year, representing approximately 56% of global deaths caused by VPDs. Globally, one hundred sixteen million children were immunized against Pentavalent (Diphtheria Tetanus Pertussis, HepB and Haemophilus) (Penta). (UNICEF, 2018). The main objective of the study was to determine utilization of immunization services among children 0-12 months in Juba City. The specific objectives were to determine the current level of immunization services, establish the social, economic, and cultural factors, determine the impact of male involvement and determine the health services factors influencing utilization of immunization services. A descriptive cross-sectional study employing mixed method (both qualitative and quantitative) was conducted among 416 participants in Juba City. This was done through systematic random sampling of every 9th household. The respondents were interviewed through structured questionnaires and key informant and focused group discussions were conducted. Findings indicated that at multivariate analysis, factors that statistically influenced immunization of infants aged 0-12 months were; age [x^2 = 4.41, p-value 0.005<0.05], gender [x^2 = 4.89, p-value 0.009<0.05], marital status [x^2 = 2.59, p-value 0.009<0.05], income level [x^2 = 1.90, p-value 0.001<0.05], Myths and misconception [x^2 = 3.75, p-value 0.002<0.05], availability of health workers [x^2 = 4.86, p-value 0.003<0.05], availability of vaccine [x^2 = 2.45, p-value 0.006<0.05], and attitude of HWs [x2 = 3.91, p-value 0.004<0.05].It was concluded that the proportion of the children 0-12 months who had been immunized for DPT3 was 87.3% and Measles 55.5% within Juba City which shows incompleteness of immunization within the city; Gender (females), age, marital status and income level were social and economic factors that influenced utilisation of immunisation services. Male involvement factors that have a positive influence on utilisation of immunisation includes father taking their children for routine immunization, reminding the spouse of children's immunization appointment, providing financial support to go for immunization and accompanying the spouse for routine child immunization. The availability of vaccines, attitude of health workers, and availability of health workers were health services factors that influenced the utilization of immunization services. It was recommended that Government of South Sudan and partners should endeavour to sensitize parents about the importance of completing the immunization schedule, especially with regard to Measles. Mass awareness campaigns be done at the community level together with the community enforce the message. Interventions to improve men's attitude to support their spouses to take their children for immunization be enhanced. Such interventions includes health education or peer education are needed to increase their involvement since their involvement influence immunization uptake positively. Government and partners should employ adequate health workers to address the issue of long waiting time not to discourage parents from bringing their children for services and also purchase and stock all the health facilities with adequate vaccines.

CHAPTER ONE

1.1 Introduction

This chapter focused on the introduction, background to the study, statement of the problem, the purpose of the study, research questions, justification, significance, scope, and the study's conceptual framework.

Immunization is one of the most cost-effective public health interventions to date, averting an estimated 2 to 3 million deaths every year. In 2018, globally, one hundred sixteen million children were immunized against Penta (Diphtheria Tetanus Pertussis, HepB and Haemophilus) (UNICEF, 2018).

Immunization reaches more people than any other health or social service and is a vital component of primary health care. It benefits individuals, communities, countries, and the world. It is an investment in the future, in three ways. Saving lives and protecting the health of populations, improving countries' productivity and resilience and enabling a safer, healthier, more prosperous world hence detecting, preventing, and responding to infectious disease threats are therefore key to global health security. (IA 2030)

The widespread use of vaccines for immunization has resulted in the global eradication of smallpox, elimination of polio and measles from many countries. It had also resulted in substantial reductions in illness and death attributable to diseases like diphtheria, tetanus, and whooping cough (WHO, UNICEF, World Bank, 2019).

Vaccines are critical to the prevention and control of many communicable diseases and therefore underpin global health security. Moreover, they are widely seen as critical for addressing emerging infectious diseases, for example by containing or limiting outbreaks of infectious diseases or combatting the spread of antimicrobial

resistance. Regional outbreaks (e.g., of Ebola virus disease), the COVID-19 pandemic and the threat of future pandemics (such as with a novel flu strain) have and will continue to strain even the most resilient health systems. A clear risk is a reduction in essential services and particularly vaccination and prevention of other communicable diseases. (IA 2030)

According to the World Health Organization (WHO), approximately 2-3 million child deaths were averted in 2013 in all age groups from vaccination against diphtheria, tetanus, pertussis, and measles (WHO, 2010). Furthermore, there is a potential to prevent many more deaths globally if WHO's recommended levels of vaccination coverage are attained and improvements made in the timeliness of the vaccines' administration (Harris et al., 2014)

However, Vaccine-preventable diseases (VPDs) still kill more than half a million children less than five years of age in Africa every year, representing approximately 56% of global deaths caused by VPDs. At the current pace, the region is off-track to achieve the Global Vaccine Action Plan (GVAP) and the Africa Regional Strategic Plan for Immunization (RSPI) target of 90% national immunization coverage by 2020. (Namuwaya, 2017)

1.2 Background to the Study

Globally over 13 million children did not receive any vaccines at all even before COVID-19 disrupted global immunization (UNICEF 2020).

It is estimated that 19.4 million infants worldwide were not reached with routine immunization services such as three doses of the Penta vaccine. (WHO, 2018). According to the WHO (2015), the global vaccination targets for 2015 was not realized as one out of every five children are still missed out on routine immunizations (WHO 2015).

Due to this low coverage of immunization services, a worldwide Immunization Vision and Strategy was launched in Geneva to fight vaccine-preventable diseases estimated to cause the death of over 2 million children every year, two-thirds being children aged under five(WHO, 2005). The Global immunization vision and strategy aims to immunize many children against emerging diseases with newly introduced vaccines and integrate other key health interventions with immunization such as de-wormers, nets, and provision of vitamin A to increase uptake of immunizations. (Cana van et al., 2014).

In some countries, progress has stalled or even reversed, and the risk that complacency will undermine past achievements is real. Outbreaks of measles and vaccine-derived polioviruses are stark reminders that strong immunization programmes and effective disease surveillance are necessary to sustain high levels of coverage and to eliminate and eradicate diseases. Because measles is highly infectious, its presence serves as a tracer (the "canary in the coal mine") of inadequate coverage and gaps in the health system. Detection of measles cases through surveillance reveals communities and age groups that are un or under-immunized and immunization programmes and overall primary health care systems that are inadequate, indicating where particular attention and interventions are needed. High coverage with measles vaccine is an indicator of a strong immunization programme, which may signal a solid foundation for primary health care services. (IA 2030)

Global coverage of the third dose of diphtheria-tetanus-pertussis (Penta) fell from 86 per cent in 2019 to 83 percent in 2020. The latest WHO/UNICEF estimates of national immunization coverage (WUENIC) also show that 90 per cent of countries that reported 2020 data experienced stagnant or declining coverage of Penta 3 compared to 2019 with nearly 30 per cent showing a decline of at least 5 percentage points. As a result, 23 million children were un- or under-vaccinated

(not receiving the first dose of Penta or not receiving the third dose of Penta, respectively) in 2020. This is the highest drop in Penta 3 vaccine coverage since 2008. Of those 23 million children, more than 60 per cent live in just ten countries (India, Nigeria, Democratic Republic of the Congo, Pakistan, Indonesia, Ethiopia, Brazil, Philippines, Angola, and Mexico) and 17 million of them did not receive any vaccines (zero-dose children). (WHO 2021)

In 2014, Indian children accounted for 22% of the 18.7 million children worldwide who had not received three doses of DPT by age one (Subaiya et al., 2015). Approximately 1 in 5 African children do not receive all the necessary and basic vaccines. As a result, more than 30 million children under five still suffer from vaccine-preventable diseases (VPDs) every year in Africa. Of these, over half a million children die from VPDs annually – representing approximately 58% of global VPD-related deaths. (WHO; 2018).

The Sub-Saharan Africa region has the highest rates of neonatal, under-five, and maternal mortality. Although there has been improvement in the reduction of Neonatal mortality in the last 20 years, Neonatal mortality stands at 27.5 deaths per 1,000 live births. (World Bank 2019)

About 31 million children in sub-Saharan Africa (SSA) suffer from vaccine preventable diseases yearly, and more than half a million children die because of lack of access to immunization. Immunization coverage has stagnated at 72% in SSA over the past six years. (Edward et al. 2021)

Immunization of children aged under five is a global priority. It is vital in contributing to SDGs goal number 3, ensuring the reduction of under-five mortality by 25 per 1,000 live births. (Cana Van, 2014).

About 8.5 million of the unvaccinated children under the age of five live in the African Region, as many other regions combined. Simultaneously, the African region is experiencing fast demographic growth, while most other areas are in demographic decline. African countries thus need to vaccinate even more children to maintain the status quo. More children are being born in countries with weaker health systems, and lower coverage acts as a brake on global coverage improvements. (WHO, 2019)

Due to low immunization for children under five years, in developing countries, child death has typically been high where 70 per cent of under-five deaths were registered in 2009 within 15 countries. Half of the death occurred in India, Nigeria, the Democratic Republic of the Congo, Pakistan, and China alone (Jones et al., 2010).

In East Africa, despite vigorous vaccination campaigns, complete basic childhood vaccination in East Africa is 69.21%. (Getayeneh et al. 2020).

Uganda's national immunization coverage rate measured by the percentage of children receiving the third dose of the Penta 3 (Diphtheria Tetanus Pertussis, HepB and Haemophilus) vaccine is said to have stagnated at 78% since 2012. This is below the Global Vaccination Action Plan target of at least 90% coverage (WHO and UNICEF 2018) compared to Kenya's national immunization coverage rate measured by the percentage of children receiving the third dose of the (Diphtheria Tetanus Pertussis, HepB and Haemophilus) vaccine (Penta 3) is 81% official country estimates (WHO and UNICEF 2018)

South Sudan has some of the worst health outcome indicators globally. Infant mortality rate (deaths < 1 year per 1000 births, 2018) 63.7/1000, Child mortality rate (deaths < 5 years per 1000 births, 2018) 93/1000 (World Bank 2018). Maternal mortality rate (deaths per 100000 births 2017) 1150/100000 (World Bank, 2017).

In South Sudan, the number of counties with Penta 3 coverage ≥80% declined from 24 in 2017 to 21 in 2018, and counties with Penta 3 <50% decreased from 42 in 2017 to 40 in 2018. Instead, the trend from 2017 to 2018 shows an increase in the number of counties between 70-80% coverage. However, unlike in previous years, many counties in secure areas have reported coverage below 50% in 2019 so far.

The EPI coverage survey 2017 shows a drop in coverages across the antigens apart from Tetanus Toxoid 2+ (TT2+) at 15.4%, which has a slight increase. There is a decline in the proportion of children fully immunized. Mothers completing the TT schedule stands at a low 11%. Card availability compared to the 2011 EPI Coverage Survey is persistently low. Pentavalent 1st dose coverage by card indicates a decline compared to the previous EPI Coverage Survey denoting poor access to immunization services. High drop-out rates observed depict poor utilization as evidence by low Penta 3 coverage.

Various approaches have been applied to understand immunization coverage Problems. However, there are acknowledged deficiencies in these approaches. This is clearly demonstrated in South Sudan, where despite many immunization campaigns through media, health visits and improved health services management, the Penta 3 coverage rate is still at 49.3 %(GAVI2019).

Through collective endeavours by all stakeholders, we will achieve the vision for the decade: A world where everyone, everywhere, at every age, fully benefits from vaccines for good health and well-being.

Table 1. 1: Current immunisation schedule showing the route of administration in South

Antigen	Minimum Age	Dose to be administered	Route of Administration
OPV 0	At birth	2 drops	By mouth – use provided dropper
BCG	At birth	0.05 ml (infants 0-11 0.1ml (children above 11 months)	Intra-dermal (within the skin); Left forearm
Penta 1	6 weeks	0.5 ml	Intramuscularly in the upper outer part of the thigh
OPV 1	6 weeks	2 drops	By mouth - use provided dropper
Penta 2	10 weeks	0.5 ml	Intramuscularly in the upper outer part of the thigh
OPV 2	10 weeks	2 drops	By mouth - use provided dropper
Penta 3	14 weeks	0.5 ml	Intramuscularly in the upper outer part of the thigh
OPV 3	14 weeks	Two drops	By mouth - use provided dropper
IPV	14 weeks	0.5ml	Intramuscularly in the upper outer part of the thigh
Measles	9 months	0.5 ml	Measles vaccine is given subcutaneously in the upper outer aspect of the deltoid muscle (Lt) at nine months. However, during supplemental immunization activities, the target age may increase to 15 years, as advised by WHO.

1.3. Problem Statement

Utilization of Immunization services in South Sudan with Penta 3 official country rate stands at 49.3% and within Juba County is 45%. This had not changed for long as in 2017, only 30% of the States achieved coverage of 80%, and 50% achieved coverage of less than 43%, and this is far below the South Sudan national target of 95% (GAVI, 2019).

There is no information on the status of utilization of immunization services within Juba city as per the survey 2017. Following the insurgencies in the country since 2013 couple with economic crisis, this might even be worse than before.

Given the protective effect of immunization and the observed low utilization of immunization services, if the current coverage is not pushed up, the number of childhood morbidity and mortality due to immunizable diseases is bound to persist among South Sudanese children, especially in areas where the coverage is even lower.

Due to this information of public health concern, utilization of immunization services needs an assessment within Juba City.

1.5. Broad Objective

To determine utilization of immunization services among children 0-12 months in Juba City.

1.5.1. Specific Objectives.

1.5.1.1. To determine the current level of utilization rate of immunization services among infants 0-12 months in Juba City.

1.5.1.2. To establish the social, economic, and cultural factors influencing utilization of immunization services among infants 0-12 months in Juba City.

1.5.1.3. To determine the impact of male involvement in the utilization of immunization services among infants 0-12 months in Juba City

1.5.1.4. To determine the health services factors influencing the utilization of immunization services among infants 0-12 months in Juba City.

1.5.2. Research Questions

1.5.2.1. What is the current utilization of immunization services among infants 0-12 months in Juba City?

1.5.2.2. What are the social, economic, and cultural factors influencing utilization of immunization services among infants 0-12 months in Juba City?

1.5.2.3. What is the impact of male involvement in the utilization of immunization services among infants 0-12 months in Juba City?

1.5.2.4. What are the health facility factors influencing utilization of immunization services among infants 0-12 months in Juba City?

1.6. Justification of the Study

Vaccines are responsible for the control of many infectious diseases. All children deserve to benefit from vaccination which has been made safer effective and easier to use. Utilization of Immunization services in South Sudan with Penta 3 official country rate stands at 49.3% and within Juba County is 45%. This had not changed for long as in 2017, only 30% of the States achieved coverage of 80%, and 50% achieved coverage of less than 43%, and this is far below the South Sudan national target of 95% (GAVI, 2019). It is known that Vaccine Preventable Diseases contribute a major proportion to Infant Mortality Rate, which are preventable by immunization.

There is no clear data on the utilization of immunization of immunization services within Juba City. In order to assess the true situation actual coverage needs to be estimated. Few studies are available within Juba city on this aspect. The present study is an attempt to assess the true situation and factors adversely affecting childhood utilization of immunization.

1.7. Significance of the Study

This study aims at establishing the utilization of Penta 3 amongst infants aged 0-12 months in Juba city. The findings of the study provides the government of South Sudan as well as the policy makers with vital information that guides them in formulating policies that was used to set measures to prevent Penta vaccine preventable diseases. Findings might also be useful in providing background information for planning strategic interventions that may help address low uptake of Penta 3 in the study area and in efforts to meet the sustainable Development Goal of reducing child mortality through immunization. The study information regarding the myths of the Penta 3 was helpful in clearing the community perception so as to plan the appropriate strategies for Penta 3 immunization

schedule which may lead to further increase in the immunization coverage of Penta 3 vaccines. To the Health care workers, suggestions made basing on study findings was used as a source of correction measure in one way or another in strategizing the role of health care providers in educating the mothers/caretakers about putting more effort in utilization of Penta 3 vaccines.

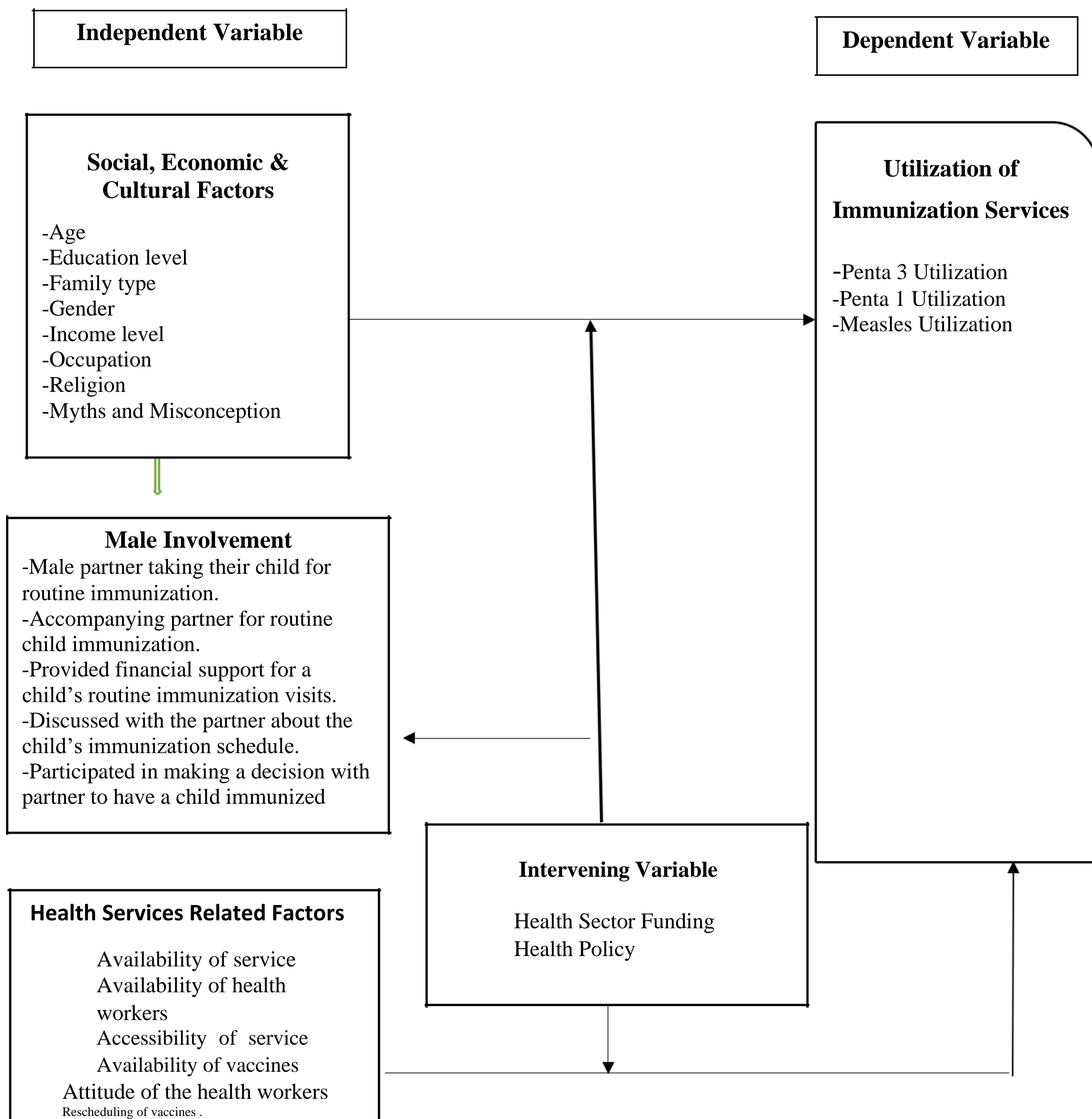
A picture of Penta 3 uptake was generated using study results to enable the government to appropriately allocate funds into immunization activities such as community out reaches especially on Penta 3.

1.8. Scope of the Study

This study focused on establishing utilization of immunization services in infants 0-12 months in Juba city, South Sudan. The study was conducted in Juba City, the capital and the largest city of South Sudan located on the White Nile and serves as the capital of Central Equatoria State with 52km2. According to the 2008 Sudan Population Census, Juba city, which comprises three payams, has a total population of 230,195 (Munuki 83,719, Juba town 82,346and Kator 64,130, respectively).

The study was conducted from July to sept. 2022 to give enough time for a thorough literature review and analysis.

1.9. Conceptual Framework



Source: Author (2023)

Figure 1. 1: Conceptual Framework

The conceptual framework was drawn on the assumption that an influence exists between the independent variables. Health service, Social, Economic and Cultural Factors and males' involvement are considered as the independent variables, Intervening variables are health sector funding and health policy. The dependent variable is "Utilization of Immunization Services" that was measured in terms of Penta 3, Penta 1 Utilization and Measles Utilization.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

This chapter reviews literature related to immunization coverage of Penta 3 and the factors associated with Penta 3 immunization among infants, and the causes of the failure to complete childhood immunization. It also includes literature from textbooks, journals, periodicals, and official reports to identify gaps related to Penta 3 immunization coverage and factors associated with immunization coverage.

2.1 Utilization of Immunization Services among Children Aged One Year

Margret W. Njeru et al. 2019 found out that Immunization at birth and six weeks was highly utilized at 91%. However, there was a decline during subsequent visits. Age, gender, profession, and level of income were significant factors that affected timely immunization. Health service barriers to utilization included long queues and waiting time, stock out of vaccine and rescheduling of vaccination and clinic return dates. Other identified factors were myths and misconceptions, side effects, parity, and lack of information.

In a study by Asrat Meleko *et al. (2017)* to assess Child Immunization Coverage and Associated Factors with Full Vaccination among Children Aged 12–23 Months at Mizan Aman Town, Bench Maji Zone, Southwest Ethiopia observed that based on vaccination card and mothers/caretakers' recall, 295 (91.6%) of the children took at least a single dose of vaccine. Of the total children, 27 (8.4%) were not immunized at all, 159 (49.4%) were partially immunized, and 136 (42.2%) were fully immunized. Mothers/caretakers educational level, fathers' educational level, place of delivery, maternal health care utilization, and mothers/caretakers'

knowledge about vaccine and vaccine-preventable disease showed significant association with full child immunization.

Onsuma, et al. (2015) studied maternal health and children immunization status in Kenya and found that majority of children vaccinated for BCG 94%, poliomyelitis 77%, DPT 91% and measles 74%. This clearly shows that those children who were started on BCG did not complete the schedule and there is no information as to whether the 74% vaccinated against measles were fully immunized.

In a study conducted to establish the immunization coverage of 12–23 months old children and its associated factors in Minjar-Shenkora district, Ethiopia, found out that three fourth of 12–23 months old children were fully vaccinated. Incorrect appointment date the experience of child sickness with previous vaccination (35.2%) and disrespectful behaviour of health professionals were the most common reasons cited by mothers/caregivers for incomplete vaccination of children. Being unmarried and not being a member of health development army (and traveling time greater than two hours on foot were predictors of incomplete immunization. (Alemayehu Gonie Mekonnen et al 2019)

2.2. Social and Cultural Factors Influencing the Utilization of Immunization Services Among Infants 0-12 Months.

Ahmad Khalid Aalemi et al 2020 in their study found out that maternal age, ANC visits, place of delivery, health facility visits in past 12 months, paternal occupation, wealth quintile, and geographic region as the factors influencing Child's vaccination status in Afghanistan.

In a study to determine the prevalence of childhood immunization defaulters and its associated factors among children below 5 years attending registered childcare centers in Petaling District, Selangor showed that the prevalence rate for defaulting immunization was 20.7%. the factors associated with this include non-

Muslims, mothers with diploma and below educational background, multiple children of 5 and above in a family, mothers with younger children aged 2 years and below, long travelling time of more than 30 min to the immunization health facility . (Damyanthy Krishna at el 2019).

In a study by *Jin-Won Noh at el 2018* to measure the basic timely childhood immunization coverage and to identify determinants influencing childhood immunization coverage in Sindh, Pakistan found out that Child's age, number of living children, parents' education level, wealth, the source of mother and child health information, number of antenatal cares, and assistance during delivery were associated with completing basic immunization.

Lilian, *et al.* (2013) observed that utilization of immunization services highly depended on mothers /caregivers' level of education. In Kaptembwo, the high uptake of immunization services was dependent on mothers /caregivers' level of education. Those who had achieved high school education were 81.6% higher than those who had primary school education 76.7% and no education 42.9%. Ghei, *et al.* (2010) noted that inadequate information on benefits of immunization lead to failure to return for follow up doses

Obinna Oleribe et al (2017) observed that Immunization coverage was significantly associated with childbirth order, delivery place, child number, and presence or absence of a child health card. Maternal age, geographical location, education, religion, literacy, wealth index, marital status, and occupation were significantly associated with immunization coverage. Paternal education, occupation, and age were also significantly associated with coverage. Respondent's age, educational attainment and wealth index remained significantly related to immunization coverage at 95% confidence interval in multivariate analysis.

Qian Li, *et al*. (2013) conducted a cross-sectional survey in East china to find out the compliance levels on all vaccinations among children aged under five and the associated factors. The study was conducted on 1426 mothers who had no permanent residence the results revealed low utilization of immunization services and non-compliance with National Child Immunization Schedule. Compliance levels were higher with parents with high level of education and those who visited health facilities regularly. They also observed that those families who were well up were able to ensure their children were fully immunized. The recommendation was that there is need to invest in social demographic aspects to improve sustainable health services.

Farzad F et al (2017) found out that Urban residence, children of poorer families, some education) and antenatal care were found to be significant predicators of full immunization.

In a study aimed at bringing data about immunization service coverage and its associated factors from Sekota Zuria district, which is one of the hard-to-reach areas in Amhara Region, Ethiopia, found that Having antenatal care, higher level of maternal education, mothers' good knowledge on immunization, short distance to health facility being born in health institutions, had increased the odds of full immunization coverage while having five and more family size reduced the odds of children's vaccine uptake. (Abadi Girmay et al 2019).

Abdi, et al. (2014) carried out studies in Ethiopia to assess levels of utilization of immunization services among children aged 12-24 months and the factors that influenced it. The survey revealed ever vaccinated 74.6% and fully immunized 36.6% indicating low utilization of services. The factors identified to influence utilization were low and no educational background, home visits by health workers, age of the caregiver, place of delivery and residential area.

In a study of a total of 360 children of age 12-36 months were found that 65% of children were fully immunized, 33.9% were partially immunized, and 1.1% were not immunized at all. Mother's education, place of birth and availability of immunization card were significantly associated with immunization status. (Sanjay Pandey et al 2019)

A study conducted to examine the individual and socioeconomic factors that influence childhood immunization coverage in Nigeria observed that immunization coverage was significantly related to the socioeconomic status of the Child's parents, region, and marital status. Similarly, childbirth order, delivery place, child number, and presence or absence of child health card in the family were significantly related to the level of immunization. Maternal age, geographical location, education, religion, literacy, wealth index, marital status, and occupation were significantly associated with immunization coverage. Respondent's age, educational attainment, and wealth index remained significantly related to immunization coverage at 95% confidence interval in multivariate analysis (Obinna Ositadimma Oleribe 2017)

A study conducted by *Anonh Xeuatvongsa et al* (2017) to evaluated factors that affect vaccination status among children aged between 12 and 35 months observed that ''maternal ethnicity", "paternal education", and "source of information about vaccination date by medical staff" were significantly associated with the children's vaccination status.

Tinashe Mukungwa (2015) in his study results showed that children of mothers with secondary education level and above were more likely to be vaccinated than children of uneducated mothers. Children of the 1st birth order were more likely to be vaccinated than children of birth order 6+. The same positive associations were also observed with Delivery in a health facility, antenatal care visits,

frequency of watching television, and wealth status. Regional variations in immunization were also established. These results depict the importance of socio-demographic factors in full immunization and call for increased awareness programs in order to promote completion of immunization schedule.

2.3. Economic Factors Associated with Utilization of Immunization Services among infants 0-12 months.

Mosiur Rahman et al (2019) observed that full vaccination rate increased with an increase in the previous birth interval and the education level of the mother. Women with the highest wealth index were significantly more likely to fully immunize their children. Distance from health facility, parity, mother's age, mass media, children's sex and tetanus toxoid injection were also significantly positively associated with full vaccination.

In a study conducted to assessed immunization uptake and identified family factors associated with immunization in children aged between 12 and 59 months in Kakamega Central, Western Kenya observed that immunization coverage was higher among caregivers who had completed secondary school (88%), those who had attended antenatal care clinics (81%) and children born in a health facility (85%). Some evidence was seen of increasing coverage with increasing socio-economic status. No evidence for a gender difference in coverage was seen. In the logistic regression model, the risk factors for incomplete immunization were low educational level of the caregiver, never attending any antenatal care (ANC) and delivery outside of health facilities. (Joram L. Sunguti et al 2016)

Peter Austin Morton Ntenda (2019) in his study showed that children from the poorest households and children who did not have postnatal care within two months had increased odds of being under-vaccinated. On the other hand, children who had no health card or whose card was lost had increased odds of being both

non- and under-vaccinated. Additionally, children from the northern region and who resided in households with either none or one under-five Child had reduced odds of being non-vaccinated and under-vaccinated, respectively.

Kiran Acharya et al (2019) in their study observed that children living in rural areas have higher odds of having a vaccination card than children in urban areas. Similarly, children living in the Hill region are more likely to have retained their vaccination card than those in the Mountain region. Children of women and men with any education are more likely to have retained their vaccination card compared with children of parents with no education.

Yohannes Kinfe et al (2019) in their study observed that mother's education level, husband employment, mother's religion, mother's antenatal care visit, presence of vaccination document, region and community antenatal care utilization were significantly associated with children full vaccination

John E. Ataguba et al 2016 in their study showed that disparities exist in the coverage of immunization to the advantage of the rich. In addition, factors such as mother's literacy, region and location of the Child, and socio-economic status explain the disparities in immunization coverage in Nigeria.

2.4. Male Involvement in the Utilization of Immunization Services Among Infants 0-12 Months

Jessica Davis et al 2016 in their study of Male involvement in reproductive, maternal and Child health found out that most maternal and child health officials consulted perceived many benefits of engaging fathers, perceived challenges to doing so may prevent the development of policies that explicitly direct health providers to routinely include fathers in maternal and Child health services.

Carolina Aguiar and Larissa Jennings 2015 in their study of impact of Male Partner Antenatal Accompaniment on Perinatal Health Outcomes in Developing Countries found out that during the early postnatal period, male antenatal accompaniment was associated with higher uptake of postnatal services, but with mixed effects on breastfeeding and newborn survival. Couples' increased communication on pregnancy care and men's subsequent motivation to ensure safe delivery may explain these observed benefits. Inadequate communication, late accompaniment, or partner type may explain the lack of influence on some outcomes.

A community-based cross-sectional study was conducted on male/female couples with a baby less than 6 months old in Addis Ababa, Ethiopia which demonstrated significant associations between male partners' involvement in maternal health care and utilization of some maternal health care services by female partners. (*Bedru Hussen Mohammed et al 2019*)

In a study to assess Male partner antenatal clinic attendance is associated with increased uptake of maternal health services and infant BCG immunization in Kenya indicated that involving male partners in MCH activities amplifies benefits of MCH services by engaging partner support for maternal uptake of services. (*Beryne Odeny et al 2019*)

Mariam Tokhi et al 2018 in their study found out that Interventions to engage men in maternal and newborn health can increase care seeking, improve home care practices, and support more equitable couple communication and decision-making for maternal and newborn health.

2.5. Health Service Factors Influencing Utilization of Immunization Services among infants 0-12 months.

2.5.1. Availability of Service

In a study on health infrastructure and immunization coverage of children aged 2-35 months residing in rural India, it was found that the availability of health infrastructure significantly improved immunization coverage for non-Polio vaccines (Datar, Mukherji, & Sood, 2015). The study further revealed that larger and better equipped facilities such as hospitals and health centers had bigger effects on immunization coverage.

2.5.2. Availability of Health Workers

A base line survey done in Ethiopia in 2012 by core group immunization project including DPT indicated that health workers did not come and give vaccine at the village at 28%. Also, reasons for defaulting are reported absenteeism of vaccinators 24% (Bisrat et al, 2012). Ndiritu et al., (2016) estimated the contribution to timely immunization was due to staff availability to administer the vaccines in Kilifi County Kenya. Cluster sample survey and simple random surveys were conducted in 2012 and 2014 respectively

2.5.3. Accessibility of Service

In a study, a representative sample of respondents was used in investigating the reasons for non-vaccination and the effects of socio-demographic factors on vaccinations in a district of Istanbul, Turkey revealed that distance from the health Centre and internal migration from less developed parts to more developed parts of the country, were significantly related to the level of immunization coverage (Sebahat & Nadi 2016).

Usman et al. (2010) determined factors relating to completion of Penta after taking the first immunization dose in Pakistan. The researchers conducted a cohort

study of 373 mother child pair participants. Participants were followed-up for 90 days on receiving the first dose of Penta immunization to note when they received the next two required doses to complete Penta immunizations (Usman et al., 2010). High rate of completion of Penta doses is significantly associated with proximity to the facility, household income, and lower age at the time the Child enters the immunization service system (Usman et al., 2010)

In a study aimed to identify factors in Remo-North influencing the use of immunization services, in order to inform intervention approaches to tackle barriers to utilization of immunization health service found out that factors like absence of delivery services, shortage of health workers, unavailability of vaccines at scheduled times, and indirect costs of immunization contributed to low utilization. (Ngozi N. Akwataghibe at el 2019)

Ngozi N. Akwataghibe et al (2019) in their study observed that community links to immunization and household decision-making patterns influenced immunization use in both wards. Migrants and those living in hard-to-reach areas were disadvantaged in both wards.

Eng et al. (2011) found in focus group discussions with mothers in Togo, found that contribution to partial immunization of Penta 3 was inaccessibility of the clinics during the rainy season. In a survey in Inhambane, Mozambique by Cutt et al. (2010) reported that children whose nearest health centre provided vaccination once per week had a relative risk of 8.5 for incomplete vaccination compared with children whose nearest health Centre vaccinated more than three times per week.

Close proximity to the clinic was associated with an increased likelihood of vaccination, with immunization coverage declining with increasing distance from vaccination clinics in Egypt (Reichler et al., 2016).

2.5.4. Availability of Vaccines

In another cross-sectional study done in Sudan showed that vaccines availability at the nearest place of vaccination strongly influenced the correct vaccination status of the Child. Children of mothers who have better access to available vaccine were 3.4 times more likely to have had the correct vaccinations than were children of mothers who don't (Ibnouf et al, 2012).

In a study conducted to assess utilization of immunization services among children aged under five in Kirinyaga County, Kenya, it found out that Immunization at birth and at 6 weeks was highly utilized at 91%. However, there was a decline during the subsequent visits. Health service barriers to utilization included long ques and waiting time, stock out of vaccine and rescheduling of vaccination and clinic return dates (Margaret W. Njeru et al 2019)

2.5.5. Affordability of the Service

In Nigeria, Abdul Raheem et al. (2011) used cross-sectional survey to investigate factors responsible for missing an immunization opportunity and partial immunization among children less than one year old. Results of this study indicated that full childhood immunization coverage for Penta 3 was 37%, and respondents attributed their incomplete vaccinations to reasons like lack of money to pay for the service (Abdul Raheem et al., 2011).

Similarly, Penta full childhood immunization status is associated with affordability of the services (Etana & Deressa, 2012).

Bagonza et al. (2013) conducted a cross-sectional descriptive study to determine Penta immunization coverage and reasons for not being immunized among residents between the ages of one months and more in Northern Uganda. The researchers observed that reasons for not participating in immunization are traveling outside the study area, lack of money for transportation to immunization

center and illness of the Child during the vaccination period. Gultiano et al., (2013) in a cross-sectional community-based survey done using cluster sampling method for sample selection showed that the drop-out rate between the first and third pentavalent vaccine coverage was 9% and affordability to the services despite the actual immunization being provided for free affected the uptake of the second and third dose of Penta 3.

2.5.6 Attitude of Health Workers

Findings from the study by Oku et al (2017) in Nigeria revealed that the attitude of health workers inhibited clients to access immunisation services for the infants. It was noted that the attitude of health care professionals as obstacles to information on vaccinations. When providing communication treatments, health professionals discussed problems related to inadequate communication abilities, low motivation, and community attitudes, including vaccine resistance.

Relatedly, a study by Simone, Carrillo-Santisteve, and Lopalco (2012) indicated that measles elimination aim cannot be achieved without the understanding and supportive attitudes of healthcare professionals about the measles-mumps-rubella (MMR) vaccination. There should be an effort made to break down any communication barriers and to improve the knowledge of vaccines among medical professionals.

CHAPTER THREE

METHODOLOGY

3.0 Introduction

This chapter presents the methodology undertaken in carrying out this study. It focused on the study area, research design, target population, inclusion and exclusion criteria, sample size and sampling procedure, among others, as detailed below.

3.1. Study Design

The design was both descriptive and an analytic cross-sectional study employing mixed method (both qualitative and quantitative). This design is chosen because it is a community study and also a one-time study that provides a snapshot of health-related characteristics of variables in a population at that particular time. Such characteristics are Social, economic, and cultural factors and health services factors associated with utilization of immunization services in Juba City.

3.2 Study Area

The study was carried out in Juba City. The city is situated on the White Nile and serves as the capital of Central Equatoria State and South Sudan. It is the world's newest capital city, and according to the 2008 Sudan Population Census, Juba city, which comprises three payams, has a total population of 230,195 (Munuki 83,719, Juba town 82,346and Kator 64,130 respectively). It has 52 km2 (20 sq. mi), with the metropolitan area covering 336 km2 (130 sq. mi).

3.3. Sources of Information

3.3.1 Primary Data

Primary data was obtained from mothers and caretakers of children aged 0-12 months in the community residing in Juba City, Juba County, Central Equatoria

State – South Sudan. Additional primary data was also obtained from immunization service providers from health facilities located in this place inform of key informant interviews- such as health workers, county health officials and implementing partners

3.4 Study Population

The research targeted mothers or caretakers of children aged 0-12 months. This age group fits this study because they represent the recent births that go through immunization schedules and age to monitor growth to identify defaults. The parents were interviewed to provide information on the immunization of their children. These were either their mothers or any person taking care of these children

3.4.1. Selection Criteria

3.4.1.1. Inclusion Criteria

A mother with a child under one year who lived for at least one year in Juba City who has consented to participate in the study.

3.4.1.2. Exclusion Criteria

A mother with a child 0-12 months living in Juba city during the time of the study and is not mentally sound was excluded in this study.

Caretakers who was very sick to take part in the study was excluded.

Mothers of children who did not consent to participate in the study were not considered for this study.

3.5. Sampling

3.5.1. Sample Procedure

The study adopted a simple random sampling technique that entailed mapping the three payams of Juba City. A list of all bomas in the three payams understudy was

obtained from each payam administrative office. The boma names were written on pieces of paper, folded, and thoroughly mixed in a container. Using simple random sampling, two bomas were randomly selected in each payam. At each chosen boma, the household registers as sampling frames for children 0-12months were obtained from the boma chief. The children were stratified into age categories of 0-3, 4-6, 7-9 and 10-12 months to avoid an age selection bias and give an equal chance of selecting each age strata. According to their strata number papers, a blinded picker placed each of the paper numbers in their bucket and pick randomly from each bucket. This generated an unbiased sample of respondents.

3.5.2. Sample Size Determination

The sample size for this study was derived by using the statistical formula by Kish Leslie (1965) for sample size estimation with a 95% confidence interval and a sampling error of 5% and the proportion of attributes understudy is 45% because the immunization coverage rate for Juba County stands at 45% (South Sudan MOH 2017)

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

Where,

n= minimum sample size.

d= allowed margin of error taken to be 5%

P= proportion of attribute under study taken to be 45% the immunization coverage in Juba City. (South Sudan MOH 2017)

Z= standard normal deviation set at 95%confidence level corresponding to 1.96.

Substituting in the formulas

$$n = \frac{1.96^2 \times 0.45\ (1 - 0.312)}{0.05^2}$$

N = 476 Respondents.

According to the 2008 Sudan Census, the study site estimated population size was 230,195 and using **Probability proportionate** to **size (PPS)** to calculate the sample size per payams.

Table 3. 1: Probability Proportionate to Size (PPS)

Payams within Juba City	Catchment population(SSD census 2008)	%	Sample size per Payam
Sample size			**476**
Munuki	83,719	36.3%	173
Juba Town	82,346	35.8%	170
Kator	64,130	27.9%	133
Total Population	230,195	100%	476

3.6. Study Variables

For the purpose of this study, the dependent variable was the utilization of immunization services. The independent variables included social, economic, and cultural and male involvement factors. An intervening variable (health service factors) in the utilization of immunization services also come into play.

3.7. Data Collection Methods

Questionnaires were administered to collect data on social, economic, and cultural factors and health services factors associated with uptake of Penta immunization. The questionnaires were administered to each respondent by the researcher or research assistant.

3.8. Study Tools

3.8.1. Structured Questionnaire

A structured questionnaire was administered to mothers or caretakers of children under age of one year. The questionnaire assisted in getting quantitative data related to the study objectives. The Design of the questionnaire had socio-demographics background information of the respondents.

3.8.2. Focus Group Discussion Guide

Some mothers or caretakers of children under one year were subjected to focus group discussions. This was done using an FGD- guide that was based on the study objectives. Each FGD comprised of 3-5 participants to avoid spread of Covid-19. This instrument was used to collect qualitative data for the study objectives.

3.8.3. Key Informants Interview Guide

Key informant interviews were conducted using key informants' interview guide with selected key stakeholders such as the in charges of the health facilities, community leaders, women leaders and MOH staff at County health department of Juba County.

3.9. Data Quality Assurance

In order to ensure quality of the data, the following were done.

3.9.1. Training of the Research Assistants

The research assistants with knowledge of both English and the local language were trained on the use of the study tools. The objectives of the study and methodology were explained to them.

3.9.2. Pre-Testing of the Study Tools

The questionnaires and the focus group discussion guide were pre-tested within the nearest community before the actual data collection to identify mistakes and questions that were not well stated for the targeted information and Corrections were made in both study tools before final data collection.

3.9.3. Supervision

The researcher or the principal investigator supervised the process of data collection and ensured that data validation was done before leaving the community and where necessary, corrections were done there and then.

3.9.4. Quality of the Data

The quality of date was ensured through onsite editing of the questionnaires, double entry into the computer and use of computer check code. Errors or missing data were corrected in consultation with the research assistants.

3.10. Validity and Reliability.

3.10.1. Validity

To ensure that the findings measure what is to be measured, competent research assistants were recruited and trained for 2 days. Scientific research methods were applied to design the data collection tools as well as the selection of the samples. This included using critically assessed instruments and following scientific sampling techniques to minimize information bias. By selecting children aged under one, this ensure unbiased information as they were supposed to have

completed all immunizations. Selecting respondents with children above this age would lead to giving incorrect data.

3.10.2. Reliability

The instrument were reliable as it produced the same results every time it was repeatedly used to measure a concept or trait from the same respondents even by other researchers. Pretesting of research instruments was done to evaluate for reliability.

3.11. Data Analysis Plan

A compilation of all the responses from the data collection techniques and tool, including 416 respondents to questionnaires, were summarized in an excel sheet and the entire data set exported to create a Statistical Package for Social Sciences (SPSS) file for analysis.

3.11.0. Quantitative Data Analysis Plan

3.11.1. Univariate Analysis

The descriptive method of analysis was adopted where univariate analysis was conducted using the Statistical Package for Social Sciences (SPSS) version 20.0. This was intended to summarize only one variable at a time. It did not deal with causes or relationships and the main purpose of the analysis was to describe the data and find patterns that exist within it. For example, data on respondent's age, sex, among others, were tabulated and frequency tables, bar charts, and pie charts generated to assess the statistical distribution followed by the study population.

3.11.2. Bivariate Analysis

The second method of analysis that carried was inferential statistics where a Chi-square test was carried out. Thus, Bivariate analysis was conducted to compare two variables (The independent and the dependent). The analysis was to ascertain the presence or absence of an association between the study variables. The Pearson Correlations Coefficient (P-value) and the Chi-square (X^2) figures were obtained for the independent and dependent variables. Chi-square tests estimated odds ratios (ORs) and 95% confidence intervals (CI) for the study variables and reflected the probability of behaviour occurrence for utilisation of immunisation based on the sub variables of the independent variables. This method of analysis was adopted to answer objectives 2, and 4. For objective 3 a linear regression analysis was conducted to ascertain the degree of impact between male involvement and utilization of immunization services among infants 0-12 months .

Therefore, cross-tabulations as a standard measure for correlation of the two categorical variables under the measure was made between the Penta 3 immunization status and each of the respondent's Social, economic, and cultural factors and health services factors. As a result of this comparison, the Pearson values (*P-value*) generated from each of these cross tabulations to determine the significance of the correlation. All Pearson values ($p< 0.05$) were considered significant from the cross tabulations and therefore considered as actual associated factors with uptake of Penta 3.

3.11.3. Multivariate Analysis

At Multivariate analysis, there was comparison of more than two variables. Therefore, all the significant associated factors with uptake of Penta 3 immunization assessed ($p< 0.05$) at bivariate analysis level were further assessed

in relation to the Penta 3 immunization status using a regression analysis and the factor with the highest regression coefficient was considered to have the highest influence on Penta 3 immunization. The multivariate analysis was guided by the hierarchy approach while controlling for confounding using the conditional logistic regression test to estimate the pooled ORs and 95% confidence interval.

3.12. Ethical Consideration

Approval of the research topic was sought from the Institutional Review Board of Uganda Christian University before carrying the research.

Approval was also sought from the Directorate of Policy, Planning, Budgeting and Research, Ministry of Health Republic of South Sudan

More so, informed consent was sought from the respondents before getting information from them so that the process of data collection can take place without coercion

The names of respondents were not recorded during data collection but instead coded, and the information collected was not exposed to the public. This was done to ensure confidentiality and privacy.

Permission was sought from the community leaders before carrying out the study.

CHAPTER FOUR

FINDINGS

4.1. Introduction

This section presents the findings based on the objectives of the study, providing specific description of each variable under each objective. The objectives are: To determine the current level of utilization of immunization services among infants 0-12 months in Juba City; to establish the social, economic and cultural factors influencing utilization of immunization services among infants 0-12 months in Juba City; to determine the impact of male involvement in the utilization of immunization services among infants 0-12 months in Juba City and to determine the health services factors influencing the utilization of immunization services among infants 0-12 months in Juba City. However, it begins with the demographic characteristics of the respondents.

4.1.1 Demographic Characteristics of the Respondents

At univariate analysis, age, gender, occupation status marital status, income, religion, type of family and Possession of myths & misconception were considered, and these were also demographic characteristics for respondent's study. Findings are presented by Table 4.1.

Table 4.1 indicates that the highest number of study respondents was between 20-29-year age brackets (63.5 %) followed by those in the 30-39 years age group (30.8%). Those in the age bracket 10-19 and those in the brackets of over 40 years constituted 4.6% and 1.2% respectively. Overall, over 94.3% of the respondents were below 39 years indicating that the majority of those who participated in the study were young were within their prime or productive years.

Among the respondents, there were 39.4% males and 60.6% females, indicating that the biggest percentage of respondents was females. The results show that gender representation was sharply skewed towards females compared to males, indicating that women were more involved in the immunization compared to men. In South Sudan there is a traditional belief that women are typically responsible for child immunization in the home or community, and therefore men tend to relax.

The majority of the respondents (81.70%) were found to be not employed while 12.50% were self-employed and 5.80% were employed. The majority of the respondents indicated that they were married (87.50%) followed by the singles at (10.80%), and the widows (1.7%).This pointed out that most of the members among the communities in Juba City were living in homes where marriage relationships were practiced. The findings also show that in all these communities, fewer people were living as singles. This brings out the gender dimension of the vulnerability among women who may be much more than these represented in this study.

For religion majority of the respondents 61.8% were Christians and 38.2% Muslims. So, respondents were believers and had different religious sects they belonged to. For income most of the respondents 33.9% had 4,001 - 6,000 SSP as monthly income, 37.5% with 2,001-4,000 SSP, 14.4% with 6,001 - 8,000 SSP and 14.2% had 8,001 SSP and over. In terms of type of family, majority of the respondents 62.3% were in monogamous family setting and 37.7% with polygamous. With possession of myths and misconception were found among 13.9% of the respondents and majority 86.1% had no misconceptions or myths.

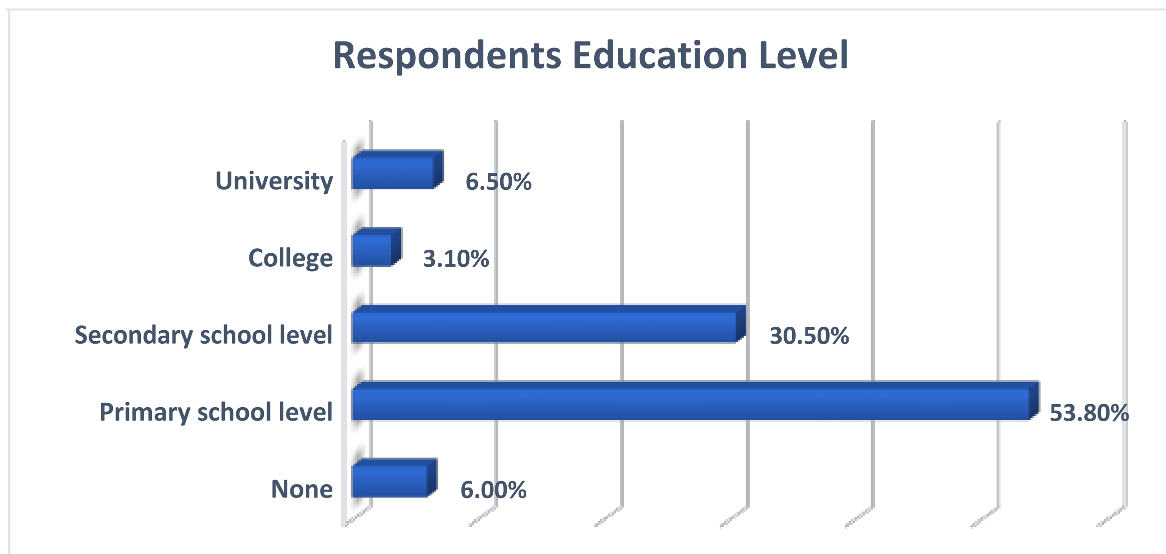
Table 4. 1: Demographic Characteristics of Respondents

Variables	Variable Categories	Frequency	Percent (%)
Age Groups	10 - 19 years	19	4.6
	20 – 29 years	264	63.5
	30 – 39 years	128	30.8
	Over 40 years	5	1.2
	Total	416	100.0
Gender	Male	164	39.4
	Female	252	60.6
Occupation	Employed	24	5.80
	Self-Employee	52	12.50
	Not Employed	340	81.70
	Total	416	100.00
Marital Status	Married	364	87.50
	Single	45	10.80
	Widow	7	1.70
Religion	Christians	257	61.8
	Muslims	159	38.2
	Total	416	100.0
Income	2,001 - 4,000 SSP	156	37.5
	4,001 - 6,000 SSP	141	33.9
	6,001 - 8,000 SSP	60	14.4
	8,001 SSP and over	59	14.2
	Total	416	100.0
Type of Family	Monogamous	259	62.3
	Polygamous	157	37.7
Possession of Myths & Misconception	Had Myths and Misconception	58	13.9
	No Myths and Misconception	358	86.1

N = 416; Source: Primary Data (2023)

In terms of education level, Figure 4.1 shows that the majority of the respondents (53.80%) manage to reach the level of primary school, 30.50% reached the level of secondary school, 6.50% at university level, 3.10% at the level of college and 6.00% had never stepped in school,

Figure 4. 1: Education Level



N=416; Source: Primary Data (2023).

From the FGD, it was noted that in terms of religion, for examples, a section of Muslim followers mentioned that they do not immunize children during Ramathan or during fasting; a period when they abstain from most activities including vaccination of children, saying that nothing should enter the blood during this period. The Ramadan is an emerging issue attributed to Perceived Religious Prohibitions. Some individuals may perceive immunization during fasting hours as conflicting with religious beliefs or teachings. Misconceptions or lack of awareness about the permissibility of vaccines during Ramadan may deter individuals from seeking vaccination services.

Therefore, during the focused group discussions, it was observed that some believes and myths among Muslims and Christians affects utilisation of immunisation services in Juba city.

It was found that among some sections of the Christian faith, they believe that through prayers or fasting alone, the disease will disappear by itself. And others believe that childhood diseases were curses or witchcraft, which can only be removed by the power of God. Therefore this information implies that overall,

religious beliefs contribute to some degree towards the beliefs of the followers on matters of immunization, who tend to follow what they believe which can negatively influence utilization of immunisation services.

4.2 Current Level of Utilization of Immunization Services Among Infants 0-12 Months in Juba City.

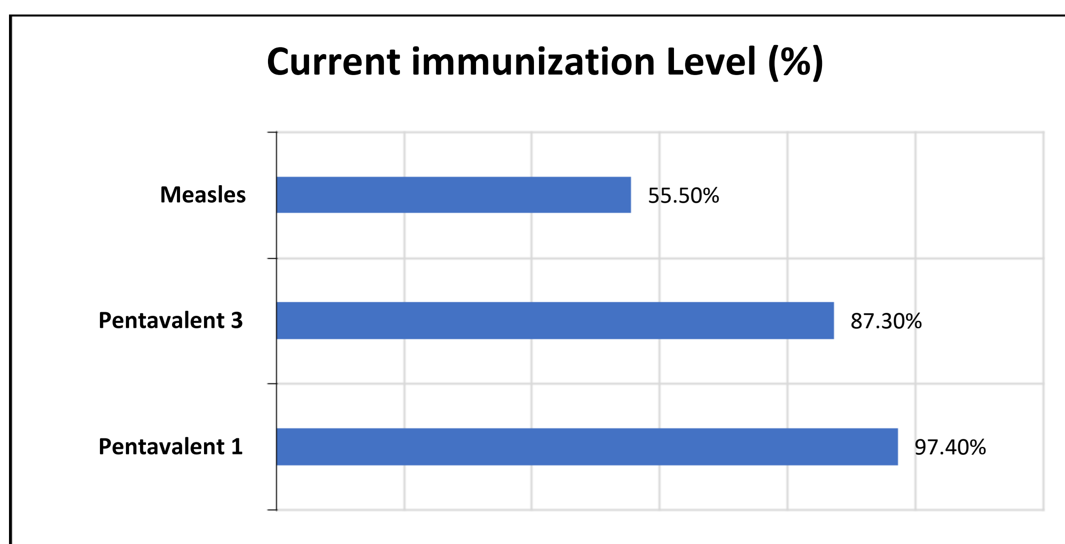
The first study objective was to determine the current level of utilization of immunization services among infants 0-12 months in Juba City. Quantitative findings are presented below.

Figure 4.2 show that 97.40% of the respondents reported that infants 0-12 months in Juba City received Pentavalent 1 immunization and 87.30% of the respondents received Pentavalent 3 immunization, whereas 55.50% of them received immunization for measles. For Pentavalent immunization, this shows a high coverage especially at Pentavalent 1 level with a drop at Pentavalent 3 level. This gives a dropout rate of 10.10% between the two levels. For measles, the findings showed a much loser coverage compared to Pentavalent 1 and 2 immunization services among infants 0-12 months in Juba City is high, though still relatively low for measles. This contrasts sharply with the data provided by GAVI (2019) for South Sudan at 49.3% for Pentavalent 3 coverage based on extrapolation from data reported by National Government level.

Whereas the findings may be justifiable, there could have been some changes in the denominator due to instability in the country which had a bearing in the final data. There could have been a large population movement in and out of Juba which affects the denominator and therefore gives high or low percentages at different points in times. This could have a bearing in the drop rate between Pentavalent 1 and Pentavalent 3 levels. In addition, in the 2020 UNICEF immunization report for South Sudan, the reported increases in coverage from

2020 reflected a decline in the reported target population and an apparent increase in the number of children vaccinated which is an artefact of poor recording and reporting. Furthermore, as the government of South Sudan is still struggling with streamlining the weak health system, there are reported issues related to the accuracy of the numerator such as high turnover of vaccination staff coupled with limited capacity in tallying which may affect the results. For measles, there is need to find out the data that shows the previous level of immunization services among infants 0-12 months in Juba City so as to compare the degree of changes. The figure 4.2 below shows the study findings of current level of utilization of immunization services among infants 0-12 months in Juba City

Figure 4. 2: Current Level of Utilisation of Immunisation Services



N-416; Source: Primary Data

4.3 Social, Economic and Cultural Factors Influencing Utilization of Immunization Services

The second objective was to establish the social, economic, and cultural factors influencing utilization of immunization services among infants 0-12 months in Juba City. Findings for bivariate analysis are presented below.

Table 4.2 indicates chi-square results where age statistically influenced utilization of immunization services [x^2 = 3.94, p-value 0.006<0.05], marital status [x^2 = 1.96, p-value 0.008<0.05],Occupation status [x^2 = 2.93, p-value 0.003<0.05], education level [x^2 = 3.53, p-value 0.002<0.05], and income level [x^2 = 4.86, p-value 0.007<0.05] .

4.3.1 Age and Utilization of Immunisation Services

At 95% confidence level, the confidence intervals of the age groups were all found to be quite wide, 20-29 years and 30-39 years though the age bracket of 30-39, and 10-19 years were not statistically significant indicating that the majority of the respondents fall in the category 20-39. The data for those at 40 years was found to be statistically not significant. This implies that respondents of 20-29 years were 3.94 times more likely to utilize immunization services compared to their counterparts. The findings and analysis point to a young population in the study, which could reflect the trend in the general population. A younger population of parents, due to their vibrancy and energy levels, engaging in public health interventions such as immunization program enhances the effectiveness of responsiveness, implementation, and sustainability of utilization of immunization services among infants. Respondents of older ages 40 years and above utilizing immunization services were few, pointing to their limited availability for the study. Despite being few, the older generation was found still to be very useful in influencing immunization services.

4.3.2 Marital Status and Utilization of Immunisation Services

Table 4.2 indicates that marital status [x^2 = 1.96, p-value 0.008<0.05] married respondents were 1.96 times more likely to utilize immunization services compared to the unmarried and the widowed. This, therefore, implies that one being married was more likely to keep it safe for the infant with immunization.

This might be to social support with the spouse/wife. Thus, improved health seeking behavior among the respondents being supported by the spouses.

4.3.3 Occupation status and Utilization of Immunisation Services

The respondents who were not employed [x^2 = 2.93, p-value 0.003<0.05] were 2.93 times more likely to utilize immunization services at the health facility. This could be because they had ample time to visit the health facility whenever the HWs prescribed.

4.3.4 Education Level and Utilization of Immunisation Services

Table 4.2 also shows that education level influenced utilization of immunization services [x^2 = 3.53, p-value 0.002<0.05]. Therefore, respondents who were less education with primary level of education were 3.53 times more likely to immunize their children aged 0-12 months and this implies that they adhered to the information provided by the health workers at the facility. This finding might be attributed to fact that such category of respondents were able to read and write; as well as internalizing the immunization information as provided. It is critical to note that there is no doubt that education and education level are very important as a basic foundation for social and economic development as it facilitates easy and quick comprehension and articulation of issues.

4.3.5 Income and Utilization of Immunisation Services

Income level was also a statistically significant variable that influenced utilization of immunisation for infants aged 0-12 months [x^2 = 4.86, p-value 0.007<0.05]. The findings indicate that the most significant level of monthly income among the respondents was falling in the bracket of those whose level of monthly income above 8,000 SSP compared to other levels of income. Findings imply that respondents who earned were 4.86 times more likely to engage in the immunization exercises for the infants aged 0-12 months. This is because they were able to meet costs involved such as transport to the health facility.

4.3.6 Gender and Utilization of Immunisation Services

Gender of the respondents statistically influenced immunization of infants [x^2 = 5.18, p-value 0.001<0.05]. This finding implies that females' respondents were 5.18 times more likely to engage in the immunization exercises for the infant. This reflects that more mothers or female gender had more responsibility in making sure that infants are immunized as provided for by the health workers.

4.3.7 Possession of Myths & Misconception

Myths and misconception was statistically in influencing utilization of immunization services among infants of 0-12 months [x^2 = 3.05, p-value 0.004<0.05]. Respondents who had no myths and misconceptions were 3.05 times more likely to utilize immunization services in Juba City.

Table 4. 2: Bivariate Analysis for Social, Economic and Cultural Factors Influencing Utilization of Immunization Services

Variable	**Variable Categories**	Utilization of Immunization Services				**Total**	x^2	**p-value**
		Yes		**No**				
		(freq)	**(%)**	**(freq)**	**(%)**			
Age	10 - 19 years	16	(84.2%)	3	(15.8%)	19		
	20 – 29 years	264	(100.0%)	0	(0.0%)	264	3.94	*0.006
	30 – 39 years	128	(100.0%)	0	(0.0%)	128		
	Over 40 years	5	(100.0%)	0	(0.0%)	5		
Gender	Female	250	(99.2%)	2	(0.8%)	252	5.18	0.001
	Male	156	(95.1%)	8	(4.9%)	164		
Marital Status	Married	364	(100.0%)	0	(0.0%)	364	1.96	*0.008
	Single	41	(91.1%)	4	(8.9%)	45		
	Widow	7	(100.0%)	0	(0.0%)	7		
Religion	Christians	255	(99.2%)	2	(0.8%)	257	1.36	0.052
	Muslims	156	(98.1%)	3	(1.9%)	159		
Occupation Status	Employed	23	(95.8%)	1	(4.2%)	24		
	Self-Employee	52	(100.0%)	0	(0.0%)	52		
	Not Employed	300	(88.2%)	40	(11.8%)	340	2.93	*0.003
Education level	University	27	(100.0%)	0	(0.0%)	27		
	College	12	(92.3%)	1	(7.7%)	13		
	Secondary	120	(94.5%)	7	(5.5%)	127		
	Primary	200	(89.3%)	24	(10.7%)	224	3.53	*0.002
	None	9	(37.5%)	16	(66.7%)	24		
Level of Income	2,001 - 4,000 SSP	151	(96.2%)	6	(3.8%)	157		
	4,001 - 6,000 SSP	120	(85.1%)	21	(14.9%)	141		
	6,001 - 8,000 SSP	57	(95.0%)	3	(5.0%)	60		
	8,001 SSP and over	59	(100.0%)	0	(0.0%)	59	4.86	*0.007
Possession of myths & Misconception	Hard of myths & Misconception	48	(82.8%)	10	(17.2%)	58		
	Had no of myths & Misconception	386	(99.5%)	2	(0.5%)	388	3.05	*0.004
Type of Family	Monogous	250	96.5%	9	(3.5%)	259	6.95	0.101
	Polygomous	100	(63.7%)	57	(36.3%)	157		

N = 416; Source: Primary Data (2023)

Following the qualitative information however, the study observed some underlying issues that affected immunization among different groups during the focused group discussions. For examples, *''a section of Muslim followers mentioned that they do not immunize children during Ramathan or during fasting, a period when they abstain from most activities including vaccination of children, saying that nothing should enter into the blood during this period''*

Among some sections of the Christian faith, *''they believe that through praying or fasting alone, the diseases will disappear by itself''*. Other, in other faith believe that the *''childhood diseases were curses or witchcraft which can only be removed by the power of God''.*

Overall, religious beliefs contribute towards the beliefs of the followers on matters of immunization, who tend to follow what they believe. This is important as it aligns the mindset of the people towards immunization. On one hand it is very effective in contribute to influencing on the utilization of immunization services among infants, yet on the other hand it can delay/slow down immunization program.

From the qualitative data, it is noted that there were cases where a family, which is earning well was finding challenges in immunizing the children

"My husband earns good money every month but I have this baby to take for immunization yet I do not see the money, so I do not know", complained a woman in Juba suburb.

Normally, one would expect that the more income a person has the more responsive it would be for enhancing immunization at household level. However, this has not been proven to be so. It can therefore be inferred that for income level to enhance immunization responsiveness, it has to be tagged along together along with other cross cutting factors such as financial literacy and priority

setting, gender equity, type of occupation, quality of service delivery, accessibility, and availability to services, among others

4.4 Impact of Male Involvement in the Utilization of Immunization Services among Infants 0-12 Months in Juba City

The third study objective was to determine the impact of male involvement in the utilization of immunization services among infants 0-12 months in Juba City. Findings are presented below.

On accompanying the wife for routine child immunization, the finding shows that the majority of the respondents (86.8%) did accompany their wives or family for routine immunization.

In terms of providing social support, 84.5% of the males were able to support their wives/spouses. Father taking the child for immunization 91.3% had done so. As a total of 87.0% of the spouses/husband allowed their children to be immunized. This might be attributed to the fact that the first dose is given right from the health facility and therefore, a father has less decision making about the first immunization.

In addition, it is noted that males were positive towards taking decisions to allow their children to be taken for immunization. This implies that in Juba, most men were positive about their children's immunization. However, the distribution and spread of this category of men seems to be narrow, implying that there were more other men out there among the population who were reluctant to allow children to go for immunization. This study could not establish the possible reasons for the reluctance by some men in allowing their children to be immunised. Some men gave a few justifications for their position. However, trend for the variables studied may not have been uniformly distributed or spread in the entire

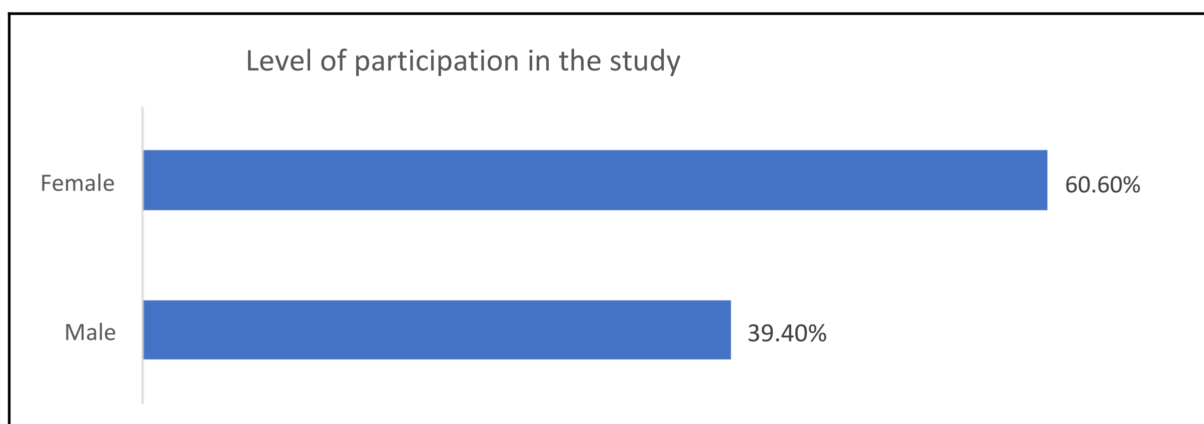
population, indicating that in the general population, many other men actually did not accompany their wives or family for routine immunization.

Table 4. 3: Univariate Analysis for Impact of Male Participation in Utilising Immunisation

Factors	Pentavalent 3		
	No	Yes	Total
Allowed child to be vaccinated	51	342	393
(%)	(13.0%)	(87.0%)	(100.0%)
Father taking their child for routine immunization	28	292	320
(%)	(8.7%)	(91.3%)	(100.0%)
Provide financial support to go for immunization	46	250	296
(%)	(15.5%)	(84.5%)	(100.0%)
Accompany you for routine child immunization	27	177	204
(%)	(13.2%)	(86.8%)	(100.0%)

Source: Primary Data (2023)

Figure 4.4 indicates that 60.60% of the females were engaged in immunization of infants aged 0-12 months. The percentage of 39.40 of the males was also engaged in the same. This is against the general health strategy that particularly emphasizes male involvement in maternal childcare. From the statistical analysis, the data on female gender indicated a strong significant factor in influencing utilization of immunization services among infants in Juba City. However, there was some reasonable evidence that females are a key factor in influencing utilization of immunization services. Besides, as females play important roles in the utilization of immunization services among infants, (5.18) odds ratio. Figure 4. 3: Gender Influencing Immunization



N = 416; Source: Primary Data (2023)

Table 4.5 indicates a regression analysis for male involvement in the utilization of immunization. Therefore, there was a positive statistical significant impact between male involvement and utilization of immunization services for infants 0-12 months [Beta = 0.780, p, 0.003 <0.05]. This symbolizes that a unit change for male involvement in terms of support and engagement in immunization of infants aged 0-12 months would lead to a 78.0% change in utilizing immunization services at the health facilities. The variable represents a high impact between male involvement and utilization of immunization for infants aged 0-12 months. Therefore, male involvement is a predictive factor as well to utilization of immunization for the infants of 0-12 months in Juba City. The high impact might be attributed to the fact that males' involvement comes with social, material, and financial support to the mothers to take the infants for immunization.

Table 4.5 indicates findings.

Table 4. 4: Linear Regression Analysis Findings-Male Involvement and Utilisation of Immunisation Services

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.652a	.618	.780	.86978	.781	335.814	1	97	.003

a. Predictors: (Constant), Male Involvement and Utilization of Immunization

N = 416; Source: Primary Data (2023)

These statistical data were similar with qualitative information collected during the focus group discussion where male involvement in vaccination was found very low.

''The mother makes all decisions concerning immunization. Most fathers are not aware of vaccination dates of the child'' health worker during key informant interviews at Gurei primary health care centre

''My husband has never assisted me in taking this child for vaccination. He doesn't even know why I take the child to the health facility'' a female participant in FGD in Nyakuron primary health care centre, Juba

The study assessed a combination of factors that provided clues that could lead to determine the impact of male involvement in the utilization of immunization services among infants 0-12 months in Juba City

"I am a very busy person; I wake up very early in the morning to go and look for money to support the family. So, I don't have time to think about children matters, and I think my children are healthy", said a village member in Hai Jabel

On taking their children for routine immunization, the findings show that 91.3% the respondents reported that men were very willing to take their children for routine immunization. This indicated that when it comes to taking children for immunization, men had time to do so, reflecting positive male involvement in the utilization of immunization services among infants.

On providing financial support to go for immunization, the data shows that male respondents were providing financial support for immunization of children. However, this positive trend by men seems to have a narrow distribution and spread, possible a different situation was occurring among the rest of the population. This could imply that there were more other men out there who were not providing financial support for immunization

"I am earning very little money and I find myself not able to support my wife or my children to go for immunization", a mechanic lamented.

It is therefore, noted that this qualitative information reflects that males also find hardship to offer support to the wives who intended to utilize immiunisation services from the facilities. So, however, many males prefer to have infants

immunized, the economic terms affect their engagement in the entire immunization process.

4.5 Health Services Factors Influencing the Utilization of Immunization Services among Infants 0-12 Months in Juba City

The study was set to determine the health services factors influencing the utilization of immunization services among infants 0-12 months in Juba City. Univariate findings are presented below.

Table 4.6- presents quantitative findings.

Table 4.6 indicates that most of the respondents 43.3% ranked the availability of services (EPI) with a very great effect towards affecting/influencing infant immunization. The availability of HWs was ranked with very great effect by 42.1% of the respondents, accessibility od EPI services with very great effect by 45.4%. The variable of avaialbioty of vaccines was ranked with a very great effect by 48.1%, attitude of HWs was ranked with very great effect by majority of the respondents 52.2%, rescheduling of vaccination had a ranking of great effect from 40.6% of the respondents. The affordability of services was ranked with very great effect in terms of influence by majority of respondents 76.2%.Findings denote the health facility factors/variables were considered very greatly influential to affecting immunization services and utilization for infants aged 0-12 months in Juba City.

Table 4. 5: Distribution of Responses Regarding Health Service Factors Influence Childhood Immunization

Responses	Very Great Effect	Great Effect	Moderate Effect	Low Effect	No Effect
Availability of services (EPI)	180 (43.3%)	139(33.4)	67 (16.1%)	23(5.5%)	5(1.2%)
Availability of health workers	175(42.1%)	147(35.3%)	56(13.5%)	30(7.2%)	8(1.9%)
Accessibility of EPI services	189(45.4%)	120(28.8%)	47(35.3%)	39(9.3%)	21(5.0%)
Availability of vaccines	200(48.1%)	189(45.4%)	11(2.6%)	9(2.2%)	7(1.7%)
Attitude of health workers	217(52.2%)	103(24.8%)	50(14.4%)	21(5.0%)	26(6.3%)
Rescheduling of vaccination return dates	129(31.0%)	167(40.6%)	18(4.3%)	47(11.3%)	55(13.2%)
Affordability of the services	317(76.2%)	27(6.5%)	59(14.2%)	10(2.4%)	3(0.7%)

N = 416; Source: Primary Data (2023)

Table 4.7 below shows that at univariate analysis, majority of respondents 86.3% indicated that the HF there were HWs available, 93.5% had not paid for immunization drugs, who paid had spent< 500SSP, 91.1% of the respondents had accessibility to services.

With availability of services 61.5% of the respondents indicated that services were available. However, 51.7% of the respondents indicated services not being affordable. It was found that 87.5% of the respondents perceived HWs with a positive attitude, 87.5% could be affected by rescheduling of vaccines at the health facility. In terms of distance, 61.8% of the respondents travelled with 15-30 minutes to reach to the HF. In terms of availability of nearby HF, 60.8% of the respondents had a nearby health facility to go to for immunization of infants and 93.9% indicated a government health facility to be in place. The information imply that HF factors critical related with and affected the immunization efforts for the infants aged 0-12 months and the decisions of the respondents to engage in such immunization would be based on the degree by which such factors favoured the community members.

Table 4. 6: Univariate Analysis for Health Services Factors Influencing the Utilization of Immunization Services

Variable Categories	Response	Frequency	Percent
Availability of health workers	Available	359	86.3
	Not Available	57	13.7
Payment for Drugs	Paid	27	6.5
	Never Paid	389	93.5
Amount Paid	< 500SSP	21	77.8
	>500 SSP	6	22.2
Accessibility of service	Accessible	379	91.1
	Not Accessible	37	8.9
Availability of vaccines/service	Available	256	61.5
	Not Available	160	38.5
Affordability of the service	Affordable	201	48.3
	Not Affordable	215	51.7
HW's Friendliness/Attitude	Positive	368	87.5
	Negative	48	11.5
Rescheduling of vaccines	Affects me	364	87.5
	Does not affect me	52	12.5
Time taken/Distance to HF	< 15 minutes	61	14.7
	15-30 minutes	257	61.8
	30-1hr	90	21.6
	>1hr	8	1.9
Availability of nearby HF	Available	253	60.8
	Not Available	163	38.2
Government HF	Yes	391	93.9
	No	25	6.1
Private HF	Yes	25	6.1
	No	391	93.9

N = 416; Source: Primary Data (2023).

Table 4.8 indicates that at bivariate analysis the availability of HWs statistically influenced utilization of immunization services [x^2 = 2.86, p-value 0.002<0.05]. Non-payment for immunization drugs [x^2 = 1.98, p-value 0.006<0.05],availability of vaccines at the HF [x^2 = 1.45, p-value 0.003<0.05], attitude of HWs [x^2 = 1.91, p-value 0.006<0.05] affordability of service [x^2 = 2.74, p-value 0.007<0.05] and the availability of nearby HF [x^2 = 2.64, p-value 0.004<0.05].

Table 4. 7: Bivariate Analysis for Health Services Factors Influencing the Utilization of Immunization Services among Infants 0-12 Months

Variable Categories	Utilization of Immunization Services				**Total**	x^2	**p-value**
	Yes		**No**				
	(freq)	**(%)**	**(freq)**	**(%)**			
Availability of health workers	358	(99.7%)	1	(0.3%)	359	2.86	*0.002
Not available	50	(87.7%)	7	(12.3%)	57		
Payment for Drugs	27	(100%)	0	(0.0%)	27		
Never Paid	387	(99.5%)	2	(0.5%)	389	1.98	*0.006
Accessibility of service	377	(96.9%)	2	(0.5%)	379	2.96	
Not Accessible	34	91.9%	3	(8.1%)	37		
Availability of vaccines	256	(100%)	0	(0.0%)	256	1.45	*0.003
Not Available	150	(93.8%)	10	(6.2%)	160		
Affordability of the service	200	(99.5%)	1	(0.5%)	201	2.74	0.007
Not affordable	210	(97.7%)	5	(2.3%)	215		
Friendliness/Attitude of HWs	360	(97.8%)	8	(2.2%)	368	1.91	*0.008
	47	(97.9%)	1	(2.1%)	48		
Rescheduling of vaccines	360	98.9%	4	(1.1%)	364	4.97	1.943
Does not affect	52	(100%)	0	(0.0%)	52		
Distance to HF < 15 minutes	51	(83.6%)	10	(16.4%)	61	2.21	1.964
15-30 minutes	246	(95.7%)	11	(4.3%)	257		
30-1hr	81	(90.0%)	9	(10.0%)	90		
>1hr	7	(87.5%)	1	(12.5%)	8		
Availability of nearby HF	250	(98.8%)	3	(1.2%)	253	2.64	*0.004
Not Available	160	(98.2%)	3	(1.8%)	163		
Government HF	390	(99.7%)	1	(0.3%)	391	1.06	
Private HF	20	(80.0%)	5	(20.0%)	25		

N = 416; Source: Primary Data (2023)

4.5.1Availability of Vaccines and Utilisation of Immunisation Services

Table 4.8 has indicated that statistically the availability of vaccines at the HF influenced utilization of immunization services [x^2 = 1.45, p-value 0.003<0.05]. This implies that respondents who perceived vaccines available at the HF

whenever they visited the facility were 1.45 times more likely to have their infants immunized. This could be due to the notion that it is within the health system program, South Sudan MOH has an elaborate immunization services that ensures children receive a dose of BCG–given at birth or first encounter with the health system, a three-dose course of the Pentavalent vaccine –given at 6, 10 and 14 weeks or at least 4 weeks apart, four doses of oral polio vaccine (OPV; given at birth, 6, 10 and 14 weeks), a dose of inactivated polio vaccine (IPV) given at 14 weeks – and a dose of measles-containing vaccine (MCV1; administered at 9 months).

County level vaccination programs are developed using the micro-planning approach where each health facility maps its health service delivery catchment areas, and groups the localities under fixed, outreached, and mobile immunization plans. Stakeholders at each of the mapped localities agree on specific day(s) for outreach or mobile sessions. It was reported that over the past years, the government, donors, and partners have stepped up support to increase cold chain equipment across several counties in the country, including Juba as part of an effort to boost immunization coverage including at fixed sites. However, some of these efforts were negatively impacted by conflicts, which resulted in some of the facilities and cold chain equipment being destroyed.

This was a significant factor in influencing the utilization of immunization services among infants 0-12 months in Juba City (p=0.005). ''*According to the health facility in charge, the immunization vaccines are available with the support coming through GAVI, UNICEF, WHO and other donors/partners supporting immunization in the country*''. However, the distribution system of the vaccines were reported still weak. Where warehouses do exist, they are often not adapted to the requirements of the vaccines. For example, most lack storage compartments for drugs.

''According to MOH officials, the costs and logistics of all vaccine distribution, from the state to the health facility level, is the responsibility of the central level''. However, this system is still being improved. Most vaccines rely on NGO networks.

In some places, there is shortage of vaccines and other medical materials supplies throughout

''Sometimes certain antigens like BCG would be out of stock due to high wastage rate hence children miss being vaccinated'' Key informant at Kator Primary health care center

4.5.2 Availability of Health Workers and Utilization of Immunization Services The findings indicate that the existing health facilities were usually inadequately staffed with low staffing level Availability of HWs statistically influenced utilization of immunization services [x^2 = 2.86, p-value 0.002<0.05]. This symbolizes that respondents who perceived HWs available at the health facility were 2.86 times likely to utilize immunization services for the health of the infants aged 0-12 months.

However, during the qualitative information gathering, it was noted that the respondents reported that the service providers at the immunization centers were available but very few in number. This was reported to delay services provision and also affected the quality of service at the immunization centers.

4.5.3 Attitude of Health Worker and Utilisation of Immunisation Services

Health workers were commended for their good attitude which has encouraged many respondents to take their children for immunization services, and this was seen as a significant factor attitude of HWs [x^2 = 1.91, p-value 0.006<0.05]. Therefore, this implies that respondents who perceived HWs having a positive attitude towards immunization clients were 1.91 times more likely to immunize their infants aged 0-12 months.

In a related way, during the FGD, one of the respondents indeed admitted having refused to use these services in the past because of the poor attitudes of the health workers then. However, a change in regime seems to have brought in more considerate health workers partnering with local NGOs. The health workers were also said to be very knowledgeable and essentially provided adequate information which enabled women to make informed choices in regard to immunization.

"Those days I was told the nurses would abuse and mistreat women that is why for my first child, I delayed immunizing." Participant FGD

Therefore, the attitudes of health workers was seen as a major factor in promoting or discouraging immunization services.

4.5.4 Affordability of the Services and Utilisation of Immunisation Services

The respondents reported that the immunization services rendered to them were free of charge. This was a significant factor in influencing the utilization of immunization services among infants 0-12 months in Juba City affordability of service [x^2 = 2.74, p-value 0.007<0.05]. So, respondents who perceived immunization services affordable were 2.74 times more likely to utilize the immunisation drugs at the facility compared to their counterparts.

In addition, during the FGD, a wide range of respondents reported that the services were easily affordable since the only cost that they needed to incur was transport where the center was far mostly met by their husbands. One major challenge that was mentioned by some of the respondents was transport costs.

"I was at home with all my three children; I did not have the resources to go to the immunization because it is far, and I cannot walk together with the children up to there."(Participant FGD)

Although services were free, women reported that they still had to pay transport to visit these immunization centers in some areas. This indicated that lack of

money for transport to visit immunization-care facilities is often a deterrent in making use of these facilities, as some are situated far from their villages, and some outreaches are far as well.

4.5.5 Non-payment for Immunisation Drugs and Utilisation of Immunisation Services

Table 4.8 showed that related to payment for drugs, the non-payment by the respondents statistically influenced utilization of immunization services [x^2 = 1.98, p-value 0.006<0.05]. Thus, respondents who had not paid for any immunization services or drugs were 1.98 times more likely to have utilization of immunization services at full capacity/level. This is due to the fact that they had other social basic needs that required them to pay for given the differences in levels of income and employment.

4.5.6 Availability of Nearby HF and Utilisation of Immunisation Services

Findings have also indicated that respondents were influenced by the presence of a near health facility, following the odds ratio and the p-value [x^2 = 2.64, p-value 0.004<0.05]. Thus, respondents who were nearby a HF were 2.64 times more likely to utilize immunization services for their infants aged 0-12 months and this might be linked to less transport cost incurred when the HF is nearby. Secondly, it saves time as a facility is within a workable distance for the respondents to have their infants immunized.

4.6 Multivariate Analysis

At multivariate analysis, factors that statistically influenced immunization of infants aged 0-12 months from the bivariate level analysis were further anylsed to determine their advance degree of significance. The analysis catered for social. economic, cultural and health service factors.

However, it was found that with multivariate analysis, factors that statistically influenced immunization of infants aged 0-12 months were; age [x^2 = 4.41, p-value 0.005<0.05], gender [x^2 = 4.89, p-value 0.009<0.05], marital status [x^2 = 2.59, p-value 0.009<0.05], income level [x^2 = 1.90, p-value 0.001<0.05], availability of health workers [x^2 = 4.86, p-value 0.003<0.05], availability of vaccine [x^2 = 2.45, p-value 0.006<0.05], and attitude of HWs [x^2 = 3.91, p-value 0.004<0.05]. Findings are presented below.

Table 4. 8: Multivariate Analysis for Social, Economic Cultural and Health Services Factors Influencing Utilization of Immunization Services

Variable Categories	Utilization of Immunization services				**Total**	x^2	**p-value**
	Yes		**No**				
	(freq)	**(%)**	**(freq)**	**(%)**			
Age (10-19yrs)	16	(84.2%)	3	(15.8%)	19		
(20-29yrs)	264	(100.0%)	0	(0.0%)	264	4.41	*0.005
(30-39yrs)	128	(100.0%)	0	(0.0%)	128		
Gender Female	250	(99.2%)	2	(0.8%)	252	4.89	0.009
Male	156	(95.1%)	8	(4.9%)	164		
Marital Status Married	364	(100.0%)	0	(0.0%)	364	2.59	0.009
Single	41	(91.1%)	4	(8.9%)	45		
Widow	7	(100.0%)	0	(0.0%)	7		
Occupation Status Employed	23	(95.8%)	1	(4.2%)	24		
Self-Employee	52	(100.0%)	0	(0.0%)	52		
Not Employed	300	(88.2%)	40	(11.8%)	340	2.93	0.981
Education level University	27	(100.0%)	0	(0.0%)	27		
College	12	(92.3%)	1	(7.7%)	13		
Secondary	120	(94.5%)	7	(5.5%)	127		
Primary	200	(89.3%)	24	(10.7%)	224	3.52	0.810
None	9	(37.5%)	16	(66.7%)	25		
Availability of HW	358	(99.7%)	1	(0.3%)	359	4.86	*0.003
Not available	50	(87.7%)	7	(12.3%)	57		
Level of Income 2,001-4,000 SSP	151	(96.2%)	6	(3.8%)	157	1.94	
4,001 - 6,000 SSP	120	(85.1%)	21	(14.9%)	141	1.90	0.001
6,001 - 8,000 SSP	57	(95.0%)	3	(5.0%)	60		
8,001 SSP and over	59	(100.0%)	0	(0.0%)	59		4.86
Possession of myths & Misconception- Hard of myths & Misconception	48	(82.8%)	10	(17.2%)	58		
Had no of myths & Misconception	386	(99.5%)	2	(0.5%)	388	3.75	*0.002
Payment for Drugs	27	(100%)	0	(0.0%)	27		

Never Paid	387	(99.5%)	2	(0.5%)	389	1.98	0.068
Accessibility of service	377	(96.9%)	2	(0.5%)	379	2.96	0.201
Not Accessible	34	91.9%	3	(8.1%)	37		
Availability of vaccines	256	(100%)	0	(0.0%)	256	2.45	*0.006
Not available	150	(93.8%)	10	(6.2%)	160		
Availability of nearby HF	250	(98.8%)	3	(1.2%)	253	2.64	0.092
HW Friendliness/Attitude	360	(97.8%)	8	(2.2%)	368	3.91	*0.004
Unfriendly	47	(97.9%)	1	(2.1%)	48		

N = 416; Source: Primary Data (2023)

4.6.1 Age of Respondents and Utilisation of Immunisation Services

In accordance with social factors, at this level of analysis findings showed that age of the respondents influenced immunization of infants aged 0-12 months [x^2 = 4.41, p-value 0.005<0.05].This stands to reflect that respondents aged 20-29 years 4.41 times more likely to immunize their infants compared to the other respondents by age. This could be due to the advance in experience with health matters and maturity. However, findings also indicated that respondents aged 30-39years had their infants immunized.

4.6.2 Marital Status and Utilisation of Immunisation Services

Marital status remained statistically significant in relation to utilization of immunization services [x^2 = 2.59, p-value 0.009<0.05] which means that married respondents were 2.59 times more likely to immunize their infants. This might be due to the social support provided by the spouses at the time to infant immunization.

4.6.3 Gender and Utilisation of Immunisation Services

Gender influenced utilization of immunization services with the odds ratio and p-value being [x^2 = 4.89, p-value 0.009<0.05].So, female respondents were 4.89 times more likely to engage in immunization of infants aged 0-12 months

compared to the male respondents. This might be attributed to the motherly care provided at home by mothers compared to the males-fathers who might be engaged with other activities such as work to provide for the family in another way. Therefore, more mothers engaging in utilization might also be attributed to the support rendered by the spouses as reflected by the findings of this study. It is argued that from the findings, the more mothers or females engage in immunizing, the higher are the chances that infants aged 0-12 months immunization vaccines will be utilized from the health facility.

4.6.4 Income Level and Utilisation of Immunisation Services

With economic factors, income level was found statistically significant and thus influenced immunization of infants aged 0-12 months in Juba cit. Findings showed that the odds ratio and p-value were [x^2 = 1.90, p-value 0.001<0.05]. Thus, respondents whose income ranged at least between 4,001-6,000 SSP were 1.90 times more likely to immunize their infants.

4.6.5 Availability of Health Workers and Utilisation of Immunisation Services

For health facility/service factors, the availability of health workers remained statistically significant as the odds ratio and p-value were [x^2 = 4.86, p-value 0.003<0.05]. This reflected that the perception by the respondents that HWs were available at the health facility would make them 4.86 times more likely to have their children immunized. This is because they would be sure to find the HWs at the facility thus a no waste for time and transport money.

4.6.6 Availability of Vaccines and Utilisation of Immunisation Services

It was also found that as per Table 4.9 that the availability of vaccines statistically and positively influenced immunization of infants aged 0-12 months with the odds ratio and p-value [x^2 = 2.45, p-value 0.006<0.05]. Therefore, the study

respondents who considered the health facilities well stocked with immunization vaccines were 2.45 times more likely to immunize their infants. This is likely to be attributed to the confidence and motivation that their infants would be instantly immunized within the prescribed periods of child growth.

4.6.7 Attitude of HWs and Utilisation of Immunisation Services

The attitude of HWs was also a statistical factor that influenced immunization of infants aged 0-12 months [x^2 = 3.91, p-value $0.004<0.05$]. So, it is observed that respondents who positively perceived HWs friendly, welcoming and with a positive attitude towards mothers were 3.91 times to go for immunisation of the infants. Therefore, the utilization of immunization services would be achieved at such health facility whose health workers smile and support the immunization services beneficiaries-parents.

4.6.8 Possession of Myths & Misconception

At multivariate level, possession of Myths and misconception remained statistically significant in influencing utilization of immunization services among infants of 0-12 months [x^2 = 3.75, p-value $0.002<0.05$]. Respondents who had no myths and misconceptions were 3.75 times more likely to utilize immunization services in Juba City.

CHAPTER FIVE

DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS

5.1. Introduction

This chapter presents the study findings, inferences and recommendations drawn from the data collected and analyzed. The broad objective of the study was to assess the utilization of immunization services among infants 0-12 months in Juba City. The response rate of the study was 87.4%, which was adequate to make inferences out of the targeted population.

5.2. Current level of utilization of immunization services among infants 0-12 months in Juba City

The study findings revealed that utilization of Penta 1 and Penta 3 stands at 97.40% and 87.30% for infants 0-12 months in Juba City, whereas 55.50% of them received immunization for measles, which is below the recommended WHO threshold of 95% for herd immunity. For Pentavalent immunization, this shows a high coverage especially at Pentavalent 1 level with a drop at Pentavalent 3 level. This gives a dropout rate of 10.10% between the two levels.

The study findings contrasts sharply with the data provided by GAVI (2019) for South Sudan at 49.3% and Juba County at 45% for Pentavalent 3 coverage based on extrapolation from data reported by National Government level. Whereas the findings may be justifiable, there could have been some changes in the denominator due to instability in the country which had a bearing in the final data. There could have been a large population movement in and out of Juba which affects the denominator and therefore gives high or low percentages at different points in times. This could have a bearing in the drop rate between Pentavalent 1 and Pentavalent 3 levels.

It is also noted that findings agree with *Njeru et al. (2019) who* found out that Immunization at birth and six weeks was highly utilized at 91%. This might be attributed to the some of the health facility, social and economic factors such as income, attitude of HWs availability of vaccines as reflected by this study. Therefore, it is argued that high level of utilisation for immunisation services for infants aged 0-12 months requires concerted efforts from different stakeholders including; the undertaking a duty of strengthening immunization services in communities and mostly in Juba City so that there is improved utilization of immunization services up to the acceptable level in line with the policies and guidelines of Ministry of Health-South Sudan.

From the findings, zero vaccine doses (not immunized) were evidenced in all antigens. The findings are supported by Karanja and Kembich (2013) whose study in a Peri-urban area in Kenya revealed that utilization of first antigens was highly utilized followed by a declining trend in subsequent visits: BCG 99.8%, 1st Pentavalent 98.5%, 3rd Pentavalent 90.5% and measles 74%.

The trend shows that majority of those children who started immunization did not complete the schedule and were partially immunized meaning that they were not fully protected from VPDs hence susceptible to contracting diseases. This study finding is also supported by Gupta et al.2015 in a study in India which found out that fully immunized children stand at 74%, partially immunized at 14% and not immunized at 11%. The immunization schedule was therefore not adhered to as stipulated by KEPI Standards and Guidelines and it's important in ensuring maximum protection from VPDs (KEPI, 2013).

The study findings revealed noncompliance with the National Child Immunization Schedule, and this was evidenced by the percentages of dropouts and those not immunized in all antigens. This implies that full immunisation of infants aged 0-

12 months was not guaranteed among the parents and therefore, this would be a health risky behaviour that would lead to mortality and morbidity of infants within Juba City.

This study are not in agreement with *Onsuma, et al. (2015)* who studied maternal health and children immunization status in Kenya and found that majority of children vaccinated for BCG 94%, poliomyelitis 77%, Penta 91% and measles 74%. This clearly shows that those children who were started on BCG did not complete the schedule and there is no information as to whether the 74% vaccinated against measles were fully immunized.

This might be caused by negative influences of socio-demographic, health service and family factors. When the schedule is not followed the percentage threshold protective levels are not constantly maintained allowing the microorganism to resurface and cause disease. Large proportion of children were not immunized, and this is a dangerous trend because these children are not protected and if a child contracts a vaccine preventable disease it can spread to infants who are not immune causing morbidities and mortality in the community. This also reflects negatively on herd immunity.

5.3. The social, economic, and cultural factors influencing utilization of immunization services among infants 0-12 months in Juba City.

5.3.1. Gender of respondents and its factors in influencing utilization of immunization services among infants 0-12 months in Juba City

The results show that gender representation was sharply skewed towards females compared to males, indicating that women were more involved in the immunization compared to men. The findings revealed that [x^2 = 4.89, p-value 0.009<0.05] females/mothers were 4.89 times more likely to engage in

immunisation of infants. It was noted that women were more readily available when called upon to respond to the study compared to the men who were mostly busy with other engagements. In South Sudan there is a traditional belief that women are typically responsible for child immunization in the home or community, and therefore men tend to relax. This is against the general health strategy that particularly emphasizes male involvement is in maternal childcare.

These statistical data were similar with qualitative information collected during the focus group discussion where male involvement in vaccination was found very low. Though they were in for support of the spouses. From the statistical analysis, the data on females indicated a high significant factor in influencing utilization of immunization services among infants in Juba City. However, there was some reasonable evidence that females are a key factor in influencing utilization of immunization services. Besides, as females play important roles in the utilization of immunization services among infants of mothers. Therefore, female offered more effort of direct involvement in utilization of immunisation services by taking infants to health facility, though males offered financial and social support in terms of accepting the infants to be immunized.

5.3.2. Age and its influence in the utilization of immunization services among infants 0-12 months in Juba City

At univariate analysis there was age differences among the study respondents and this reflected differences in terms of utilization of immunization services. The age factors there was reflected at the multivariate analysis thus it was considered influencing utilization of immunization services for infants aged 0-12 months. Respondents with 20-29 years were 4.41 times more likely to engage in immunizing of infants. The findings and analysis point to a young population in the study,

which could reflect the trend in the general population and also the high utilization of immunization services.

The study findings concur with a study carried out by *Samra, et al (2015)* in Bangladesh as regards age as a factor influencing immunization and found that, females marry early hence are less likely to immunize their children due to fear of unknown. However, it is argued that in this study, there was no provision to ascertain information when females got married as the case was for the study by Samra, et al (2015). But whatever the case, it is important to more of the females were committed to engage in immunization of infants and this reflects their direct involvement with or without the support from the husbands or male counterparts. Further, the findings of this study finding coincide with *Obinna Ositadimma Oleribe 2017* who found that Respondent's age, educational attainment, and wealth index remained significantly related to immunization coverage at 95% confidence interval in multivariate analysis. Relatedly, findings are in line with *Aalemi et al (2020)* in their study identified maternal age, ANC visits, place of delivery, health facility visits in past 12 months, paternal occupation, wealth quintile, and geographic region as the factors influencing child's vaccination status in Afghanistan.

The findings coincide with a finding by Kitamura et al (2013) which revealed that maternal age and notification of vaccination date increased the odds of full vaccination. Indeed, in the same spirit, this finding coincide with *Odusanya et al.*2012 who found out that children whose mothers were aged less than 30 years were 2 times more likely to be fully immunized. The fact that females were more engaged in immunisation of infants further strengthens the efforts by the Ministry of Health-South Sudan and partners to have infants immunised. to prevent and reduce mortality and morbidity due to diseases.

5.3.3. Income and its contributory factor in influencing utilization of immunization services among infants 0-12 months in Juba City.

Overall, in this study, income alone by itself was observed not to have much influence on the utilization of immunization services among infants 0-12 months. Even though the findings show high levels of unemployment in Juba city, the odds ratio [x^2 = 1.90, p-value 0.001<0.05] reflected that possession of a source of income would make respondents 1.90 times more likely to engage in utilization of immunisation services. Therefore, there would be financial support for the mothers/females mostly in terms of transport fare and upkeep when travelling to the health facility for infant immunisation. It is also argued that such an income level would be guranting a good health at home as more other basic needs are met at family level. This is critical since the respondents resided in city and urban places.

This finding is consistent with a case control study done in Southern Ethiopia which found that occupational status did not show an association with defaulting (Tadesse et al, 2014). Study findings coincide with a study by *Nath et al. (2015)* on determinants of immunization coverage in 510 children aged 12-23 months in urban slums in India, found out that incomplete Penta 3 immunization and unimmunized status of the children were associated with low socio-economic status. Indeed, the study findings did not agree with a study conducted by Castro-Leal, 2016 who found no difference in Penta 3 rates with respect to socio-economic status.

The findings of this study did not Concur with Samia, et al. (2015) who carried out a study in Bangladesh to assess the impact of employment on utilization of immunization services and found that pressure of work and lack of time the employed parents/care givers were not able to take their children for timely

immunization services as compared to unemployed counterparts. These observations are not consistent with Abdi, et al. (2014), who revealed that employment status and educational background influenced utilization of immunization services in an area. In line with this study, it is argued that the standards of living improve with a stable source of income where food and medical care are assured. So immunisation services as part of medical care would also be provided to infant's right from birth.

5.3.4. Marital Status influence on the utilization of immunization services among infants 0-12 months

At multivariate level of analysis, marital status was found to be a factor that influences the utilization of immunization services among infants, the findings show that respondents were married and the married were more likely to involve in utilising of immunisation services for infants aged 0-12 months services following the odds ratio and the Pearson value [x^2 = 2.59, p-value 0.009<0.05]. the married respondents were therefore, 2.59 times more likely to engage in infant immunization compared to their counter parts. This was based on the fact that they would support each other's as marrieds in relation to care-taking of the infants compared to the non-married whose relationship or love might be questioned.

This finding is in agreement with a cross sectional study done in Burkina Faso which found out that children whose mothers were married were significantly associated with complete immunization for Penta 3 Aboubakary et al, (2014).

The study findings are also in line with a study done on review of the DHS data of Bangladesh to compare the marital status of mothers of children less than five years of age indicated that mothers who had married were more likely to fully immunize their children than those who were single or widowed (WHO, 2016). It

is therefore, argued that in relation to the findings of this study, indeed, the support to each other for health matters would be minimal since they were not staying as partners or married couples. Related to marital status, the fact that most of the people were living in homes where marriage relationships exist provides a leeway to promote infant immunization programming options at household level in Juba city.

5.3.6. Education level and influence on the utilization of immunization services among infants 0-12 months

At multivariate level of analysis, education level was not significant to utilisation of immunisation services. Yet, there is no doubt that education is very important as a basic foundation for social and economic development as it facilitates easy and quick comprehension and articulation of issues. However, from the statistical data, none of the levels of education was tagged as significant with the p-values above the thresh hold at multivariate analysis. The significance of this variable remained at bivariate analysis level. This shows that the level of education by itself did not significantly influence the utilization of immunization services among infants 0-12 months in Juba city.

The finding in this study did not agree with a study conducted in China by *Xie and Dow (2015)* which found that education was positively associated with Penta 3 immunization. The study finding also did not coincide with a study conducted by *Ibnouf, Van den Borne and Maarse, 2015* in Khartoum State Sudan, found out that Penta 3 vaccination coverage increased with an increase in the education level of the mother. The study findings differ from *Tinashe Mukungwa (2015)* who found that children of mothers with secondary education and above were more likely to be vaccinated than children of uneducated mothers.

5.3.7 Myths and Misconception and influence on the Utilization of Immunization Services among Infants 0-12 months

Findings showed the parents with no misconceptions and myths were 3.75 times more likely to have their infants immunised and so utilisation of immunisation was present among such category of caregivers. This implies that their thinking and decision to have infants immunised had not been washed away by cultural-based thoughts and believes. This might be attributed to the awareness that facilities try to provide to the parents at the time of antenatal care services to have their infants immunised right from the time of birth. This is in line with literature and findings of *Njeru et al (2019) who noted that* misconceptions and myths influenced immunisation of infants. It is therefore, noted that increased holding of such beliefs tend to limit the immunisation of infants in communities as the case has been with this study.

5.4. Impact of male involvement in the utilization of immunization services among infants 0-12 months in Juba City.

The study assessed a combination of factors that provided clues that could lead to determine the impact of male involvement in the utilization of immunization services among infants 0-12 months in Juba City and found that father taking their children for routine immunization, reminding the spouse of children's immunization appointment, providing financial support to go for immunization and accompanying the spouse for routine child immunization has a significant influence in the utilization of immunization services in Juba City. For this study the degree of impact between male involvement and utilisation of immunisation services was 78.0 percent and this reflects that if males make a direct involvement in immunisation services of infants, there will be such a change in the utilisation of the same service at the health facility (ies).

This study findings are in line with *Carolina Aguiar and Larissa Jennings 2015* in their study of impact of Male Partner Antenatal Accompaniment on Perinatal Health Outcomes in Developing Countries found out that during the early postnatal period, male antenatal accompaniment was associated with higher uptake of postnatal services, but with mixed effects on breastfeeding and newborn survival.

The study findings concur with *Beryne Odeny et al (2019)* whom in their study to assess Male partner antenatal clinic attendance is associated with increased uptake of maternal health services and infant BCG immunization in Kenya indicated that involving male partners in MCH activities amplifies benefits of MCH services by engaging partner support for maternal uptake of services.

The findings of this study are in line with *Fred Bagenda et al (2021)* whom in their study found that the benefits of male involvement in maternal health care include family wellbeing and health, health care services utilization, health worker motivation and community improvement and prosperity.

5.5. Health services factors influencing the utilization of immunization services among infants 0-12 months in Juba City.

5.5.1. Availability of Health Workers

The findings indicate that the existing health facilities were usually inadequately staffed with low staffing level [x^2 = 4.86, p-value $0.003<0.05$]. This reflected that the perception by the respondents that HWs were available at the health facility would make them 4.86 times more likely to have their children immunized.The findings of this study differ with a base line survey done in Ethiopia by *Bisrat et al, (2012)* which indicated that health workers did not come and give vaccine at the village and reasons for defaulting are reported absenteeism of vaccinators.

These findings concur with a study conducted by *Ngozi N. Akwataghibe at el (2019)* found out that factors like absence of delivery services, shortage of health workers, unavailability of vaccines at scheduled times, and indirect costs of immunization contributed to low utilization of immunization services.

This finding is supported by *Abdi, et al. (2014)* who found that inadequate health care providers, place of delivery, knowledge on importance of vaccination, inaccessible health facilities, and stock out of vaccines significantly affect the level of utilization of immunization services in a region.it is therefore, noted that the availability of health workers would reduce the waiting time the understaffing at the health facility and as well ineffective and inefficient health care services delivery in terms of immunization of infants aged 0-12 moths.

5.5.2 Availability of Services

It was from this study, that however, the availability of service was not a statistical factor at multivariate analysis. The study found that the immunization services were generally available but seems to be at a subdued level as expressed by the positive odds ratio just above. This study is not in line with a study conducted by *Datar, Mukherji, and Sood, (2015)* which found that the availability of health infrastructure significantly improved immunization coverage for non-Polio vaccines.

The findings coincide with study by *Ophori et al. (2014)*, who found that apart from highly ineffective primary health care services resulting from lack of investment in personnel, facilities, drugs, and poor management of existing resources; there is also lack of confidence and trust by the public in the health services due to the poor state of health facilities and low standards of delivery.

5.5.3. Availability of Vaccines

The study revealed that availability of vaccines has a significant influence in the utilization of immunization services in Juba city with [x^2 = 2.45, p-value 0.006<0.05]. Therefore, the study respondents who considered the health facilities well stocked with immunization vaccines were 2.45 times more likely to immunize their infants. It is noted that sometimes certain antigens like BCG would be out of stock due to high wastage rate hence children miss being vaccinated'' Key informant at Kator Primary health care center. These observations concur with studies conducted by Favina, et al. (2012) and Lillian, et al. (2013) who found that stock out of vaccines hindered effective utilization of services for it leads to missed opportunities for parent/caregivers were unlikely to go back for subsequent vaccine doses.

The same study concurs with study findings that long waiting hours significantly affected childhood immunization. These delays without being served forces some mothers not to return their children for subsequent vaccinators. This leads to non-compliance with National Child Immunization Schedule, partial immunization and dropouts thus subjecting the children to infection with VPDs.

These findings agree with a study conducted by *Njeru et al (2019)* the revealed that Health service barriers to utilization of immunization services included long ques and waiting time, stock out of vaccine and rescheduling of vaccination and clinic return dates. The study finding differ from a study conducted by *Nakayiza Manyanja 2018* who found that vaccines availability is not significantly associated with Penta 3 immunization status of the child. It is therefore, argued that increase supply of immunization vaccines would increase chances the infants aged 0-12 moths are immunized since it would motivate parents/mothers and fathers to engage in such services for the good health of their infants.

5.5.4. Attitude of Health Worker

Health workers were commended for their good attitude which has encouraged many respondents to take their children for immunization services, and this was seen as a significant factor [x^2 = 1.91, p-value 0.006<0.05]. it was noted that respondents who perceived HWs having a positive attitude towards immunization clients were 1.91 times more likely to immunize their infants aged 0-12 months. This is backed up by one of the members in a focused discussion who said, "*Those days I was told the nurses would abuse and mistreat women that is why for my first child, I delayed immunizing." Participant FGD*. Therefore, the attitudes of health workers were seen as a major factor in promoting or discouraging immunization services. Therefore, it is noted that the findings agree with literature by Oku et al (2017) who noted that in Nigeria the attitude of HWs influenced the utilisation on immunisation services. This is true based on the findings of this study and therefore, this demotivates parents/guardians for the infants from accessing such services. Yet, the government spend tax-payers money to provide such vaccines. In addition, the findings are in agreement with the literature by Simone, Carrillo-Santisteve, and Lopalco (2012) who noted that the attitude of HWs was important in the fight against measles vaccination as well as other diseases of mumps and rubella. Therefore, a good attitude is a motivating factor to mothers/parents to have their infants immunized as per the findings of this study.

5.5.5. Affordability of the Services

This was not a significant factor at multivariate analysis that influenced the utilization of immunization services among infants 0-12 months in Juba City. This means that if the services are affordable, it influences utilisation of immunisation services positively and is it's not affordable, it influences utilisation negatively. However, the qualitative information from a focus group discussion which

reflected from one respondent who said that; "*I was at home with all my three children; I did not have the resources to go to the immunization because it is far and I cannot walk together with the children up to there."(Participant FGD). In addition, "Sometimes the vaccination center is far and walking with the children is very difficult," said a female participant in a FGD meeting.*

These study findings concurred with a study conducted by Abdi et al (2014) that revealed distance as a significant factor in the utilization immunization of services.

The study findings are in line with a finding by Reichler et al., 2016 that revealed that proximity to the clinic was associated with an increased likelihood of vaccination, with immunization coverage declining with increasing distance from vaccination clinics in Egypt.

6.0. CONCLUSION AND RECOMMENDATIONS

This chapter gives the conclusions of the study findings and recommendations that could be considered to improve Penta 3 immunization status.

6.1. Conclusion

I. The proportion of the children 0-12 months who had been immunized for Penta 3 was 87.3% and Measles 55.5% within Juba City, which shows incompleteness of immunization within the city.

II. Social and economic factors that influenced utilisation of immunisation services includes Gender (females), age, marital status and income level.

III. Male involvement factors that have a positive influence on utilisation of immunisation includes father taking their children for routine immunization, reminding the spouse of children's immunization appointment, providing financial support to go for immunization and accompanying the spouse for routine child immunization.

IV. Health services factors influencing the utilization of immunization services among infants 0-12 months in Juba City were availability of vaccines, attitude of health workers, Availability of health workers based on multivariate analysis.

6.2. Recommendations

To increase Penta immunization and measles coverage and to ensure the completeness of immunisation services based on the findings in this study it is recommended that:

- The Government of South Sudan and partners should endeavour to sensitize parents about the importance of completing the immunization schedule, especially about Pentavalent and Measles vaccines. Do mass awareness campaigns at the community level together with the community to enforce the message. There should be underscores on benefits of immunization and need to adhere and complete the National Child Immunization schedule, intensify door-to-door campaigns strategy to trace and vaccinate defaulters of immunization.
- The National Ministry of Health, State Ministry of Health , County Health Department of Juba County and Health Partners to ensure health promotion officers engage not only with mothers, but also with community leaders to address social economic and cultural factors such as gender responsiveness, income level of women by having income generation activities or cash programs targeting poor families to increase their income level. Demystify myths and misconceptions of the religious and equip the public with proper information to help deal with these issues and increase compliance levels.

- Interventions to improve men's attitude to support their spouses to take their children for immunisation be enhanced such as health education or peer education are needed to increase their involvement since their involvement influence immunisation uptake positively. These interventions need to be centred on the involvement of both parents in the health care of the family, in conjunction with local and policy-level changes that support an environment more conducive to men's participation. Younger fathers and men with occupations that keep them away from home such as traders could be the primary target of these interventions.
- The Ministry of Health and Health Implementing partners should employ adequate health workers to address the issue of long waiting time not to discourage parents from bringing their children for services and also purchase and stock all the health facilities with adequate vaccines to eliminate concerns about stock outs of vaccines that leads to incompleteness.
- For issues of affordability and access, government should introduce free of charge of immunization services in some of the private clinics where its closure to the community and encourage mothers to use government health facilities. On the attitude of the health workers, continual medical education be instituted especially targeting work ethics and the importance of having positive attitudes towards clients be emphasis.

Limitation

The limitations in this study included,

Recall bias. Some mothers forgot their children's vaccination/immunization status, especially those without immunization cards. This was overcame by checking immunization scars.

Smooth data collection for this research was hindered by rain, as July to September was a rainy season. This was overcome by extending the days for data collection.

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Appendices 1: Research Project Budget

s/no	Items	Description	Quantity	Unit cost (UGX)	Amount (UGX)	Remarks
1	Stationary	This supported in the process of writing	lumpsum	250000	250,000	
2	Training of research assistants	This enabled them to carry out the process of the research	6*3days	150000	2,700,000	
3	Transport	For both the research assistance and the researcher	7	150,000	1,050,000	
4	Secretariat services	It entails all forms of typing, editing and other secretariat services	lumpsum	500,000	500,000	
5	Printing	Draft copies and final copies printing	Lumpsum	300,000	300,000	
6	Binding	Mainly for the final copies	Lumpsum	150,000	150,000	
7	Airtime	Support communication between research assistants and the researcher	7	50,000	350,000	
8	Substantial allowance	This was allowance that was used to pay research assistants and other support personals as a survival allowance	9	200,000	1,800,000	
9	Meals	Meals as in the field	9	50,000	450,000	
10	Miscellaneous budget	Other unforeseen costs.	Lumpsum		500,000	
Total costs					8,050,000 UGX	

Appendices 2: Informed Consent

My name is …………………………………….... I am a Master student from Uganda Christian University. I am conducting a study on Utilization of Immunization Services among children aged under one year in Juba City. The information was used by the Ministry of health to improve access and quality of Immunization Services that will help control, eliminate, and eradicate vaccine preventable diseases.

Explanation of the procedure to the respondent

Participation in this study will require that I ask you some questions in relation to the study and scrutinize the child health booklet to assess on the immunization status of your Child.

You have the right to refuse participation in this study. You will get the same care and information on importance of immunization services from us whether you agree to join the study or not and your decision will not deter us from providing you with information of immunization today in your home setup or that you will get from any other health worker at any other time.

You may refuse to respond to any questions, and you may stop an interview at any time. You may also stop being in the study at any time without any consequence to the services you receive from this visit or any other visit now or in the future.

Discomforts and risks

Some of the questions you were asked may make you uncomfortable. If this happens, you may refuse to answer these questions if you choose. You may stop the interview at any time. The interview may take half an hour and then you resume your daily routine.

Benefits

If you participate in this study, you will help us to understand the immunization status of your Child. If any gap in the immunization schedule is identified, the Child was referred to a health center for immunization of that antigen and this will improve the health of the Child and reduce the risk of contracting a communicable disease. Permission for community entry was sort from the

administration who are the gatekeepers of the community. Feedback of the study findings was communicated to the community through organized forums.

Rewards

There were no financial rewards but you wasteful from health information that will enable you safeguard your Child's health.

Confidentiality

The information you provide us was kept strictly anonymous and confidential. Your name will not be recorded on the questionnaire. The questionnaire was kept in a locked cabinet for safe keeping at Uganda Christian University. Everything was kept private.

Contact Information

If you have any questions you may contact Mr. Matata John Waran (+211927923500, matatajw@gmail.com) or the Uganda Christian University Ethical Review Committee Secretariat on uncstresearch@uncst.go.ug

Participant's statement

The above information regarding my participation in the study is clear to me. I have been given a chance to ask questions and my questions have been answered to my satisfaction. My participation in this study is entirely voluntary. I understand that my records were kept private and that I can leave the study at any time. I understand that I will get the same care and information on childhood immunization whether I decide to leave the study or not and my decision will not change the care and information that I will receive from the visit by health workers today or that I will get from any other health worker at any other time

Name of

Participant............................Signature or Thumbprint................................
Date

Investigators statement

I, the undersigned, have explained to the volunteer in a language s/he understands, the procedures to be followed in the study and the risks and benefits involved

Name of Interviewer.......................Sign or Thumbprint ....Date................

Appendices 3: Questionnaire

PART A: DEMOGRAPHIC CHARACTERISTICS OF THE RESPONDENTS

1. Gender:

(a) Male **(b)** Female

2. What is your age?

(a) 10 - 19 yrs. (b) 20 – 29 yrs. (c) 30 – 39 yrs. (d) Over 40 yrs.

3. Marital status

(a) Married (b) Single (c) Window (d) Widower

4. **PART B: Table 2.0 - UTILIZATION OF IMMUNIZATION SERVICES**

DOB	AT BIRTH	> DOB	Non	6wks	>6wks	Non	10wks	>10wks	Non	14wks	>14wks	non	9mths	> 9mths	non	18 mths	>18 mths	non	TCA given	TCA not	COMMENT
BCG																					
BOPV																					
POLIO 1																					
POLIO 2																					
POLIO 3																					
PENTA 1																					
PENTA 2																					
PENTA 3																					
PCV 1 10																					
PCV 2 10																					
PCV 3 10																					
ROTA 1																					
ROTA 2																					
MEASLES																					
MEASLES 2																					

KEY> - Greater than TCA – To come again (return date) PCV10 - Pneumococcal Vaccine D.O.B – Date of birth
BOPV – Birth Oral Polio vaccineWks. – Weeks MONT - Month

PART B: social, economic, and cultural factors influencing utilization of immunization services among children 0-12 months in Juba City.

1. **Your highest professional qualification**

    (a) None (b) Primary school level (c) Secondary school level

    (d) College (e) University

2. **What is your occupation?**

    (a) Employed (b) Self-Employee (c) Not Employed (d Others specify

3. **What is your religious belief?**

    (a) Christian (b) Muslim (c) Others

4. **Is there any believe in your religion that affect utilization of immunization services?**

    (a) Yes (b) No

If yes, how does it affect immunization?
....

5. **What is the level of your income?**

    (a) 0 – 2,000 SSP (b) 2,001 – 4,000 SSP (c) 4,001 – 6,000 SSP

    (d) 6,001 – 8,000 SSP monthly (e) 8,001 SSP – And over monthly

6. **Does your income affect you taking your child for immunization?**

    (a) Yes (b) No

7. **Type of family**: a. Monogamous b. Polygamous

PART C: HEALTH SERVICE FACTORS INFLUENCING CHILDHOOD IMMUNIZATION

To what extent do the following health service factors influence childhood immunization?

Use the five-point scale to respond to factors below were

1. Very great effect

2. Great effect

3. Moderate effect

4. Low effect

5. No effect.

Responses	1	2	3	4	5
Availability of services (EPI)					
Availability of health workers					
Accessibility of EPI services					
Availability of vaccines					
Attitude of health workers					
Rescheduling of vaccination return dates					
Affordability of the services					

Please circle the appropriate response

1. Is there any health facility which does vaccination service near your home?

(a). Yes (b). No

2. If yes to above question which health, facility is near your home?

a). Government Health Centre b). Private health facility

3. Time taken to reach health facility (by foot)?

a). Less than 15 minutes b). 15-30 minutes c). 30-1hour minute d). > 1 hour

4. Are the health workers friendly in carrying out vaccination services in your area?

1. Yes 2. No

6. Are the immunization services accessible to you in the health facility?

1. Yes 2. No

7. Are the health workers always available when you take the Child for immunization?

1. Yes 2. No

If yes, how much? …………………………………………

8. Do you pay for the services on immunization?

1. Yes 2. No

9. Is the vaccines always available for the children?

1. Yes 2. No

Part: D effect of male involvement in the utilization of immunization services among children 0-12 months in Juba City

1. Has your husband or a man responsible for the child participated in the following?

Variable	Answers		
Allowed child to be vaccinated	Yes		No
Father taking their child for routine immunization	Yes		No
Reminded you of child's immunisation appointment	Yes		no
Provide financial support to go for immunisation.	Yes		No
Accompany you for routine child immunization	Yes		No
How do you rate your husband level of involvement	Good	Poor	mean

Part E: Immunisation of the child 0-12 months

Did you fully immunise your child at the age 0-12 Months?

1. Yes 2. No

END OF THE QUESTIONNAIRE; THANK YOU SO MUCH

Appendices 4: Key Informant Interviews Guide

1. In your own view, how do mothers perceive childhood killer diseases and immunizations in this community?
2. What are the reasons why parents refuse to immunize their children? (How common is this, in which category of parents is this common, what reasons were given for refusing immunization for their children? which specific vaccine was refused, what did you do as health worker to persuade such refusing parent? What was the outcome of your persuasion? – was the child eventually immunized? If yes, when? Was it at that or later visit?
3. What information do you normally give to mothers on immunization days?
4. Have there been occasions in which immunizations may not hold at all? If yes, what were the causes?
5. What are your suggestions for getting more children immunized on schedule?

Appendices 5: Focused Discussion Guide

1. What do you understand by immunizations?
(Probe for: the common names by which it is called in the community, the diseases it aims at preventing, the age group and group of people that it is most needed).
2. Why do you think Childhood immunization is necessary?
3. Who decides whether a child should receive immunization at household level in this community? (Probe for: who decides on whether a child goes for immunization who is responsible for taking the child for immunization, and other key persons in the decision-making process).
4. What are the factors that hinder you from getting children immunized in this community?
5. What are the factors that motivate you from getting children immunized in this community?
6. What are your suggestions for getting more children immunized on schedule?

Appendices 6: Research Workplan

WORKPLAN FOR REARCH WORK																								
	Feb				March				April				May				June				July			
Major Activities	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4				
Introduction																								
Literature Review																								
Methodology																								
Designing of the instrument																								
Proposal submission																								
Pilot use of the tool																								
Incorporation of feedback																								
Actual data collection																								
Data processing and analysis																								
compilation of report																								
first Draft of the report																								
Proof reading and editing																								
Submission of the final report																								
Final defense																								

Appendices 7: Research Approval Letter from UCU

UGANDA CHRISTIAN UNIVERSITY

A Centre of Excellence in the Heart of Africa

To: Manda Waran

UCU
+256775823131

08/07/2022

Type: Initial Review

Re: UCUREC-2022-318: UTILISATION OF IMMUNISATION SERVICES AMONG INFANTS 0-12 MONTHS IN JUBA CITY, 1st , 2022-05-13

I am pleased to inform you that the Uganda Christian University REC, through expedited review held on **30/06/2022** approved the above referenced study.
Approval of the research is for the period of **08/07/2022** to **08/07/2023.**

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 addenda 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.
3. Reports of unanticipated problems involving risks to participants or any new information which could change the risk benefit: ratio must be submitted to the REC.
4. Only approved consent forms are to be used in the enrollment of participants. All consent forms signed by participants and/or witnesses should be retained on file. The REC may conduct audits of all study records, and consent documentation may be part of such audits.
5. Continuing review application must be submitted to the REC **eight weeks** prior to the expiration date of **08/07/2023** in order to continue the study beyond the approved period. Failure to submit a continuing review application in a timely fashion may result in suspension or termination of the study.
6. The REC application number assigned to the research should be cited in any correspondence with the REC of record.
7. You are required to register the research protocol with the Uganda National Council for Science and Technology (UNCST) for final clearance to undertake the study in Uganda.

The following is the list of all documents approved in this application by Uganda Christian University REC:

No.	Document Title	Language	Version Number	Version Date
1	Protocol	English	1st	2022-05-13
2	Informed Consent forms	English	1st	2022-05-13
3	Data collection tools	English	1st	2022-05-12
4	Data collection tools	English	1st	2022-05-12
5	Data collection tools	English	1st	2022-05-12

Yours Sincerely

Peter Waiswa
For; Uganda Christian University REC

Appendices 8: Research Approval Letter MOH, Research Ethics Review Board (MOH-RERB), Juba

REPUBLIC OF SOUTH SUDAN

Ministry of Health, Research Ethics Review Board (MOH-RERB), Juba.

Date: 26th September, 2022

Protocol No: RERB-MOH 40/14/09/2021 **Approval No: MOH/RERB 5/2021**

To: Principal Investigator: Matata Waran

Address: Uganda Christian University

Title of the Project: "Utilizations of Immunization Services Among Infants 0-12 Months In Juba City"

Dear Waran,

The Ministry of Health Research Ethics Review Board at its 12th and 14th meeting held on 23rd and 24th September 2022 reviewed your research proposal and has given a favorable ethical opinion for implementation.

The approval was based on the quality of your application form, protocol and supporting documents that complied with the conditions and principles established by the international and national guidelines for carrying out research involving humans as research participants. This approval shall be valid until 20th Dec 2022.

In this regard, you are expected to commence implementation of this research. Please note that the annual report and the request for renewal (if applicable), should be submitted to the MOH-RERB one month before the expiry of the approval time.

The progress report should not exceed five pages. In addition, any serious problem related to implementation of this research protocol should be promptly reported to the MOH-RERB, and any changes to the protocol should not be implemented without the MOH-RERB approval except in instances where such a change is necessary to eliminate or prevent an immediate hazard to the research participants. Note that any information generated from the study should not be published without the consent of the MOH-RERB. We wish you all the best in implementing this research.

For/Mr. Arsanya Jacob Kasio

Deputy Director Research & Deputy Chairperson MOH-RERB

Ministry of Health, Republic of South Sudan-Juba

CC: Undersecretary -MOH-RSS, CC: Director General, Primary Health Care -MOH RSS, CC: DG SMOH, CC: Juba City Council Health Unit

Name: **MATATA JOHN WARAN** RJ19M21/028

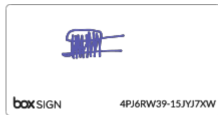
Title: **Utilization of Immunization services among infants 0-12 months in juba city**

COMMENTS

Sections.	*Comments*	*Addressed or not*
Concept note stage	1. Revise the topic to utilization of immunization services among infants 0-12 months in Juba City or Juba county from Determinants of utilization of immunization services among children less than 1 year in lokiliri payam, juba county	Addressed from cover page
Problem statement comments:	1. When writing problem statement you need to answer the following questions? 2. What is the problem (current situation)? 3. What is supposed to be the ideal situation according to WHO, MoH etc 4. What is the disparity? 5. What will happen if nothing is done about the problem? 6. What is the relevance of solving the problem?	Addressed as indicated in the problem statement.
Broad objective	The broad objective is not clear, consider revising as below;	''To explore factors influencing the utilization of immunization services among children 0-12 months in Lokiliri payam of Juba County ''
Revise the specific objectives as below;	**Revise the specific objectives as below**; 2. Try to make the objectives SMART (At least mention the target group, geographic location, service to be provided like Immunization) and keep the objective short.	Addressed
Conceptual Framework	Revise the conceptual framework to reflect the proposed objectives illustrating the independent, intervening and dependent variable.	
Proposal stage.	Many thanks for sharing your proposal. You have made good progress, though there are still a lot of work for you to proceed to ppt presentation and eventually defend	
The following are the issues you need to work on	**Chapter one** The background is not smoothly in the form of the inverted triangle where you were expected to introduce the topic of study and then highlights the global, regional and finally South Sudan issues or facts on immunization. Review it carefully and adjust accordingly. Remove unnecessary	All comments addressed

	information. The problem statement is not clear….. you need to improve on it in line with the questions I provided you with a framework to enhance good flow as you write the problem statement. The conceptual frame has limited variables against each objective review it further. The description of the conceptual framework is not interlinking the independent, intervening and dependent variable. The flow of the research idea is also not clear. The number of the section, subsection, clause etc within the chapter is not consistent. Please work on it. **Chapter two** Generally, good literature searches and write up. Please work on the number of the section, subsection, clause etc within the chapter is not consistent. **Chapter three** The exclusion criteria are not clear. The number of the section, subsection, clause etc within the chapter is not consistent. Please work on it. I will provide more comments as you do your mock defense presentation. **Referencing** Use APA system of referencing	
Dissertation stage	**ABSTRACT** 1. Abstract to be succinct and one page 2. It should spell out findings per objective, conclusion and recommendations	
	FINDINGS. 1. Please here do not simply list your variables, present highlights of the findings of the important socio-demographic characteristics and refer readers to table 2. It might be important to present all results of the univariate analysis in tabular format as opposed to presenting them in different formats. 3. Where are the other factors in your regression analysis results? Look back	

	at their study objectives and determine if you answered them in the results section 4. Analyse some of the findings again to bring out the association between the variable and utilisation of the immunisation services. It is not clear. 5. Some of your discussions are not clear as indicated in comments attached. Revisit and reverse them. 6. Do not mix odds ratio and P-Value in your discussion. Stick to the P-value to discuss your findings. 7. As indicated above, do more analysis in some of the variables to bring out clearly the associations. 8. Triangulate your findings and discussion with the qualitative data collected. It is not coming out clearly.	



STUDENT'S SIGNATURE: **SUPERVISOR'S SIGNATURE:**