

**LEVEL AND FACTORS ASSOCIATED WITH UPTAKE OF IMPLANTS AMONG
WOMEN OF REPRODUCTIVE AGE (15_49) IN TWIC EAST COMMUNITY, SOUTH
SUDAN.**

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DECLARATION

I, JOHN THON RIAK YOM, hereby declare that this is my original work. It is not plagiarised and has not been submitted to any other institution for any award.

Student's name: John Thon Riak Yom

Signature.....



Date...13/09/2023

APPROVAL

The research work culminating into this dissertation was conducted under my guidance and supervision.

Signed.

Date. 13th September 2023

JOSEPHINE NAMYALO

Supervisor:

DEDICATION

I dedicate this dissertation to the Almighty God for the blessings he has accorded to my lovely family and me and friends for their firm support throughout this academic journey (**Mathew: 20:26_28**).

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The successful completion of this thesis would have not been possible without the support from many individuals who assisted me in various ways from the start to the end.

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LIST OF ABBREVIATIONS

CHN	Community Health Nurse
CHPS	Community-Based Health and Planning Service
CHW	Community Health Workers
CPR	Contraceptive Prevalence Ratio
DHMT	District Health Management Team
EPI	Expanded Program on Immunization
HIV	Human Immunodeficiency Virus
IEC	Information, Education and Communication
IUD	Intrauterine Device
MDG	Millennium Development Goal
MOH	Ministry of Health
NGOs	Non-Governmental Organizations
NHIS	National Health Insurance Scheme
NRHSP	National Reproductive Health Strategic Plan
SPARH	Strategic Pathway to Reproductive Health
STI	Sexual Transmitted Infection
UHC	Universal Health Coverage
UN	United Nations
UNFPA	United Nations Population Fund
UNICEF	United Nations Children Fund
WHO	World Health Organization

DEFINITION OF TERMS

Contraception/Family planning: Family planning is a provision and utilisation of service which allows individuals and couples to control and attain the best number of children and spacing and timing of their birth, (WHO, 2015).

Contraceptive Prevalence Ratio: Percentage of women of reproductive age who are currently using or whose partner is currently using, at least one contraceptive method, regardless of the method used (WHO 2015).

Contraceptives: Substances or devices which are able to prevent pregnancy, they include injectable, oral pills, intrauterine devices and condoms, (WHO, 2019)

Fertility Rate: The number of children a woman would have by the end of her childbearing years if she were to pass through those years bearing children at the current observed age specific rate (WHO, 2018).

Unmet need: Unmet need in contraception describes women who either want to suspend child birth for some years or women who want to stop childbearing altogether but are unable to assess and use contraceptive services due to either lack of contraceptive or low knowledge of using the contraceptives services, (WHO, 2019).

Utilization: Defined as the measure of people who have need for a service and actually having access and using the service in quality and quantity, (WHO, 2018).

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ABSTRACT

Introduction: Implants are among the modern contraceptive methods that are hormonal, long-acting, and reversible contraceptives. They are small, thin, and flexible plastic rods that release a progestin hormone in the body, either levonorgestrel (Jadelle and Sino implant) or etonogestrel (Implanon).

Methods: The research was a community-based cross sectional study. The main source of information for this research was primary data, which was collected from respondents' households by use of questionnaires, a structured open-ended questionnaire was used as a data collection instrument, and the descriptive statistics and multiple regression analysis were used for the analysis of data.

Results: The level of uptake of implants among women of reproductive age in Twic East Community, South Sudan was at 40 percent, with a 95% confidence interval of 33.7 percent to 46.5 percent. At multivariate level, after assessing for interaction and confounding, the factors that were significantly associated with uptake of implants were 45-49 years age group (aPR=0.25, 95%CI: 0.08- 0.78, p-value=0.017), Anglican and other religion (aPR=0.60, 95%CI: 0.37- 0.95, p-value=0.031; aPR=0.48, 95%CI: 0.30- 0.78, p-value=0.003), having 3-5 and 6-10 children (aPR=1.86, 95%CI: 1.24- 2.78, P-value=0.003; aPR=3.67, 95%CI: 1.69- 7.99, P-value=0.001), having still birth pregnancy outcome (aPR=4.35, 95%CI: 2.56- 7.39, P-value=0.001), not had unplanned pregnancy (aPR=0.45, 95%CI: 0.29- 0.69, P-value=0.001) and not discussing with husband about implants (aPR=0.21, 95%CI: 0.12- 0.37, P-value=0.001).

Conclusion: Our study found uptake of implants among the women of reproductive age at 40 percent. Policies targeted to women of age group 45 to 49 years to encourage more use of implants, more sensitization of husbands on implants will further help to increase uptake of implants and consequently prevent unplanned pregnancies.

CHAPTER ONE:

1.0 INTRODUCTION

1.1 Background of the study

Implants are among the modern contraceptive methods that are hormonal, long-acting, and reversible contraceptives. They are small, thin, and flexible plastic rods that release a progestin hormone in the body, either levonorgestrel (Jadelle and Sino implant) or etonogestrel (Implanon). After being inserted under the skin of women's upper arm by trained health professionals, implants work by releasing a small amount of progestin hormone steadily into the blood that gives continuous protection for 3 to 5 years depending on the number of rods inserted, (Teferi G., Teshome J., Mustefa M.,2016).

Implants are one of the most effective reversible hormonal contraceptive methods ever developed as compared to short-acting methods. Overall, in three years of Implanon use, less than one pregnancy per 100 users can be expected, and this is 1.1 for the five years use of Jadelle and 0.9–1.06% cumulative pregnancy rate in the four years of use of Sino implant, (Elias B., 2015). The use of long-acting methods like implants by couples in a country shows that the family planning (FP) program in that country is highly efficient in terms of management and financing in addition to being highly effective in spacing and limiting births. This is owing to implants' fewer requirements of providers and a lesser quantity of contraceptive supplies than a program relying on short-acting methods, (Endriyas M., Eshete A., 2017).

Furthermore, implants prevent unintended pregnancies, reduce the number of abortions, and lower the incidence of death and disability related to complications of pregnancy and childbirth. Use of implants also frees a woman from using injectable contraceptives every three months and daily pills during the intended birth intervals because they are effective in preventing pregnancy from 3 to 5 years, (Manduku C., 2019).

Despite these benefits, the use of long-acting contraceptives (LACs) has not kept pace with that of short-acting methods, such as oral contraceptives and injectables. Data from demographic and health surveys (DHS) from four sub-Saharan African countries shows that the proportion of women currently using LACs is significantly lower than the proportion of those using short-acting methods. Globally, among women of reproductive age group, 53% use modern contraception methods but less than one percent use implants, (Gebre-Egzabher D., Abrha

Medhanyie A., 2017). In many sub-Saharan African countries, fewer than 5% of women are using LACs. The Ethiopian demographic and health survey, (2016); also showed that only 10% family planning (FP) clients utilised long-acting methods, 8% implants and 2% IUCD (Elias, 2015). In Twic East community, the level of the utilisation of the implants family planning method is not known.

1.2 Problem statement

The Contraceptive implants are a long-term birth control option for women. They are a flexible plastic rod about the size of a matchstick that is placed under the skin of the upper arm which releases a low, steady dose of a pregestational hormone to thicken cervical mucus and thin the lining of the uterus. Contraceptive implants typically suppress ovulation and make it impossible for the pregnancy to occur. The global average of 2.5%. Decrease in GFR has a much longer term effect in reducing MMR, however, contraceptive use has only reached 4% of the population compared to 62% globally (Alkema, 2016). The global estimate for maternal mortality showed that the rate was decreasing. However, the rate of 289 deaths per 100,000 live births in 2013, most of which occurred in Africa was worrying.

The major problem in Twic East is the high rate of maternal mortality among the women of reproductive age group. The maternal mortality ratio 789/100,000 live birth whereas neonatal is 39.3/1000 lives in South Sudan, (WHO, 2017). Twic East is one of the counties in south Sudan where there is insecurity and the health services are interrupted, most women are subjected, and majority of the women are experiencing birth complications, abortions, and still births. Not only does the uptake of implants services help individuals and couples in attaining the desired number of children, it has a direct impact on a woman's health and wellbeing and it contributes significantly to the reduction of mortality in women and neonates (Eliason et al. 2013). In Sub-Saharan Africa, it was proven that the use of modern family planning and contraceptive methods in the spacing of pregnancies by at least two years can reduce maternal mortality by 35% and reduce neonatal mortality by about 13% (Eliason et al. 2014). I chose to research on the implant family planning method because it works for more years, it doesn't interrupt sex and it's an option if you can't use oestrogen-based contraception.

1.3 Scope of the Study

This study was conducted in Twic East, which is situated in the central part of Jonglei state, Twic East is composed of five Payams. It shares borders with Duk County to the North, Pibor County to the East, Bor County to the south and River Nile to the west. The climate of Twic East is much drier compared to Equatorial climate and the rest of the country. It has savannah woodland vegetation that is characterised by short scattered trees, which are drought resistant. Two main seasons exist in the area: the wet season, which starts from May to October, and the dry season from November to April. According to the last census report of (2008), the population of Twic East was estimated at 85,349, with a female population of more than 50%.

1.4 Justification of the Study

The world's youngest country South Sudan in which Twic East is located, since gaining independence in 2011, South Sudan is building normalcy after decades of devastating war that have displaced people, destroyed both physical and social infrastructure, and lost many of its health professionals. This, combined with gender inequality and misconceptions about family planning, has seriously limited both access to and use of quality reproductive health services implants.

With over half of girls married below age 18, and uptake of modern contraception less than 2%, South Sudan has one of the highest maternal and child mortality rates in sub-Saharan Africa and globally. The Government of South Sudan, (2017); became an FP2020 commitment maker, cited family planning as critical to improving the lives of its women and girls and positioning the country on the path toward a demographic dividend.

Despite all these FP2020 commitments made by the national government to increase the utilisation of modern contraceptives across the country, Twic East still has unclear records of uptake of family planning services compared with other regions in South Sudan. This study therefore aims at determining the level and factors associated with uptake of implants among rural mothers in Twic East Community, South Sudan.

1.5 Significance of the study

This study results provided updates to the health care providers to enhance prevention of miss-timed and unwanted pregnancies that increase the mortality and morbidity cases among women

of reproductive age and children under five year. The study also provided an important basis for growing literatures on family planning in both the regions and the country, and the findings may also be a hint for south Sudan policy makers on what should be done to improve modern contraceptive uses depending on factors that affect use of modern contraceptive methods and on what is needed in each region.

1.6 Main objective

To determine the level and factors associated with uptake of implants among women of reproductive age in Twic East Community, South Sudan.

1.7 specific questions

1.7.1 What is the level of access to implants services among women of reproductive age (15_49) in Twic East?

1.7.2 What are the factors associated with the uptake of implant methods among women of reproductive age (15_49) in Twic East Community?...

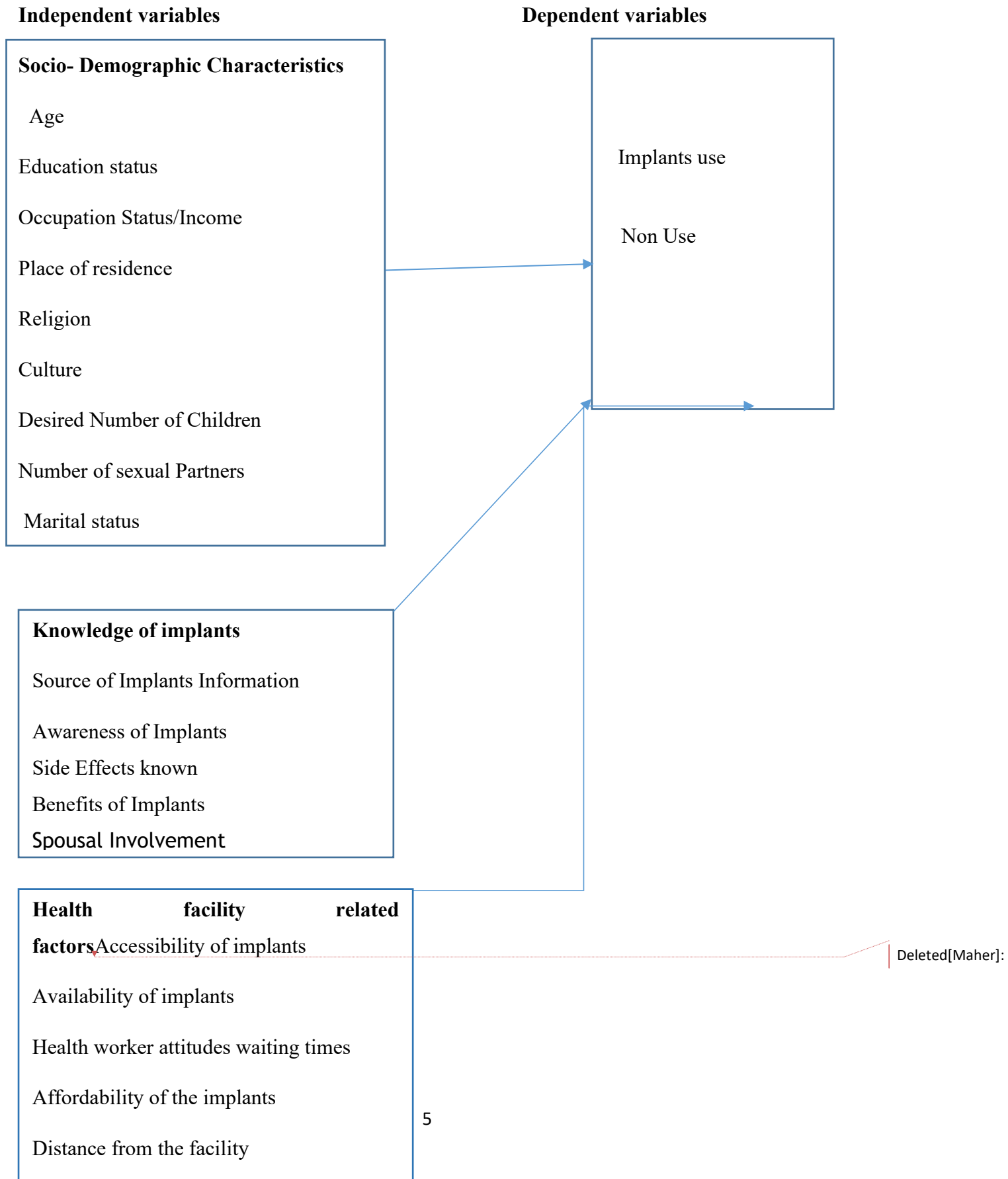
1.8 Specific objectives

1.8.1 To determine the factors associated with uptake of implants among women of reproductive age (15_49) on the use of implants services.

1.8.2 To determine the level of access to implant services among women of reproductive age in Twic East.

1.9 Conceptual Framework

A conceptual framework illustrating the socio demographic factors and the use of implants family planning methods among women of reproductive ages (15_49).



CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Introduction

Implants are among the modern contraceptive methods that are hormonal, long-acting, and reversible contraceptives. They are small, thin, and flexible plastic rods that release a progestin hormone in the body, either levonorgestrel (Jadelle and Sino implant) or etonogestrel (Implanon). After being inserted under the skin of women's upper arms by trained health professionals, implants work by releasing a small amount of progestin hormone steadily into the blood that gives continuous protection for 3 to 5 years depending on the number of rods inserted, (Teferi G.,2016).

Family planning program planners tend to assume that men are opposed to family planning and will, if involved in reproductive decision making, prevent women from regulating their fertility. Available data, however, suggests that the most successful family planning programs target women as well as men and promote communication about contraception between spouses. (Karra et al 2017).

Unintended pregnancy is a major problem among sexually active women and can result from incorrect, inconsistent, or non-use of contraception, or contraceptive failure that is, becoming pregnant while using a family planning (FP) method. Long-acting reversible contraception (LARC), which includes intrauterine devices (IUDs) and subdermal implants, have many desirable attributes, such as highly effective protection against unwanted pregnancies and few contraindications. They do not require the users' ongoing effort for long-term and effective use following initial insertion, are cost-effective, do not require frequent visits for resupply and are reversible with a rapid return to fertility after removal.

2.2 Global use of Family planning implants

The World Health Organizations (2013), view reproductive rights as “Reproductive rights rest on the recognition of the basic right of all couples and individuals to decide freely and responsibly the number, spacing and timing of their children and to have the information and means to do so, and the right to attain the highest standard of sexual and reproductive health also include the right of reproduction free of discrimination, coercion and violence” can serve as guidelines in reviewing adolescent contraceptive use. As at (WHO, 2011), the prevalence rate of

contraceptives was estimated at 63% worldwide. The use of contraceptives is increasingly becoming one of the essential basic elements to adolescent reproductive health as it gives them a sense of freedom to exercise their sexuality and a sense of power in view that they will be able to manage their lives in dignity. Attainment of easy access to the reproductive health need globally is still quite far from being achieved; it is estimated that about 143 million women in sexual relationships globally, face an unmet need for contraceptives; this number has a probability of rising up to 215 million when traditional methods of contraceptives are included. (LYNN KOMEY, JULY, 2016).

To my own analysis of the contraceptive use among women of reproductive age in the context of sub Saharan African countries such as south Sudan, I strongly disagree with the statement quoted by (WHO, 2011), that, 'The use of contraceptives is increasingly becoming one of the essential basic element to adolescent women reproductive health' as it gives them a sense of freedom to exercise their sexuality and a sense of power in view that they will be able to manage their lives in dignity, this is not true, because adolescents are confined by their cultural norms and practices, and that is one of the reasons for many girls dropout in primary and secondary schools, instead it is better with married women because some of them are exposed to antenatal care services and many other pillars of safe motherhood.

2.3 Implants use and options in Sub-Saharan Africa

Sub-Saharan Africa has the highest fertility rates of any world region, 5.4 births per woman on average-double that of Asia (excluding China) and more than three times that of Europe. One of the factors underlying the high maternal mortality rate is the low use of modern contraception. Only 18% of married women in Sub-Saharan Africa use modern methods of family planning.

An estimated 35 million women in Sub-Saharan Africa have unmet need for family planning. They want to delay or stop childbearing but are not using any method, (ANTONY M. WAIRAGU, June 2013), but to my opinion, I concurs with (ANNE_BAKILANA & RIFAT HASAN,2016); who consider culture, religious beliefs, gender relations and low child survival rates, that, all factors play some critical roles in very personal decisions about reproduction and hence overall fertility levels and trends. They added that, it is not always about 'supply side' factors or economic barriers like the availability of family planning services but the number of children women have is a very personal decision.

This programmatic review and analysis highlights the marked uptake of contraceptive implants that has been occurring in much of sub-Saharan Africa over the past several years. Although

implants have many attractive features, including convenience, very high effectiveness, and long duration of action, they have been marginal methods for many years in family planning programs, largely because of high commodity cost once upwards of US\$20/set. As recently as 2011, the contraceptive prevalence rate (CPR) for implants in sub-Saharan Africa was only 1.1% among married women, including 0.6% in Western Africa, 0.3% in Middle Africa, and 0.1% in Southern Africa. United Nations (UN), Department of Economic and Social Affairs, (2018); found out that, use of implants among sexually active unmarried women was likely even lower.

In the subsequent few years, however, the situation has been changing greatly for implants in terms of overall use; use by women in almost all socio demographic categories; share of the method mix; and contribution to countries' gains in the modern contraceptive prevalence rate (MCPR) and achievement of Family Planning 2020 (FP2020) goals. This article analyses these changes in 12 countries that comprise 61% of sub-Saharan Africa's population of 1.03 billion people, (World Development Indicators, 2017); noting important achievements and trends and assessing to what extent the “immense potential of wider implant availability is being realised” (Jacob stein R, Stanley H, 2013).

2.4 Factors associated with the uptake of implants methods of family planning

The most recent generation implant was introduced to the U.S. market in 2006, and remains the only contraceptive implant available in the U.S. Barriers to implant use include high up-front cost, lack of awareness and availability, and required insertion and removal by a trained health care provider, (Wood, S, et al. (2014).

Use of long-acting reversible methods is proposed as a strategy to reverse undesirable maternal health consequences in developing countries, (UNFPA, 2011). Scientific evidence has determined implant and copper-bearing Intrauterine Device (IUD) contraceptives to be highly effective and well tolerated (Mitchel MT, 2014).

Similarly, injectables and implants are proven to be safe, effective and reversible contraceptive options (Roberts, and Noyes, 2019). Despite evidence of LARC effectiveness and safety, actual uptake in resource-poor settings like Uganda is low, and is possibly affected by several factors such as knowledge and general awareness of contraceptive methods, access to different contraceptive methods, user characteristics, technology and socio-economic status.

Unintended pregnancy is a major problem among sexually active women and can result from incorrect, inconsistent, or non-use of contraception, or contraceptive failure that is, becoming pregnant while using a family planning (FP) method. Long-acting reversible contraception (LARC), which includes intrauterine devices (IUDs) and subdermal implants, have many desirable attributes, such as highly effective protection against unwanted pregnancies and few contraindications. They do not require the users' ongoing effort for long-term and effective use following initial insertion, are cost-effective, do not require frequent visits for resupply and are reversible with a rapid return to fertility after removal.

The World Health Organisation (WHO) estimates that only one unintended pregnancy occurs among every 2000-implant users in the first year of use; the effectiveness of IUDs is nearly the same. In contrast, failure rates in the first year of typical use for popular short-term methods are considerably higher: 90 unintended pregnancies per 1000 users of pills, and 60 unintended pregnancies per 1000 users of the depo medroxyprogesterone acetate (DMPA) injectable, which contains progestogen hormone. Thus, implants and IUDs are 120 times more effective than the injectable and 180 times more effective than the pill.

LARC methods that are widely available in Kenya include the two-rod levonorgestrel, the one-rod etonogestrel implant, and the copper IUD. Kenya has made tremendous progress in increasing uptake of contraceptive use over the years. As per the Kenya Demographic Health Survey, use of modern methods in Kenya has increased from 32% in 2003 to 53% in 2014 among married women aged 15–49 years, which has largely been driven by use of short-term methods. Uptake of LARC has steadily increased from 4.1% in 2003 to 13.3% in 2014 (Kenya National Bureau of Statistics 2015).

The more recent findings of Performance Monitoring and Accountability (PMA) 2020 round 7 data (November–December 2018) for Kenya, indicates a modern contraceptive prevalence rate (mCPR) of 60.7% with a substantial improvement in long acting and permanent methods (LAPM) use, currently at 28.5%. Despite the progress Kenya has made in contraceptive use over the last four decades, discontinuation rates are still high, with one out of three women discontinuing use by 12 months. Discontinuation rates are higher for common short-term methods (45% for pills, 31% for injectable, and 43% for male condoms) compared with LARC (6% for IUDs, 8% for implants) (Kenya Demographic and Health Survey 2014). Meanwhile, LARC users are less likely to discontinue use due to side effects and health concerns (4% of IUD users, 7% of implant users) compared with common short-acting, hormonal methods (16%

of pill users, 14% of injectable users). Thus, a shift to long-acting methods is likely to reduce discontinuation rates and may better meet women's needs.

Many studies have also cited reproductive health factors such as fertility intention, parity, and desire for FP as influencers of uptake of LARC methods and contraceptive use in general.

In other studies, parity, desired family size, women who gave birth prematurely, previous history of abortion, women who had ever experienced an unwanted pregnancy and women who had visited a clinic in the past year for FP services were identified as reproductive health factors associated with LARC use. While many studies on LARC have been carried out to prove the effectiveness of the methods, the literature regarding determinants of LARC uptake among contraceptive users have focused mainly on certain women population subsets, such as postpartum women and adolescents.

2.5 Level of Access to implants among women of reproductive age

Some evidence supports the idea that the popularity of SAHC over LARC methods is more due to access barriers than women's preferences. For example, mobile outreach has been a more effective strategy for LARC promotion than clinic-based provision (U.S. Agency for International Development, 2012,) suggested that convenience plays a role in demand. Furthermore, supply-side deficits including lack of trained providers to offer LARC methods and supply chain problems are common in Low Middle Income Countries and create supply-side barriers for LARC access, (Tilahun Y, Lew C, 2017). Even when methods are theoretically available, evidence from the United States suggests that patient interest in LARCs is dependent on adequate counselling and training of providers.

According to (Staveteig S, Maliick L, 2015); Cost is another access barrier to contraceptive use that is likely to disproportionately decrease interest in long acting reversible contraceptive methods relative to SAHC. Lastly, other aspects of the service delivery environment such as provider bias or distrust in services, which commonly impact adolescents, and general concerns over quality of care may also influence LARC use. Indeed, a demonstration project in Ethiopia to create youth friendly family planning services found that it successfully increased LARC uptake among the target population,

The use of long-acting methods like implants by couples in a country shows that the family planning (FP) program in that country is highly efficient in terms of management and financing in addition to being highly effective in spacing and limiting births. This is owing to implants'

fewer requirements of providers and a lesser quantity of contraceptive supplies than a program relying on short-acting methods. Furthermore, implants prevent unintended pregnancies, reduce the number of abortions, and lower the incidence of death and disability related to complications of pregnancy and childbirth, (Endriyas M., 2017).

Use of implants also frees a woman from using injectable contraceptives every three months and daily pills during the intended birth intervals because they are effective in preventing pregnancy from 3 to 5 years. Despite these benefits, the use of long-acting contraceptives (LACs) has not kept pace with that of short-acting methods, such as oral contraceptives and injectables. Data from demographic and health surveys (DHS) from four sub-Saharan countries show that the proportion of women currently using LACs is significantly lower than the proportion using short-acting methods.

Globally, among women of reproductive age group, 53% use modern contraception methods but less than one percent use implants. In many sub-Saharan African countries, fewer than 5% of women are using LACs. The (Ethiopian demographic and health survey, 2016) also showed that only 10% family planning (FP) clients utilised long-acting methods (8% implants and 2% IUCD).

Ethiopia introduced community level implant insertion by trained health extension workers (HEWs). In order to strengthen and support the work of HEWs at the community level, the Ethiopia government introduced a new community mobilisation structure called women development groups (WDGs) (Abrha Medhanyie A., 2017) which consists of a group of women networked in the villages where health extension workers visit and mobilise the candidate women for the appropriate Implanon uptake. Implants are relatively the preferred methods of contraception than other long-term family planning methods though not the commonest method in use in many countries.

2.6 Summary of the literature review

These literature reviews present good background information on the levels and factors associated with implants among mothers of reproductive ages across the globe and within sub-Saharan Africa. There is a citing in the literature from the (U.S Agency for international development, 2012), that said; convenience plays a role in demand and furthermore, supply-side deficits including lack of trained providers to offer implants methods and supply chain problems are common in Low Middle Income Countries and create supply side barriers for their access.

And to my own observations, there are myths which rural women have in mind is that when an implant is put under the skin, it travels away from where it was, moves and disappears in the body, this scares women who have limited information about it. Moreso, I agree with (Staveteig S, Maliick L, 2015); who stated that; Cost is another access barrier to contraceptive use that is likely to disproportionately decrease interest in long acting reversible contraceptive methods relative to SAHC. Financial constraints, implants are a little bit more expensive than injectables and pills, and for this matter, the majority of the women who can't afford them disregard them.

CHAPTER THREE:

3.0 RESEARCH METHODOLOGY

3.1 Introduction

This chapter presents a description of the methodology the researcher employed during the collection and processing process. The chapter covered study design, area of study, information sources, study population, sample selection, data collection methods, and procedure for data collection. The instruments to collect the data, including methods to be applied to maintain validity and reliability of the instrument and the data analysis are also well illustrated.

3.2 Research Design

The research was a community-based cross sectional study conducted in Twic East County of Jonglei state, South Sudan. The research was carried out among women of reproductive age (15-49) in 5 Payams of Twic East county. The research employed a mixed methods design using quantitative and qualitative methods for data collection. The qualitative approach was useful in generation of information on the non-quantifiable information such as perceptions of the respondents.

3.3 Area of Study

Twic East County is located in Jonglei State, which is the largest state in South Sudan. The county is composed of five Payams namely: Pakeer, Ajuong, Nyuak, Lith and Kongor with an estimated population of 111,935 people (before the outbreak of violence and flooding that led to population displacement). Headquarters of Twic East County and it is situated in Panyagor and considered at the level of town. Rural villages of Twic East county are about 7-60 KMs away from boundaries of Panyagor town which is considered as an urban centre.

Twic East County in Jonglei state is among the worst areas that has been experiencing high maternal mortality and infant mortality. According to estimates from the World Health Organization and United Nations the infant mortality rate is 102 deaths per 1,000 live births, and the under-five mortality rate is 135 per 1,000 live births.

3.4 Sources of Information

The main source of information for this research was primary data which was collected from respondents' households by use of questionnaires. Number of key informants' interviews and some focus group discussions were also administered, brought together and compared and then consolidated general concepts in the area.

3.5 Study Population

According to Bordens & Abbott (2011), population is defined as all elements (individuals, objects and events) that meet the sample criteria for inclusion in a study. The eligibility criteria were that the participants must be a female between the ages of 15 to 49 years.

3.6 Sample Size determination

According to Black and Champion (1976), a sample is a portion of elements taken from a population, which is representative of the population. The study population should be known so that the sample size was determined using Yamane Taro method and calculation.

$$n = \frac{N}{(1+(N(e)^2)} \quad N=650, e=0.05 \quad \frac{650}{(1+(650*(0.05)^2)} \quad 650/ (2.625) =248$$

Where

n is the required sample size,

N is the study population size

e is the margin of error (which is 0.05)

Considering the calculation, the sample size consisted of 248 respondents randomly selected from 650 households in Twic County.

3.7 Sampling Techniques and procedures.

According to Black and Champion (1976), a sample is a portion of elements taken from a population, which is representative of the study population. This research involved selection in a progressive stage. The sampling was spread across three Payams and only 5 bomas were targeted in this area of study of Twic which had equal chances of being selected for the study. The 248 respondents were however selected from one randomly selected five village. At village level, a random sampling technique was applied to get each respondent in a household. The first household was selected due to the close proximity to the roadside and the second household was selected after the three household and the interval of the households continue until the end of the data collection. This ensured that each household in the study area had an equal chance of participating in the study.

3.8 Data collection Methods

Structured questionnaires were used to collect data. The questionnaire was designed in English; then translated into local language (Dinka) for respondents, then administered through face to face interviews. Three research assistants were recruited and trained for this purpose. The research assistants had a minimum qualification of diploma in public health and certificate in medical assistant. The approach and content of questionnaire translation into the local dialect was part of the enumerators' training; in which the team discussed and agreed on specific words and phrases and for capturing consistent, valid, reliable and uniform data.

The questionnaires were pre-tested with 20 participants in Panyagor headquarters of Twic East County, where the adolescents have similar characteristics as those in the study area. The questionnaire was revised with the necessary corrections from the pretesting and reviewed before the main data collection activity. The final revised questionnaire was used to study the participants at households. The average time for an interview was 15 minutes per respondent. All the interview forms were addressed with anonymity of the participants. Using the pre-tested questionnaire, data were collected on key subjects including socio-demographic characteristics of reproductive women, knowledge of family planning implants, and the health facility related factors with the respondents. Consent was sought from the husband to allow the participation of the wife in the study.

3.9 Data collection instruments

A structured open-ended questionnaire was used as data collection instruments. A questionnaire is a printed self-report form designed to elicit information that can be obtain through the written responses of the participants and the illiterate participants were assigned the female translators to interpret the message to them before they provide their answers. The decision to use questionnaires as tools for data collection was influenced by following advantages as outlined by Borden & Abbott (2011). They ensure a high response rates as the questionnaires were distributed to respondents to complete and be collected by the researcher himself, they required less time and drive to administer, they offered the possibility of anonymity because subjects are not named. The questionnaires consisted mostly of closed-ended questions, as these provide diverse and details.

3.10 Quality and Error control

The way to control the quality was to develop a well-written procedure for data collection to share with the research assistant and the critical recruitment and training plan to enforce the value of collecting accurate data. The final step is to monitor and evaluate the process in the field and identify areas of improvement to strengthen the study's protocol, (Knatterud GL, 1998).

3.11 Reliability

Reliability in research measures how stable, trustworthy, dependable, and consistent a test is in measuring the same thing every time the data is collected. In this way, the collection of the data can be repeated and should have the same result (McNeill, 1985). Having this in mind as a researcher, attention was paid to the designing of the questionnaires and instruction on how to answer the questionnaires so clearly to avoid any ambiguity.

Furthermore, a pilot test using the intended procedures and the same questionnaire was administered prior to full scale data collection. This was to evaluate the feasibility and reliability of the proposed procedures. The results were extrapolated, and lessons learnt were taken into consideration for correction during the study prior.

3.12 Validity

According to Burdens & Abbott (2011), validity measures the extent to which certain inferences can be made from test scores or other measurement. It looks at the extent or the degree to which

the test or measurement used accomplishes the purpose for which they are being used. The research followed clear, well designed, reliable, and up to date questionnaires and designs.

A team of research assistants who were involved in data collection were also trained on the procedure and administration of the tools. The pre-test in the homogenous population aimed to ensure familiarity to the real situation and testing of the tools' validity. The results were examined and quickly analysed to incorporate and adjust and lessons learnt for more accuracy information during the survey.

3.13 Strategy for data processing and analysis

The data was entered into Epidata version 3.1 and exported to Stata version 14 for cleaning, validation and analysis. Frequencies and percentages were used to summarize the respondents' demographic characteristics. The pie-chart was used to determine the level of uptake of implants. The modified poisson regression model was used to determine the factors associated with uptake of implants among the women. Variables that had p-values less than 0.2 at bivariate level were considered for multivariate analysis. The prevalence ratio (PR) was used as the measure of association and p-values less than 0.05 implied statistical significance.

3.14 Ethical considerations

The researcher started the processes with getting the ethics clearance from UCU REC and then clearance from the Local government of the area under study, and during the data collection processes, the research sought consent of the respondents and carried on with the interviews. The purpose of the research was communicated to the respondents and consents were first sought before entering into interviews. This was to give room for confident building. Assurance was provided to the respondents that no particular reference was to be given to them regarding the information collected. The questionnaires were administered with no name to avoid inconveniencing the individual female respondents' privacy. The research was purely for academic purposes and as required, all the consulted resources were acknowledged, cited and referenced.

3.15 Anticipated methodological constraints

Access, especially during the rainy season, was always a challenge in Jonglei state and areas of Twic East county in particular. These led to alteration of random selection in the selected location and were replaced due to access issues. Another anticipated limitation was that the research was only carried out in Twic East which was a county out of 79 counties in the country while the information could be used to generalise the general situation in South Sudan.

CHAPTER FOUR

4.0 DATA ANALYSIS AND PRESENTATION

4.1 Socio-demographic characteristics of respondents

The study was conducted among 248 but 8 of the participants declined to participate in the survey and hence 240 women of reproductive age (15- 49) were interviewed in Twic East Community, South Sudan. Two-thirds of the women (159/240, 66.2%) were between 15 and 24 years. The majority of the women (171/240, 71.2%) had at most primary education. Only a quarter of the women (60/240, 25.0%) were salaried workers, with more than a half (141/240, 58.7%) earning a monthly income less than 10,000 SSP. Most of the women (150/240, 62.5%) had at least 3 children, and almost all of them (237/240, 98.7%) had been pregnant before. Table 1 provides a summary of the socio-demographic characteristics of the respondents.

Table 1: Socio-demographic characteristics of 240 women of reproductive age in Twic East Community, South Sudan

Characteristic	Category	Frequency	%
Age group (years)	15- 24	60	25.0
	25- 34	99	41.2
	35- 44	60	25.0
	45- 49	21	8.8
Education	No formal education	78	32.5

	Primary	93	38.7
	Secondary	57	23.7
	Tertiary	9	3.7
	Other	3	1.2
Occupation	Salaried worker	60	25.0
	Trade/business	90	37.5
	Farmer	87	36.3
	No	3	1.2
Residence	North	132	55.0
	Central	48	20.0
	South	60	25.0
Monthly income	1,000- 5,000SSP	81	33.7
	5,100- 10,000SSP	60	25.0
	10,100- 15,000SSP	30	12.5
	15,100- above	69	28.8
Religion	Catholic	57	24.0
	Anglican	93	39.2
	Pentecostal	51	21.5
	Episcopal	30	12.7
	Seventh Day Adventist	6	2.5
Children	1 to 2	90	37.5
	3 to 5	102	42.5
	6 to 10	48	20.0
Pregnant before	Yes	237	98.7
	No	3	0.3
Outcome of pregnancy	Live birth	216	91.2
	Still birth	6	2.5
	Spontaneous abortion	15	6.3
Had unplanned pregnancy	Yes	42	17.5
	No	198	82.5
Sexual partners	One	198	84.6
	Two	36	15.4

4.2 Level of uptake of implants

The level of uptake of implants among women of reproductive age in Twic East Community, South Sudan was at 40 percent (96 out of 240), with a 95% confidence interval of 33.7 percent to 46.5 percent (See Figure 1). The majority of the women mentioned child spacing as the main reason for using implants (85.3%), and fear for side effects (36.7) as the main reason for not using them (See Table 2 for more details).

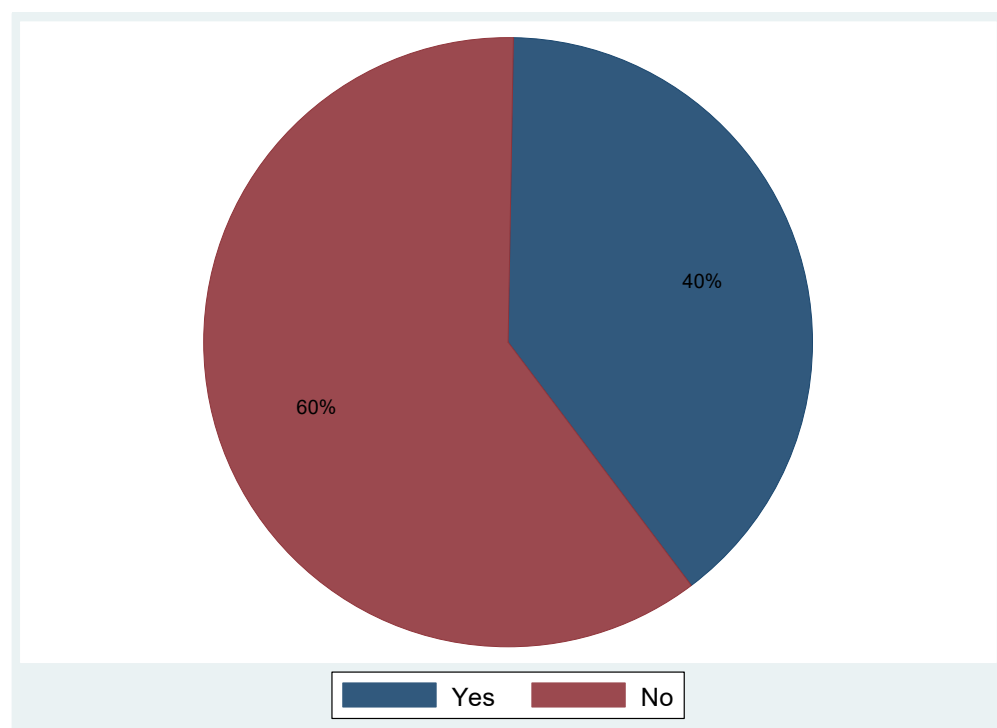


Figure 1: The level of uptake of implants among 240 women of reproductive age in Twic East Community, South Sudan

Table 2: Reasons for using implants among women of reproductive age in Twic East Community, South Sudan

Characteristic	Category	Frequency	%
Why using implants *	Space birth	87	85.3
	Limit number of children	45	44.1
	Birth control	21	20.6
	Studies	6	5.9
Reasons for not using implants *	Religious belief	24	16.3

	Fear side effects	54	36.7
	Pressure of husband	42	28.6
	Fear of removal of implant	36	24.5
	Want to have a child	84	57.1
When to have a child	Less than one year	33	13.7
	1 to 2 years	150	62.5
	3 to 4 years	48	20
	5 years or more	9	3.7

*- multiple response variable

4.3 Factors associated with uptake of implants

4.3.1 Bivariate Analysis

The modified poisson regression was used to determine the factors associated with uptake of implants. At bivariate level, the outcome variable- uptake of implants was regressed with each independent variable. The independent variables were socio-demographic, knowledge and health system characteristics.

4.3.1.1 Socio-demographic characteristics

The socio-demographic characteristics included in the bivariate analysis were being age groups, education level, occupations, residence, monthly income, religion, children, outcome of pregnancy, had un-planned pregnancy and sexual partners. The socio-demographic characteristics significantly associated with implants uptake were 25-34 years and 35-44 years age groups, secondary and above education level, Trade/business and farmer occupations, 15,100- above monthly income, Anglican and other religion, stillbirth outcome of pregnancy, had no un-planned pregnancy and having 2 sexual partners (See Table 3 for details).

Table 3: Bivariate modified poisson regression to determine socio-demographic characteristics associated with uptake of implants

Characteristic	Category	Uptake of implants			
		Yes	No	cPR	95%CI
Age group (years)	15- 24	15	45	1	

	25- 34	51	48	2.06	1.28- 3.33	0.003
	35- 44	27	33	1.8	1.07- 3.03	0.027
	45- 49	3	18	0.57	0.18- 1.78	0.335
Education level	No formal education	24	54	1		
	Primary	30	63	1.05	0.67- 1.64	0.835
	Secondary and above	42	27	1.98	1.35- 2.90	<0.001
Occupation	Salaried worker	39	21	1		
	Trade/business	30	60	0.51	0.36- 0.72	<0.001
	Farmer or no occupation	27	63	0.46	0.32- 0.67	<0.001
Residence	North	54	78	1		
	Central	18	30	0.92	0.60- 1.39	0.685
	South	24	36	0.98	0.67- 1.42	0.906
Monthly income	1,000- 5,000SSP	24	57	1		
	5,100- 10,000SSP	21	39	1.18	0.73- 1.91	0.498
	10,100- 15,000SSP	12	18	1.35	0.78- 2.35	0.288
	15,100- above	39	30	1.91	1.28- 2.83	0.001
Religion	Catholic	33	24	1		
	Anglican	33	60	0.61	0.43- 0.87	0.007
	Other	27	60	0.54	0.36- 0.79	0.001
Children	1 to 2	30	60	1		
	3 to 5	48	54	1.41	0.99- 2.02	0.059
	6 to 10	18	30	1.12	0.70- 1.80	0.622
Outcome of pregnancy	Live birth	87	129	1		
	Still birth	6	0	2.48	2.11- 2.92	<0.001
	Spontaneous abortion	3	12	0.49	0.18- 1.39	0.182
Had unplanned pregnancy	Yes	27	15	1		
	No	69	129	0.54	0.40- 0.73	0.001
Sexual partners	One	66	132	1		
	Two	24	12	2	1.47- 2.71	<0.001

cPR- Crude Prevalence Ratio; CI- Confidence Interval

4.3.1.2 Knowledge and health system characteristics

The knowledge characteristics included for the bivariate analysis included where information was obtained, discuss with husband about implants, and who decides use of implants. Whereas the health system characteristics included distance from the health facility, implant services accessible, nature of service provider, services always available at health facility, attitude of health workers, implant services free in area and cost of implant services. The significant characteristics included where information was obtained from family members/friends, not discussing with husband about implants, husband or wife decides to use implants, not used implants before, need vehicle for distance from health facility, family planning provider as nature of service provider and no service free in the area (See Table 4).

Table 4: Bivariate modified poisson regression to determine knowledge and health system characteristics associated with uptake of implants

Characteristic	Category	Uptake of implants		cPR	95%CI	P-value
		Yes	No			
Obtained information	Health facility	78	78	1		
	Family members/friends	12	42	0.44	0.26- 0.75	0.002
	Radio/religious leaders	6	9	0.80	0.42- 1.52	0.495
Discuss with husband about implants	Yes	81	87	1		
	No	15	57	0.43	0.27- 0.69	0.001
	Both husband and wife					
Who decides use of implants	wife	72	18	1		
	Husband	3	33	0.10	0.03- 0.31	<0.001
	Wife	21	39	0.44	0.30- 0.62	<0.001
Used implants before	Yes	21	3	1		
	No	75	138	0.40	0.32- 0.51	<0.001
Distance from health facility	Within walking distance	57	81	1		
	Need vehicle	39	24	1.50	1.13- 1.98	0.004

Implant services accessible	Yes	78	36	1		
	No	18	6	1.10	0.84- 1.42	0.495
Nature of service provider	Health centre	30	24	1		
	Hospital	54	39	1.04	0.78- 1.40	0.769
	Family planning provider	12	36	0.45	0.26- 0.78	0.004
Services always available at h/centre	Yes	54	63	1		
	No	42	72	0.80	0.58- 1.09	0.155
Attitude of Health workers	Positive	81	129	1		
	Negative	15	9	1.62	1.14- 2.31	0.008
Services free in the area	Yes	93	117	1		
	No	3	21	0.28	0.10- 0.82	0.021
Rate cost of implants	Expensive	3	21	1		
	Affordable	57	42	4.61	1.57- 13.51	0.005

cPR- Crude Prevalence Ratio; CI- Confidence Interval

4.3.2 Multivariate Analysis

The factors that were less than 0.2 at bivariate level were considered for multivariate analysis. At multivariate level, after assessing for interaction and confounding, the factors that were significantly associated with uptake of implants were 45-49 years age group (aPR=0.25, 95%CI: 0.08- 0.78, P-value=0.017), Anglican and other religion (aPR=0.60, 95%CI: 0.37- 0.95, P-value=0.031; aPR=0.48, 95%CI: 0.30- 0.78, P-value=0.003), having 3-5 and 6-10 children (aPR=1.86, 95%CI: 1.24- 2.78, P-value=0.003; aPR=3.67, 95%CI: 1.69- 7.99, P-value=0.001), having still birth pregnancy outcome (aPR=4.35, 95%CI: 2.56- 7.39, P-value=0.001), not had unplanned pregnancy (aPR=0.45, 95%CI: 0.29- 0.69, P-value=0.001) and not discussing with husband about implants (aPR=0.21, 95%CI: 0.12- 0.37, P-value=0.001) (See Table 5 for details)

Table 5: Multivariate modified poisson regression to determine factors associated with uptake of implants

Characteristic	Category	aPR	95%CI	P-value
Age group (years)	15- 24	1		
	25- 34	1.28	0.84- 1.96	0.253
	35- 44	1.36	0.68- 2.71	0.386
	45- 49	0.25	0.08- 0.78	0.017
Education	No formal education	1		
	Primary	1.07	0.68- 1.68	0.779
	Secondary and above	1.39	0.83- 2.34	0.208
Occupation	Salaried worker	1		
	Trade/business	0.86	0.48- 1.54	0.604
	Farmer or no occupation	0.83	0.48- 1.44	0.506
	1,000- 5,000SSP	1		
Monthly income	5,100- 10,000SSP	0.96	0.55- 1.69	0.899
	10,100- 15,000SSP	0.56	0.30- 1.03	0.064
	15,100- above	0.90	0.50- 1.61	0.727
	Religion	Catholic	1	
Anglican		0.60	0.37- 0.95	0.031
Other*		0.48	0.30- 0.78	0.003
Children	1 to 2	1		
	3 to 5	1.86	1.24- 2.78	0.003
	6 to 10	3.67	1.69- 7.99	0.001
Outcome of pregnancy	Live birth	1		
	Still birth	4.35	2.56- 7.39	<0.001
	Spontaneous abortion	0.64	0.15- 2.71	0.550
Had unplanned pregnancy	Yes	1		
	No	0.45	0.29- 0.69	<0.001
Discuss with husband about implants	Yes	1		
	No	0.21	0.12- 0.37	<0.001

aPR- Adjusted Prevalence Ratio; CI- Confidence Interval; *- Pentecostal, Episcopal, seventh Day Adventist and Muslim

CHAPTER FIVE

5.0 DISCUSSION

5.1 Introduction

The study sought to determine the level of uptake of implants and associated factors among women of reproductive age in Twic East Community, South Sudan. The study involved a random sample of 240 women. Two-thirds of the women were between 25 and 34 years, and the majority had at most primary education. Most of the women had at least 3 children, and all the women have been pregnant before. The level of uptake of implants was at 40 percent, with a 95% confidence interval of 33.7 percent to 46.5 percent. The factors that were associated with uptake of implants included; 45-49 years age group, Anglican and other (Pentecostal, episcopal, seventh day Adventist and Muslim) religion, having 3-5 and 6-10 children, having still birth pregnancy outcome, not had unplanned pregnancy and not discussing with husband about implants. The findings from this study will be used to improve the uptake of implants among women of reproductive age with the aim of preventing unplanned pregnancies and on other hand, several studies have reported older women to have a higher likelihood of using implants or modern family planning methods. However, a population based study conducted among women aged 15 to 49 years in 20 African countries reported women aged 25 to 34 years more likelihood to use modern contraceptives compared to those aged 15 to 24 years (Apanga et al., 2020)

5.2 The level of uptake of implants

Our study estimated the level of uptake of implants among women of reproductive age in Twic East Community, South Sudan at 40 percent, with a 95% confidence interval of 33.7 percent to 46.5 percent. Meaning, out of every 100 women of reproductive age, 40 are currently using implants as a contraceptive method. Our estimate was higher than what was reported in several studies in Africa which range between 6.1 percent and 26.5 percent (Apanga et al., 2020; Boadu, 2022; Busse, 2016; Hubacher et al., 2011). A study conducted in a similar setting, among 400 young women in Kenya, by Hubacher et al. (2011) reported an uptake of 24 per cent. This difference could be due to the difference in the definition of reproductive age. Our study considered an age group of 15 to 49 years (as reproductive age) which includes more sexually active adults as compared to Kenya study that used 18 to 24 age groups. Another study

conducted in Juba teaching hospital among 295 postpartum women reported only 18 (6.1%) used long acting reversible contraceptive methods, and all the 18 mothers used implants (Busse, 2016). The level of uptake at the teaching hospital could be very low because the study was done among postpartum women who may not be engaging in sexual activities immediately after giving birth.

5.3 Factors associated with uptake of implants

5.3.1 Socio-demographic factors

Our study found the age group 45-49 years to have a decreased likelihood for uptake of implants. The prevalence of implants uptake among women aged 45 to 49 years was 75 percent less than that of women aged 15 to 24 years. This could be because the women aged 45 to 49 years are no longer as sexually active as those aged 15 to 24 years. Several studies have reported older women to have a higher likelihood of using implants or modern family planning methods. However, a population based study conducted among women aged 15 to 49 years in 20 African countries reported women aged 25 to 34 years more likelihood to use modern contraceptives compared to those aged 15 to 24 years (Apanga et al., 2020). This could also mean that women in the age group 25 to 34 years use more implants than those in age group 15 to 49 years, however, when they move into the age group of 45 years and above, they tend to be less sexually active and use less implants than those aged 15 to 24 years. Boadu (2022) also reported women between 35 and 39 years to be more likely to use implants or modern contraceptives.

The Anglican and other (Pentecostal, episcopal, seventh day Adventist and Muslim) women were found to have a reduced likelihood for uptake of implants. The prevalence of uptake of implants among the Anglican women was 40 percent times less than that of the Catholic women. Whereas that of the Anglicans was 52 percent times less than that of the Catholic women. On the contrary, a study by Busse (2016) reported that the Muslim women to have an increased likelihood for uptake of long acting reversible contraceptives compared to the Catholic women. Oluwole et al. (2016) also found religion to be significantly associated with uptake of modern family planning methods.

Having 3 children or more was found to have an increased likelihood for uptake of implants. The prevalence of uptake of implants for women with 3 to 5 children was almost twice that for

women with less than 3 children whereas the prevalence for those with 6 to 10 children was over 3 times more. These results show that as women get more children they tend to use more of the implants. A study by Ssentongo et al. (2019) also reported having more living children was associated with contraceptive use.

Having still birth outcome of pregnancy was also significantly associated with the uptake of implants. The prevalence of uptake of implants among women that have had still births was over 4 times that of the women that have had live births. Perhaps this could be because the women are afraid of getting pregnant again after having still births. Our results also showed that women who did not have unplanned pregnancy were less likely to use implants compared to those who had planned pregnancy. This also means that women, who have gone through the hardship of unplanned pregnancies, now appreciate the importance of using implants to avoid such happenings in the future.

5.3.2 Knowledge factors

Women who discuss with their husbands about implants were found to have an increased uptake of implants. The prevalence of implant uptake among women who discussed with their husbands about implants was 79 per cent more likely to use implants. Perhaps this could be because when the woman discusses implants with the husband, they get encouragement from their partner or husband to use implants. Consequently, the husbands are a motivational factor for women to use the implants.

CHAPTER SIX

6.0 CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusion

Our study found uptake of implants among the women still low. The factors- being in the age group 45- 49 years, being non-Catholic, having 3 children or more, having still birth outcome of pregnancy and discussing with husband about implants were significantly associated with uptake of implants. Policies targeted to women of age group 45 to 49 years to encourage use of implants, more sensitization of husbands on implants will help to improve uptake of implants and consequently prevent unplanned pregnancies.

6.2 Recommendation

Basing on the results presented, the following recommendations should be considered;

- The authorities in Twic East should consider women in the age group of 45-49 years while formulating policies related to uptake of implants.
- In Twic East, the non-Catholic women should also be encouraged to use implants. This can be majorly done by the religious leaders, as a campaign to prevent having unplanned pregnancies.
- The women with less than 3 children should be sensitized to start early to use implants.
- The husbands should be sensitized on importance of using implants, as evidence shows that they have a big influence on women's decisions to use implants.

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