ASSESSMENT OF COMPLIANCE WITH IRON AND FOLIC ACID SUPPLEMENTATION AMONG ANC WOMEN ATTENDING PUMWANI MATERNITY HOSPITAL, NAIROBI COUNTY

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DECLARATION

This work is my original creation and never has it been submitted for a degree in any institution of high learning.

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Approved by Supervisor

We do confirm that the work submitted in this thesis was done by the candidate under our supervision

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DEDICATION

I dedicate this thesis to my late father as well as to my wife for her unceasing support and inspiration.

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ABSTRACT

Out of three mothers, one has anaemia and lack folic acid, signifying that iron and folic acid (IFA) deficiencies make up the major micronutrient deficiencies among women in the world. Iron insufficiency is a serious health problem due to its increased prevalence and potential negative outcome. Iron insufficiency may lead to many adverse consequences like preterm births, stillbirth, underweight births, and maternal and neonatal deaths. The main aim of the research was to establish the determinants of the utilization of Iron & Folic Acid Supplements (IFAS) among pregnant women visiting free maternity services in Pumwani Maternity Hospital (PMH), Nairobi-Kenya. The research focused on socio-demographic factors; knowledge among expectant mothers; and the prevalence of IFA use amongst expectant mothers visiting Antenatal Care (ANC) in PMH. A cross-sectional design was used. The primary data was collected from the expectant mothers visiting PMH for ANC services by administering questionnaires and key informant interviews. The researcher used both probability and non-probability sampling methods. The researcher used random sampling approach to determine equal chance among the pregnant women in PMH. All expectant mothers that consented to the research were interviewed with the aid of a written questionnaire targeting a sample size of 341 participants. The data was collected, edited, coded and put into Epi-Data after which it was exported to SPSS. Descriptive analysis was utilized to establish the use of IFAS amongst expectant mothers. Distribution of the variables was analyzed via the use of frequency tables. Bivariate analysis was completed to establish the factors related with IFAS used amongst expectant mothers by using P-value and Pearson's Chi-Square. Binary Logistic regression was used to establish predictors of use of iron and folate supplements. Ethical clearance to conduct this study was obtained. Findings from the study show that 70% of respondents used IFAS during pregnancy. Close to 52 % respondents had good knowledge on the use of iron and folate supplementation. Bivariate analysis illustrates that level of education χ^2 *(df=3)* (15.15, N=341), *p=0.02* and level of knowledge χ^2 (*df*=1) (22.6, N=341) *p=0.001* were significantly associated with uptake of iron and folate supplementation. Regression analysis shows that the level of education A.O.R=3.331 (CI 2.0119-5.496) *p=0.0001*, level of knowledge A.O.R=1.886 (CI 1.317-2.701) p=0.001 and the number of pregnancies A.O.R=0.154, (CI 0.010-1.413) were strong predictors of iron and folate supplementation. Social demographic factors that significantly influenced use of IFAS were household income and number of children. Formal education and mothers' knowledge on use of IFAS significantly increased the odds three folds using IFAS. Use of IFAS reduced the chances to experience of anaemia in life or during pregnancy. Majority mothers were able to access health facilities and IFAS whenever needed. IFAS was affordable. The health facilities were operational and met health care needs. Health care workers hospitability and provision of satisfying prescription of IFAS increased use of IFAS by 9.5 and 2.8 times respectively. To achieve desirable coverage level on the use of iron-folate supplementation, policy makers should develop novel strategies to educate expectant women. All stakeholders should take a further step on promoting IFAS use to ensure 100% compliance.

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LIST OF ABBREVIATIONS AND ACRONYMS

ANC	Antenatal Care
FANC	Focused Antenatal Care
IFA	Iron & Folic Acid
IFAS	Iron & Folic Acid Supplements
KDHS	Kenya Demographic Health Survey
KMOH	Kenya Ministry of Health
KNG-CIFFAS	Kenya National Guideline of Combined IFAS
MOPHS	Ministry of Public Health & Sanitation
NTDs	Neural Tube Defects
PMH	Pumwani Maternity Hospital
USAID	United State Agency for International Development
WHO	World Health Organization

CHAPTER ONE

INTRODUCTION

1.0 Introduction

The chapter consists of background of the study, Problem statement, objectives and questions of the research, the significance of the research and finally conceptual Framework.

1.1 Background

World Health Organization (WHO), (2015) describes anaemia in female who are at the age of bearing children being the state in which hemoglobin convergence is below 12.0 g/dL. It is characterized as less than 11.0 g/dL amongst expectant mothers. Hemoglobin focus cut-off level that characterizes anaemia shifts in age, physiological status, smoking status, and the height in that evaluated populace resides. Frailty amid pregnancy can prompt unfavorable maternal and prenatal results. The WHO prescribes that every single pregnant woman, gets supplements containing iron and folic acid are highly recommended in areas where anemia is common.

Iron deficiency is a condition that occurs when there is not enough iron in the body to maintain the typical physiological states of tissues. Anemia is caused by a lack of iron in the body. Although there are a number of factors that might lead to anemia, it is generally accepted that a significant fraction of instances are brought on by a deficiency in physical activity (Ganz and Nemeth, 2016). Anemia is caused by a lack of iron in the diet in at least one out of every two pregnant women who develop the condition (Percy and Fraser, 2017). The most vulnerable demographic, both in terms of prevalence and severity, are young children and women of childbearing age. The survey that was carried out by the WHO in 2015 found that roughly 42 percent of women suffer from anemia. The government guideline for the Philippines' effort to prevent micronutrient deficiencies emphasizes the necessity of daily IFAS throughout pregnancy (WHO, 2012). Factors such as

population size and maternal health care access in a country like the Philippines shape the IFAS policy for pregnant mothers there and elsewhere. Factors including travel, the price of tablets, and the quality of prenatal counseling on IFAS all play a role (Nisar et al., 2014). However, both globally and locally, supplementation is the most often used method of treating iron insufficiency. In accordance with programs offered by the Philippine government many Filipinos rely on the services provided by barrio health stations which are staffed and located in rural areas (Kavle & Landry, 2018). The midwife at each BHS knew the names of all of the women who got IFAS. Pregnant women receive IFAS at no cost. Pregnant women consumed 82.4% of the recommended pills, according to the 2008 Philippines National Survey that assessed the uptake of IFAS (Fiedler & D'Agostino, 2015).

When compared to the prevalence of anemia in expecting women in wealthy nations (18%), the prevalence of anemia in underdeveloped nations (56%) is significantly higher than the prevalence of anemia in wealthy nations (8%). There was a prevalence of anemia among pregnant African mothers of 48.2 percent (Gebremariam et al., 2019). Maternal anemia affects 31% of Eswatini's pregnant women, despite the fact that researchers have not yet investigated the factors that might account for the country's lower prevalence rate in comparison to that of other developing nations (Mabuza et al., 2021). The mother and the kid she is carrying are both at risk of dying from anemia (Ali et al., 2011). There is a strong correlation between anemia and the risk of having a pregnancy end in a stillbirth. According to estimates, forty percent of Eswatini's female population is anemic, which may be caused by a lack of iron in the diet (Birhanu et al., 2018). As part of their prenatal care (also known as antenatal care or ANC), all pregnant women ought to be given an oral supplement of IFA (Barua et al., 2014).

Pregnant women experience an anaemia prevalence of around 40% in all of West Africa's countries, including Niger (Ayoya et al. 2012; WHO, 2015), raising serious public health concerns (WHO, 2011). According to estimates, more than 55% of children and pregnant women living in low-income areas of the world have anaemia that can be treated with iron (Stevens et al., 2013). According to Black et al. (2008), iron deficiency causes maternal mortality, and anemia is responsible for 6.4% of maternal deaths in Africa. Having 7.6 children is the norm rather than the exception in Niger (The World Bank, 2015). It is anticipated that increased ANC use and IFA supplement compliance will enhance mother and newborn health outcomes, including a decrease in maternal anemia and maternal death (Pena-Rosas et al. 2015). Niger has enacted a policy of regular ANC for IFA supplementation throughout pregnancy (Wuehler & Biga Hassoumi, 2011). Although there have been significant increases in the coverage, more significantly, 58.6% of pregnant women had anaemia, which is a very high incidence (WHO, 2016).

It is possible to predict anemia with a high degree of accuracy, and the condition can be treated (WHO, 2011). In order to combat the underlying causes of anemia, such as jungle fever, worm infestations, and press supplements, a number of preventative measures have been put into place in Africa. These measures have proven to be effective and compelling in reducing the prevalence of anemia during the prenatal period (Burke and Suchdev, 2014; Breymann, 2015).

IFA supplementation adherence varies significantly across Ethiopia (Abdullahi et al., 2014; Titaley & Dibley, 2015; Ratanasiri & Koju, 2014), distinct dynamics impact supplementation adherence (Maina et al., 2013). Despite advancements in maternal and child health initiatives over the past 20 years, anaemia still affects 24% of pregnant women in Ethiopia (Sanghvi et al., 2010) and IFA supplement adherence is patchy. By resolving information gaps and removing obstacles to IFA

supplements compliance, pregnant women's IFA status has not been permanently and uniformly improved (Nisar et al., 2016).

The world mortality percentage, which is the ratio of maternal deaths to 100000 live births, fell by almost 2.3 percent each year between the years 1990 and 2015. This decline occurred between the years 1990 and 2015. Despite this, there has been a reduction in the number of deaths that occur during pregnancy since the year 2000. (WHO, 2016). In collaboration with other organizations, the Ministry of Health of Kenya has developed and implemented a multi-year program with the goals of increasing the IFAS utilization ratio, reducing maternal and neonatal mortality rates to 147 per 100,000 and 11 per 100,000 respectively by the year 2015, and accelerating IFAS utilization.

USAID (2014) indicated that, in Nairobi, the prevalence of folic acid and iron corrosive use amongst expectant moms was at 28.0%. This demonstrates a gap between the administration's focus of reaching 80% and the genuine take-up in the populace. The report also demonstrates 44.6 % and 58% detailed had gotten data on compress and folic corrosive independently. Out of the women who got supplementation, 67.7% established being begun on press supplementation after 4 months of incubation while 80.7% proclaimed having begun on folic corrosive supplementation following twelve weeks. Investigation indicates poor learning or absence of data on press and folic corrosive supplementation.

Folate and Iron are micronutrients that are needed in little quantity for typical working, development & advancement. Day by day press supplementation is prescribed to every pregnant lady as a major aspect in ANC to diminish dangers of underweight births, press insufficiency, maternal Anemia that are all related with low admission of iron, while folic corrosive supplements

with 400µg decreases occurrence of neural tube birth abandons (NTDs) when administered earlier than origination or inside 28 long stretches of pregnancy (WHO, 2012).

Folic acid and Iron supplements are solid segments inside FANC strategy and have been proposed to support quality of moms amid pregnancy and guarantee sufficient blood bank in the body amid and later conveyance, (KMOH, 2013). WHO's rule prescribes that in nations where Anemia is >40% every single pregnant lady ought to get the supplementation paying little heed to their Anemia status.

The Ministry of Health, Kenya (MoHK), in 2012, as a joint effort with different partners, designed a five-year programme (2012-2017) for reducing maternal Anemia via Folic Acid and Iron supplements of expectant mothers. The intent of this programme was to expand Iron and Folic Acid supplements coverage to 80% and build Iron and Folic Acid use beginning 2.5% to 30% for no less than 90 long stretches of pregnancy by end of 2017.

Checking, evaluating, and research on utilization of IFAS in expectant mothers to comprehend fundamental reasons behind low adherence among the targeted population is one of the five essential parts of the program that needs to be strengthened. The program has five essential parts that require strengthening. (KNG-CIFAS 2013) presents an itemized portrayal on the measure of micronutrients that are required by pregnant moms on a regular basis. This is important to keep in mind given the fact that fetal development and pregnancy require more nourishment. These include sixty milligrams of iron and four hundred milligrams of folate.

An iron and folic acid supplement is one of the mediations that have been established up to confront the problem of anemia in expecting mothers and the birth absconds that are linked with it. Another mediation that has been set up to address this issue is prenatal testing. However, according to WHO (2013), taking folic acid supplements after the first 28 weeks of pregnancy

does not help prevent birth defects such as NTD from occurring. This is the case even if the supplements are taken throughout the entire pregnancy.

According to WHO (2011), a new combination of IFA medication that may be taken as a tablet alone has been introduced to the market. This tablet formulation can also be used. This mixture contains 400 g of folic acid and 60 mg of iron, and it is possible to acquire this mixture with the intention of achieving a certain goal, which is to combat the issue of anemia in pregnant women by increasing the usage of IFAS in pregnant mothers.

1.2 Statement of the Problem

One out of every three moms has anemia and is deficient in folic acid, which demonstrates that deficits in iron and folic acid are the two most common micronutrient deficiencies among women around the world (Haidar and Pobocik, 2012). Due to the rising prevalence of its harmful effects, a lack of iron is a problem that has to be addressed. It is possible that this factor contributes to a range of unfavorable outcomes in terms of health, including low birth weight, stillbirth, preterm birth, stillbirth, and mortality in both mothers and newborns. It's possible that interventions aimed solely at infants won't be enough to regulate the iron status of youngsters (Haidar and Pobocik, 2012).

There is a 55% prevalence rate of anemia among women who are pregnant in Kenya (USAID, 2014). While just 25.5% of pregnant women actually take iron and folate, the administration's primary focus is on ensuring that 80% of pregnant women do so (UNICEF, 2012). According to research conducted by USAID (2014), the percentage of expectant mothers who consume iron and folic acid supplements that are corrosive is 28% in Kenya. Supplementation with iron and folic acid is required to increase during pregnancy because of the increased need for the production of red platelets in the mother as well as the growth of the placenta in the fetus.

In spite of the efforts made by the government to adopt antenatal policies to enhance the use of iron and folic acid supplements amongst pregnant mothers as a component of Focused Antenatal Care (FANC), the reason why IFA is still poorly utilized is not yet apparent. A low consumption of IFA supplements during pregnancy may put both the mother and the unborn child in jeopardy. These risks include neural tube defects (NTD), including as spina bifida and anencephaly, low birth weight, and an increased risk of maternal anemia, in addition to neonatal morbidity and mortality.

There is a paucity of understanding on the factors that identify the use of IFA supplements in pregnant mothers at Pumwani Maternity Hospital (PMH), Kenya since no studies have been done in this area and there have been no research done in this region. This research, therefore, finds to fill the gaps by concentrating on the factors that influence the usage of IFA supplements among expecting mothers, utilizing PMH-Kenya as a case study.

1.3 Objective of the study

1.3.1 Main Objective

To establish determinants of use of IFAS amongst expectant mothers visiting free maternity services at Pumwani Maternity Hospital, Kenya.

1.3.2 Specific Objectives

i. To determine socio-demographic factors associated with the use of IFA supplements among expectant mothers in Pumwani Maternity Hospital, Kenya.
ii. To assess the knowledge of expectant mothers on the need for Folic acid and iron (IFA) supplements use among expectant mothers in Pumwani Maternity Hospital, Kenya.

iii. To determine the prevalence of IFA use among expectant mothers visiting antenatal care in Pumwani Maternity Hospital, Kenya.

1.4 Research Questions

i. What are the socio-demographic factors associated with the use of IFA supplementation among expectant mothers in Pumwani Maternity Hospital, Kenya?

ii. What is the level of knowledge of expectant mothers on the need for Folic acid and iron (IFA) supplements use among expectant mothers in Pumwani Maternity Hospital, Kenya?

iii. What is the prevalence of IFA use among expectant mothers visiting ANC in Pumwani Maternity Hospital, Kenya?

1.5 Hypothesis of the study

$H0_1$: There exist no statistically significant association among sociodemographic features and the use of IFA supplements among expectant mothers in Pumwani Maternity Hospital, Kenya.

$H0_2$: There is no statistically significant relationship between knowledge of expectant mothers on the need of IFA supplements and the use IFA amongst expectant mothers in Pumwani Maternity Hospital, Kenya.

1.6 Significance of the Study

The study would inform on policy to help in improving the use of IFA supplements amongst expectant mothers. The findings would inform the service providers in designing better approaches for caring for these mothers in pregnancy. Generally, improvement in health care service in related areas would also improve.

1.7 Delimitation and limitation

The study was delimited on the factors influencing utilization with iron IFAS amongst expectant mothers in Pumwani Maternity Hospital, Kenya. Some mothers may be hesitant to fill out the

questionnaire in its entirety due to the sensitive nature of the questions it contains. The mother received sufficient therapy to help her understand the significance of the research and agree to take part in it. This was bolstered by the guarantee of secrecy and personal space.

Potential problems with the study included: respondent bias (the possibility that, depending on their motivations, they will provide inaccurate or biased responses); and the inability to generalize the results to a larger population. To address the potential for bias, the researcher took ethical factors into account, ensuring that all respondents' motivations for taking part in the study were sincere.

1.8 Scope of the study

Geographical Scope: The research was carried out in Pumwani Maternity Hospital, Nairobi County, Kenya. The hospital was selected because it offers free maternal health care and receives a high number of expectant mothers.

The aim of the research was to revealing utilization of IFAS determinants amongst expectant mothers visiting free maternity services at Pumwani Maternity Hospital, Kenya. The target population of this study was all expectant mothers attending Pumwani Maternity Hospital and are willing to part take in the study.

1.9 Operational Definition

Anaemia – This is a situation in which Hemoglobin level in human body goes below 11g/dl.

Folic Acid - is a vitamin B which aid women avoid major birth defects of baby's spine and brain when the mothers has sufficient folic acid at the time of pregnancy.

Supplement – is a substance introduced in order to prevent deficiencies.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

The chapter surveyed related publications identified with this theme that has been carried out earlier having in mind to reveal the gaps. The writing was founded on study objectives incorporating pervasiveness by utilization IFAS amongst expectant mothers, social demographic related with the utilization, knowledge variables & wellbeing framework elements that are related to the utilization with IFAS.

2.2 Over View of Micronutrients and Micronutrient Deficiencies

It is believed that 52 percent of pregnant women living in nations located in sub-Saharan Africa and 23 percent of pregnant women living in countries with modern technology suffer from anemia (WHO, 2013). The World Health Organization estimates that approximately 10.8 million individuals in African countries and 9.7 million people in Western European countries suffer from anemia (Alemu, 2011). There is a possibility that the infection rate in Sub-Saharan Africa is as high as 61 percent (Mclean et al., 2009). According to research published in 2015 by the World Health Organization, the haemoglobin levels of more than half of all pregnant women over the world are lower than 11.0g/dl.

Folate and iron are examples of micronutrients, which are nutrients that are only required in trace amounts for normal functioning, growth, and development. Daily press supplementation is prescribed to every pregnant lady as a major component in ANC to diminish dangers of underweight births, press insufficiency, and maternal anemia that are all related with low admission of iron, while folic corrosive supplements with 400g decreases occurrence of neural tube birth abandons (NTDs) when administered before conception or inside 28 long stretches of

pregnancy. Daily press supplementation is additionally prescribed to every pregnant lady as a major component in ANC to diminish dangers (WHO, 2012).

Locations such as Ghana, which have a high incidence of malaria, have even bigger values (WHO, 2013). According to the World Health Organization (2015), the prevalence of anemia around the world has been broken down by region and population group. According to the research, females and younger children are more susceptible to anemia than men are. The proportion of pale moms and children is highest in the black nation region, where 57% of expecting mothers, 48% of non-pregnant mothers, and 68% of preschool children are pale. Anemia affects approximately 48% of pregnant mothers in South Asia (18 Million), 46% of non-expectant mothers in South Asia (182 Million), and 66% of pre-school children in South Asia (115 Million).

Anaemia in pregnancy was studied by Glover-Amengo et al. in Ashanti province's Sekyere West District in 2005. Among 205 pregnant women aged 15 to 49 from the Sekyere West division of Ghana's Ashanti region, hemoglobin levels were consistently high throughout the third trimester (Ahankari& Fogarty, 2017).

A blood sample was taken to check for malaria parasites, and a stool sample was taken to check for intestinal worms. According to the data, 57.1% of pregnant women had hemoglobin levels below than 10 g/dl, the MOH's threshold for anemia. The prevalence of anemia was significantly lower in the district's urban sections than in its rural ones. Inadequate Hb and high rates of maternal anemia were strongly linked to both low socioeconomic status and early age. Parasites from malaria in weak blood are a major risk factor for anemia (Cassam, 2013).

Nonetheless, there was a further robust association between hookworm and anemia. To further investigate the prevalence of anemia during pregnancy, Getachew et al. (2012) conducted a study in the Gilgel Gibe Dam region of Ethiopia, where they found that 53% of the pregnant women

surveyed were anemic and that the risk of anemia was 2.8 times higher among pregnant women living in rural areas than among those living in urban areas.

2.3 Empirical Framework

2.3.1 The Influence of Age, Income and level of education Influences the Iron and Folic Acid uptake Supplementation amongst expectant mothers

The study conducted in 2012, in south India, age, birth order and socio economic status had significant association with use of Iron Folic Acid Supplementation. Perceived side effects (vomiting, constipation and gastritis) and ldue to a lack of understanding regarding the advantages of IFAS, adherence rates have declined (Mithra et al., 2014). In another Indian study conducted by means of District Household Level survey (2007 - 2008) data, women who visited early Antenatal Care and frequently (at least 4 visits), received additional services and counseling are likely to continue taking Iron and Folic Acid supplements for longer than ninety days (Wendt et al., 2015).

In the cross sectional hose hold survey that was conducted in Pakistan in 2012, factors that were significantly associated with the nonuse of IFAS included living in rural residence (adjusted odds ratio: 1.72), maternal ages of 45 years or older (adjusted odds ratio: 1.97), non-maternal knowledge (adjusted odds ratio: 2.36), belonging to the lowest socio economic class (adjusted odds ratio: 1.47) and non-utilization of ANC (Nisar et al., 2014). Women who were concerned about the potential for adverse consequences, considered the tablets to be contraceptives, and had a history of forgetfulness were less likely to take dietary supplements, according to the findings of another qualitative study that was conducted in Pakistan in 2012. On the other hand, women who were aware of the benefits of IFAS had a higher level of trust in their healthcare practitioner, improved

after tablets were administered, and were supported by their family members were more likely to take dietary supplements (Nisar et al., 2014).

In an Indian study done in 2012, inattention and forgetfulness were the primary causes of non-adherence followed by distance from health facility, and side effects (constipation, gastritis, vomiting and others) (Mithra et al., 2014). Age, educational status, working status, family socioeconomic status, parity, using ANC services, residence and partner's occupation provide important support in the use of antenatal IFAS (Nisar et al., 2014). In the contrary, early ANC visit, increased level of education and household wealth index, being from urban residence, and being not too far from the health facility increases the adherence to IFA tablets (Titaley and Dibley, 2015).

In the study done in 2005, about weekly Iron-Folic Acid Supplementation in Vietnam, showed not to be far from the health facility and less frequent side effects were among the factors that contribute for the higher uptake of supplements (Casey et al., 2013). The existence of side effects: nausea and vomiting (65%), abdominal cramp (25%), and constipation (1.5%) were among the most hindrance factors for adherence (KuMar et al., 2014). In the study conducted in Northern Tanzania (2009), showed advanced maternal age, an analysis of Anaemia in pregnancy and pointers of insufficient socio-economic condition were positively associated with IFAS.

On the other hand, Multiparous mothers were unlikely to use supplementations (Ogundipe et al., 2012) and 54.3% of non-adhered pregnant women reported frustration from too many tablets (Ibrahim et al., 2011). In the study done in Kenya (2013), the factors that had significant association with adherence to IFAS were residence, pregnancy trimester, history of current Anaemia, and knowledge on Anaemia. However, age, level of education, matrimonial status, and family size could not considerably linked. The reasons for taking the IFAS were taking the tablet

boost blood levels, following doctors' advice, increase appetite, and avoid eating stones. On the other hand lack of information that it is a requirement to take, diet provides adequate nutrients, side effects (vomiting, heart burn),bad taste, and unwillingness to take were among the reasons for not taking the IFAS (Dinga et al., 2013).

Mithra et al. (2014) evaluated IFA tablet compliance among pregnant women and investigated the social factors affecting it. In this study, 190 expectant mothers who sought antenatal treatment at tertiary health facilities in Mangalore, South India, were included. Personal interviews were used to collect data after the Institutional Ethics Committee (IEC) gave its approval. Non-compliance was defined as missing 2 doses in a row and was used to examine the data. The study population's average age was 25.8 years (SD: 4.1). 72.1% of the respondents were from a lower socioeconomic position and the majority of them consumed a mixed diet. IFA tablet compliance was 64.7% overall. Increases in age, birth order, and daily single dose all led to higher compliance. The main causes of non-compliance were forgetfulness and side effects of IFA therapy that were both perceived and actual. IFA tablet compliance was moderate, with essential socioeconomic and demographic determinants playing a significant effect.

Felipe-Dimog et al. (2021) looked at how people followed recommendations for IFA supplementation and what caused them to do so. Some of the things that were looked at were age, education, job, wealth, ethnicity, religion, factors such as residency, birth count, and antenatal care (ANC) enrollment, and total number of ANC visits. The outcome variable was adherence to the advice to use IFA supplements for at least 180 days. The study evaluated 7983 expecting women of 15 and 49 years. 25.8% of these participants followed the advice to take IFA supplements. According to multiple logistic regression analysis, pregnant Muslims and Muslims of non-Indigenous ancestry were less likely to follow the advice to take IFA supplements. Age between

25 and 34, higher levels of education and affluence, rural residence were associated with greater compliance with IFA supplementation. Different wealth classes experienced different effects of housing on IFA adherence.

In Wolaita Zone, Southern Ethiopia, Seifu et al. (2020) evaluated the compliance rate with iron-folic acid (IFA) where eight randomly chosen health centers were the subject of a cross-sectional study. The multistage sample procedure involved 647 pregnant women in all. Epi Info program, was used to enter the data before being exported to SPSS. Through correlation coefficients, bivariate relationships were investigated. Generally, 73.2% (95% CI, 70.72 to 75.79) of the requirements were met. Vomiting and experiencing heartburn dramatically decreased the compliance rate. Better education and unintended pregnancy had a negative impact on compliance. Contrarily, favorable indicators were acceptance of the IFA supplement, the quantity of antenatal care (ANC) visits, and prior marital status. An expectant lady typically took no more than a quarter of the maximum amount of IFA supplements that is suggested for daily use.

In a cross-sectional study, Taye et al. (2015) evaluated the factors that influence women in the Mecha region of Western Amhara's compliance with prenatal iron and folate supplementation from June 25 to July 15, 2013. The study included 634 women who had children 1year prior to the survey. After proportionally dividing the whole sample among the kebeles, participants were systematically obtained in the procedure. The revised, coded, and inputted data were exported to SPSS version 16 after being entered into Epi app. Analyses with two and more variables were computed. 628 women who gave birth an year prior to the survey were included overall. Only 20.4% of the individuals in this study adhered to the recommendations for iron foliate supplementation. In a multivariate analysis, age, education level, familiarity with anemia and iron-folate pills, and a prior history of anemia during pregnancy were all substantially linked with

supplemented adherence (P .05). The main excuses for disobedience were the fear of negative effects and the conviction that taking too many tablets would be bad for the unborn child.

Moshi et al. (2021) sought to identify the variables related to the consumption of iron supplements during pregnancy among Tanzanian women of reproductive age. The research relied on data collected in Tanzania during the 2015–2016. The investigation covered a total of 6,924 women between the ages of 15 and 49 who were fertile. The reference population was a population of mainland cities, and the present employment status was working. The study found that even though pregnant women have free access to iron supplements, some of them choose not to take them at least once. During pregnancy, pregnant women who began antenatal visits later, hailed from low-income families, lacked formal education, resided in rural regions, had a high parity, were from rural areas of the mainland, and were employed were more likely to lack access to iron supplements.

Nisar et al. (2014) conducted a cross-sectional household survey to investigate why fewer Pakistani women take prenatal vitamins containing iron and folic acid. 14 project districts to collect the necessary information. Interviews with married women of childbearing age were conducted by trained female field workers between December 2011 and March 2012. Most recently pregnant women within the five-year survey window were selected for this study. STATA applied in data analysis and account for the cluster sampling methodology. To pinpoint the independent variables connected to not using antenatal IFA supplements, multivariate logistic regression models were built. 2,400 out of the 6,266 women surveyed took IFA supplements. Only a small fraction of pregnant women in the studied districts of Pakistan actually take antenatal IFA supplements; this low rate is significantly connected with older age, living in the pooverty.

Ethiopian study conducted in 2012 among eight rural districts of the four main areas showed that, Compared to women who had ≥4 Antenatal care attendances, the once having zero, one, two and three attendances contain 0.04 less times odds of adherence in that order. Mothers without detailed information of Anaemia (AOR = 0. 75) and mothers that were not knowledgeable of the value of Iron supplements in pregnancy (AOR = 0.05) had significantly lower adherence (Abdullahi et al. 2014).

The main factors for luck of observation were (63.3%) side effects and (16.7%) were forgetfulness (Samson et al., 2014). In the rapid initial assessment of IFA tablets through Antenatal Care in Ethiopia, the likely factors for non-adherence to IFA tablets were, inadequate access to care, begin Antenatal Care later, or insufficient antenatal care, inadequate counseling, forgetfulness, luck knowledge on the require tablets, fear to give birth to a big-baby reactions, and problems associated to tablets (size, test, colour, storage problem, coating) (Fiedler et al., 2014).

Many researchers conducted on various project on this theme to be accord over a demo-graphic determinants those are measurably connected amid the utilization of IFAS amongst expectant mothers: in any case, it's hard to meet their concurrences in connection to the demo-graphic indicators related to the use of supplementation. The investigation has tried to decide the variables related to the utilization with press and Folic corrosive supplements amongst expectant mothers in Pumwani Maternity Hospital, Nairobi-Kenya.

2.3.2 Knowledge of the expectant mothers on the need of IFAS

Use of IFAS has been connected to the guideline and the data of expectant mothers: it can be distinctly or unfavorably, chooses the women's choice on searching for and becoming a predictable to the game plan.

The preparation past the optional school is distinctly linked to the usage of Folic and Iron destructive supplementation (Lacerete et al., 2011). Of course, in similar report, data related to Anemia in pregnancy and its balancing activity procedures have been reviewed as a basic determinant that can influence use of Folic and Iron destructive supplementation. This exhibits poor data related to Anemia amongst expectant mothers can be an imperative pointer for poor usage of IFAS.

In a study conducted in, Mecha district (2013), Ethiopia showed women aged 35-49 years old, Literate women, report history of Anaemia during pregnancy, had higher knowledge of Anaemia, had higher knowledge of iron foliate tablets were 3.41, 4.49, 5.83, 3.64, 5.25 counts more likely to adhere in comparison to women aged 15-24 years old, were unable to read and write, did not report history of Anaemia, had low knowledge of Anaemia, and had low knowledge of IFA tablets respectively. 28.45% of study participants had fear that continuous consumption of IFAS leads to overweight babies.

Kouadio et al. (2013), assessed to determine the knowledge of expectant mothers on the need of IFAS, indicted that there is a significant effect between knowledge and uptake of IFAS. Researchers also did not find any evidence of treatment resistance. Women in Bangladesh who participated in another study by Alam et al., 2015 about women's understanding of iron supplements reported that they were aware that taking iron and folic acid pills reduced their risk of developing anemia.

Fewer expectant mothers expressed anxiety regarding the link between folic acid use and large newborns, according to the same study. Some research has shown that pregnant women in poorer nations don't get enough of certain vitamins and minerals because of their poor dietary habits, therefore getting enough of all of them is essential for a healthy pregnancy and baby (Zeng et al., 2014). Research by Messina et al. (2013) and others has shown that having access to a refrigerator and residing in an urban setting can reduce the risk of developing anemia. Increased education of iron-rich diets is credited with this development.

This examination agrees with some different investigations completed freely from various zones of the world. As per an examination done in Malaysia by Thirukkanesh et al., (2010), the principle purposes behind non-use with press and folic corrosive among the pregnant moms were absent-mindedness, encounters about reactions including sickness and heaving, stress in regards to enormous size of the infants and poor learning about the program medical advantages.

In 2014, study completed in Ethiopia by Taye et al., demonstrated that out of 628 talked with ladies who conceived an offspring a year prior to the overview, just 20.4% were consistent with the Folic and Iron corrosive supplementation, one of the related indicators with utilize was training status of moms, their insight on Anemia in pregnancy and Folic corrosive drug, encounter in Anemia amid past pregnancy. Then again, the examination uncovered that conviction that an excessive number of tablets would hurt the infant and dread of the repulsive impact of the Folic Acid and Iron drugs were amongst the real explanations behind none utilize.

Siekmans et al. (2018) investigated and evaluated the facilitators and barriers to iron and folic acid (IFA) supplements use. IFA supplementation projects were analyzed based on preliminary data gathered in 2012 and 2013. Content analysis was applied to qualitative data gathered through focus groups to uncover overarching themes involving facilitators. Throughout the world, women are aware of the risks associated with anemia during pregnancy, yet many of them do not feel at risk for it personally. Facility-based prenatal care (ANC) is an effective method of delivering IFA because to widespread knowledge and expanded coverage; nevertheless, access to IFA is restricted due to attitudes about when to visit ANC for the first time. Inconsistent availability and poor quality of ANC services, such as a shortage of IFA supplies and minimal counseling to boost consumption, impede both coverage and adherence. IFA delivery in the community and ANC referrals provide for earlier and more regular access as well as more opportunity for follow-up. To enable IFA supplementation throughout pregnancy, ANC access and quality must be improved. Problems with timely and ongoing access to supplements can be addressed by community-based distribution and counseling.

Kurzawa et al. (2021) used a quasi-experimental method to examine the program's efficacy and cost-effectiveness in boosting pregnant women's consumption and adherence of IFA supplements. The program boosted IFA consumption by 45.05 supplements. Pregnant mothers and front-line healthcare workers have both enhanced their familiarity of IFA supplement prescription and advantages. When measured against a number of cost-effectiveness standards, the program's cost avoided in 2018 was $ 47.11 USD, which is seen as being extremely cost-effective.

The goal of Wana (2020) was to determine the extent and the variables influencing the use of prenatal iron supplementation. In January 2016, a cross-sectional quantitative study with a focus on the community and a qualitative component was done. 411 pregnant women who delivered

their babies six months prior to the data collection were chosen. Four focus group discussions (FGDs) with local expectant women and interviews with the district's MCH focal, three MCH center directors, and four health extension workers were used to evaluate the elements that contribute to the proper use of supplements. With 95% confidence intervals. 11.5% (95% CI = 9.9-13.1%) of the study's participants took the supplement for three months or more. The odds of pregnant women utilizing iron supplements were 77% lower for those who couldn't read and write than for those who could (AOR = 0.23 (95% CI: 0.07-0.75)). Those who had two or three antenatal care had 78% less chance of utilizing the supplementation, compared to four or more ANC visits. The equivalents had 90% lower likelihood of utilizing the supplement compared to women who were aware of its advantages for maternity and child health. Women who were unaware of anemia had 85% lower likelihood of using the supplement than those who were aware (AOR = 0.15(0.04-0.62)). According to the qualitative study, there were no issues with the iron supplement's supply or logistical system, and the most common excuses for not taking the supplement were a delayed start to prenatal care and ignorance

Maternal iron-folic acid (IFA) supplements adherence was studied by Wiradnyani et al. (2016), who also looked into whether this was connected to women's awareness of potential risks during pregnancy and the amount of emotional and practical help they received from their loved ones. Data were utilized for this secondary analysis. Increased loyalty to IFA supplementation was related with knowledge of pregnancy-related hazards and full family support (especially from the husband; adjusted OR=1•9; 95% CI 1•6, 2•3). Increased adherence was linked to receiving adequate prenatal care (ANC). Unfortunately, even among women who had adequate ANC visits, 15% said they had never been given or purchased IFA tablets, and 30% said they had no idea of the risks connected with pregnancy. In predicting adherence, a substantial interaction between

family support and the women's educational attainment was found. Among women with less than nine years of education, family support dramatically boosted adherence.

An in-hospital cross-sectional survey was conducted by Bahati et al. (2021) among 241 postnatal women who had sought MCH services at Kakamega level 5 hospital. 241 eligible postnatal women provided the quantitative data. Respondents cited a variety of factors as contributing to their lack of adherence, including undesirable effects from using IFA (41.3%), forgetfulness (37.3%), and the odor of the IFA supplements (10.3%). In comparison to multigravida participants, primigravida participants demonstrated higher IFA adherence (OR=2.704; 95% CI: 1.262, 5.793; p=0.010), as well as those with higher anaemia knowledge than those with lesser anaemia understanding. Other characteristics that showed a connection with IFA adherence were preconception counseling, IFA education, and the total number of prenatal care visits achieved.

Research on supplements and related factors was undertaken by Kamau et al. (2019) in a rural Kenyan county. 364 pregnant women between the ages of 15 and 49 took part in this cross-sectional study. Two-stage sampling was used to select five public health facilities and one sub-County. Sixty-seven percent of the 364 people polled were familiar with IFAS, while only 40.9% (149) were very well-versed in the subject. The highest levels of knowledge were held by women who learned about the topic via brochures (91%), and community health workers (CHWs) (87%). Women over the age of 30 who were married and had multiple children had a significantly higher chance of being successful (p 0.05). There was a considerable gap in the quality of IFAS counseling provided by various health care practitioners, and there was a correlation between the level of IFAS comprehension possessed by the client and the extent to which therapy was administered.

Senoga (2015) examined the knowledge, attitudes, and behaviors of antenatal care (ANC) patients who went to KCCA health clinics in Kampala in regards to iron-folic acid (IFA) supplementation. A cross-sectional assessment of health care facilities was conducted in the six KCCA clinics. Respondents were pregnant women in need of ANC services. Information on demographics, education, employment, and IFAS-related knowledge, belief, and behavior was gathered by interviews using a standardized questionnaire. Health professionals were interviewed as key informants to get qualitative data. STATA 12 was used to examine quantitative data that was submitted into EpiDATA. Manual content analysis using condensed and abstracted key themes was used to assess qualitative data. Only 19.4% of the 423 participants recognized that folic acid supplementation should start before conception, and only 16.5% of them had ever used folic acid during preconception. Eighty-one percent of the 423 people surveyed were already using IFA supplements, and 343 of those people (81%) had heard of IFAS. In total, 68.9% of those polled had adequate knowledge, 68.3% had a constructive outlook, and 79.2% were engaging in beneficial habits. The adjusted odds ratios for positive attitudes and good practices toward IFAS among women with sufficient information were 4.18; 95% CI 4.18(2.566.83) and 3.86; 2.37-6.30, respectively. Graduates had a 5.6-times higher likelihood of being knowledgeable than people without a degree (AOR 5.6; 95%CI 1.4 - 22.3). Three ANC visits increased respondents' likelihood of being knowledgeable by 2.41 times compared to one visit. Married women had an adjusted odds ratio (AOR) of 1.8 (95% CI: 1.1- 3.0) for having sufficient awareness of IFAS, compared with solitary women. Women in their pregnancies who went to an ANC at a KCCA health center were well-informed, enthusiastic, and prepared. Because so few women were aware of the significance of preconceptional use of FA and because so few actually used FA before becoming pregnant, health professionals should concentrate on educating all women of reproductive age about the

value of FA (prevention of NTDs) and advocating for its preconception use. The primary reason that mothers stopped taking IFAS was stock-out, which suggests that additional efforts are required to guarantee access to IFAS for pregnant women. A significant predictor of both IFAS knowledge and practice was having completed at least the secondary level of schooling. Being married and going to more than two ANC visits were significant predictors of having sufficient knowledge, a favorable attitude, and excellent behaviors with regard to IFAS. The fact that more IFAS is used when mothers are encouraged to get prenatal care and more people know about it is strongly supported by the positive effects that pregnant women's knowledge of IFAS has on how they feel about it and how they use it in general.

In Kisumu and Migori, Kenya, Kimiywe et al. (2017) evaluated the obstacles to maternal supplementation in randomly chosen health facilities, each representing three sub-counties in the counties of Migori and Kisumu. To code, analyze, and identify key themes, qualitative data was imported into NVIVO II software (QSR International Pty Ltd.). The qualitative interview guide's primary themes served as the foundation for the codes. The data were put into groups based on themes that kept coming up in the FGD transcripts and issues that people kept bringing up. Due to its suitability for identifying the most frequently occurring repeating themes and concerns, thematic analysis was employed. Even though a significant number of pregnant women go to at least four prenatal sessions, the majority of them do not go as regularly or as early as is recommended. This could have a negative impact on the health of both mothers and infants, in addition to the number of people who receive IFA supplements through ANC. More than fifty percent of women do not receive enough BCC messaging exposure. Although the MOH's IFA media campaign and the "Malezi Bora" biennial outreaches may have contributed to some women's knowledge, more should be done to inform them of the health advantages of taking IFA

supplements. Though they may not completely grasp it, most women recognize the value of arriving at ANC early. Some women receive information from healthcare professionals, such as CHWs and facility-based clinicians, about when to take IFA supplements and the advantages of IFA supplementation, but it is insufficient (what, why, and how it prevents health consequences can be reinforced). Side effects are significant obstacles to adherence that need to be removed. The vast majority of women understand the importance of getting to ANC on time, even if they may not have a thorough comprehension of its meaning. It is true that some women obtain information about when to take IFA supplements and the benefits of IFA supplementation from healthcare professionals such as CHWs and facility-based clinicians; nevertheless, the information that they receive is often insufficient (what, why, and how it prevents health consequences can be reinforced). The elimination of side effects is necessary since they present considerable adherence barriers.

Titaley et al. (2017) sought to investigate if there was a correlation between knowing about the importance of taking iron and folic acid supplements during pregnancy and actually taking them Data came from a cross-sectional study carried out in four areas in Indonesia in June 2014. We used data from 436 moms who had their baby within the previous six months of the survey's start date and had taken at least 90 IFA tablets during their previous pregnancy. After adjusting for confounders and other important predictors, logistic regression analysis was used to see at how much of an effect familiarity had on consuming at least 90 IFA tablets while pregnant. As a result, there is a strong correlation between compliance and knowledge of IFA supplements. Women with intermediate understanding, and women with strong knowledge had odds of taking at least 90 IFA tables that were about 100% higher than those of women with inadequate awareness of IFA supplementation. Attendance at least four antenatal visits was another feature that was linked to

compliance as was the fact that pregnant women reported no adverse effects from taking IFA pills (p0.001).

A cross-sectional study was conducted by Yamashita et al. (2021) in Muntinlupa, Philippines, with the purpose of determining whether or not there is a correlation between maternal knowledge and the prevalence of iron and folic acid supplementation among pregnant women. At a hospital in Muntinlupa, the Philippines, a cross-sectional study was carried out between the months of March and August of 2019, with the participation of 280 women who were expected to become pregnant. Participants were chosen through the application of a method known as systematic random selection. Interviews and questionnaires were used to collect the necessary information for analysis. In order to determine the factors that are associated with the occurrence of IFAS in pregnant women, a multivariable logistic regression analysis was carried out. The consumption of IFAS was reported by the majority (85.6%, n = 238) of the 280 pregnant women. Among the respondents, 126 (45.3%) had awareness of the advantages of IFAS, whereas 42 (15.4%) were aware of its negative effects. Of the respondents, 128 (45.9%) women were aware of attributes of anemia. Health care practitioners, who accounted for 41.8% of the sample, and community health workers were the primary sources of information regarding IFAS (14.6%). Prevalence of IFAS increased in correlation with mothers' knowledge of its benefits.

In 2021, Fite et al. examined the factors that contribute to or detract from the rate at which pregnant women in Sub-Saharan Africa use iron and folic acid supplements (IFAS). In order to conduct this brief systematic review and meta-analysis, a number of different databases were scoured for applicable studies. Twenty-four thousand seven hundred and ninety-two pregnant women participated in the study's 23 trials. Pregnant women in SSA reported following the recommendations for iron and folic acid supplementation by 39.2%. (IFAS). However, the meta-

analysis found that IFAS was followed by pregnant women who had received counseling 1.96 times more often than those who had not. Moreover, research found that IFAS compliance was 2.71 times more frequent among women who were aware of the program than among those who were not. In addition to this, it was discovered that women who were conscious of their anemia were 5.42 times more likely to utilize IFAS in comparison to women who were not aware of their anemia [OR5.42, 95% CI (1.52, 19.43)].

As per an investigation conducted by Bannink et al., (2014), in Northern Uganda, just about one out of four moms of youngsters having Spina bifida were not aware of the significance of predisposition commencement of Folic corrosive supplementation, as an avoidance system of Spina bifida. Just 3.5% of moms had ever caught wind of these confusions and just 1% of this realized that Folic corrosive could forestall Spina bifida. This lack of learning added to their poor usage of IFAS and thusly credited to increased predominance of Spina bifida amongst the latest conceived in Gulu, Northern Uganda. Every one of this examination underscore how training/learning of moms are measurably critical indicator of utilization with press and Folic corrosive supplementation amongst expectant mothers.

2.3.3 The Use of IFAS

Universally, an expected 2 Billion individuals are influenced by lacks of fundamental minerals and vitamins, all things considered identified as concealed craving, that adversely influence wellbeing and monetary advancement. The bound together worldwide endeavors to alleviate the concealed appetite, in populaces around the globe are significant to the accomplishment of the

greater part of the Millennium Development Goals (MDGs). Various nations in developing countries, and Afghanistan and India, raised an alarm state on abnormal state of shrouded starvation, together with hindering, press inadequacy Anemia, and vitamin A lack each and every one having profoundly predominant (Muthayya and Black, 2013). In 36 nations, inadequacies of micronutrients were in charge of 1.5-12% of the aggregate DALYs (Van Der Straeten and De Steur, 2017).

B9 Vitamin (Folic corrosive and Folate) is basic to various substantial capacities. Human body requires Folate to combine, restore, and methylate DNA and in addition to go about as a cofactor in a given organic responses (Riaz, 2014). It is particularly imperative in helping fast cell division and development, for example, in early stages and pregnancies. motherly folate inadequacy is related to neural tubes deserts (NTDs).

As indicated by a survey, there is critical measurement - reaction connection flanked by Folate admission and birth-weight. The association demonstrated 2% expansion in birth-weight for each two overlay increment in Folate consumption (Hoyt and Druschel, 2014). Less folic admission amid pregnancy might be related with extreme introvertedness in babies. Primer research has demonstrated a conceivable connection between folic corrosive and Down disorder. Iron and Folic Acid supplementation expended previously and amid pregnancies might lessen danger related to heart abandons with newborn children.

More than 40 percent of women aged 19 to 64 have iron intakes that are below the minimum dietary requirement (Buttriss& Nugent, 2017). Women in urban areas are more likely than those in rural areas to take iron supplements for the full 90 days advised (GSS, 2015). It is recommended that women who are attempting to conceive take steps to enhance the amount of iron in their

bodies. In the fight against iron deficiency, one of the front lines is education on nutrition; another is the fortification of foods with iron; and the third is the eradication of worm infestations (Manios & Singh-Povel, 2014). According to the findings of a survey, there is a crucial connection between measurement and reaction, with folic acid consumption and birth weight serving as bookends. According to the findings of the organization, there was a 2% increase in baby weight for every two percent increase in folate consumption (Hoyt and Druschel, 2014). It's possible that babies born to mothers who consume less folic acid during pregnancy are more reserved than other children. Initial investigations have uncovered a potential link between folic acid and Down syndrome. Folic acid is also known as folate. Iron and folic acid supplements taken both before and throughout pregnancy have the potential to lower the risk of heart defects in the newborn child.

Iron deficiency has been related to several risk factors for anemia, and pregnant women are commonly prescribed folic acid and iron medications during their prenatal care appointments (Bah, & Prentice, 2017). In regions where anemia is more common (more than 20%), Iron supplementation is recommended for women who have menstrual cycles (Wang &Serdula, 2016). Adolescent girls are singled out in this WHO advice because they are at the stage of life when their bodies can most benefit from storing iron before becoming pregnant (WHO, 2012).

In Bangladesh, pregnant and non-pregnant women whose diets included iron-rich foods saw an increase in their iron reserves (Mwangi & Prentice, 2015). However, operational issues during programs contribute to the persistent problem of low iron supplement adherence (Zhao & Li, 2015). Iron supplementation is not popular among women because of the gastrointestinal (GI) symptoms it can cause (Wang &Serdula, 2016). This raises the question of whether or not non-adherent moms are concerned about the increased risk of anemia they face while pregnant because of their failure to take the prescribed dose of iron supplements (Mwangi& Prentice, 2015). This is

likely due to the belief that anemia is not a particularly pressing maternal health condition in compared to other severe illnesses, leading many to believe that routine iron supplementation is unnecessary (Zhao & Li, 2015).

The global frequency of NTDs varies from 1 – 10 in every 1000 deliveries with close to the same frequencies between two main groups (Rosas-Salazar & Hartert, 2017). In United State, the total year counts of NTD affected birth defects was summed up from a two years prefortification duration (1995 to 1996) and a two-year postfortification period (1999 to 2000) (Veena & Fall, 2016). An expected 2490 spine bifida- - influenced pregnancies and 1640 anencephaly-influenced pregnancies happened every prior year fortress of sustenance with Folic corrosive, following stronghold (Veena and Fall, 2016). As indicated by an overview, the pregnant pallid ladies going by tertiary care doctor's facility of Rawalpindi has press (Hoyt and Druschel, 2014).

Sufficient folate consumption amid the previously established inclination time frame (which is the time just previously and soon after a lady winds up pregnant) ensures against various innate contortions, counting neural tube absconds (that are the major eminent delivery abandons which happen from Folate insufficiency) (Silva and Pinto, 2017).

Folic acid supplements have not appeared to lessen danger of cardio-vascular infections or all - cause deaths amongst members in earlier accounts of vascular sickness however it is belongings amid prepregnancy and earliest trimester in decreasing frequency of a few variations from the norm in infant is plainly settled in various examinations.

Advancing in the direction of Millennium Development Goals (MDGs), it is fundamental to distinguish the weight of infection of micro-nutrient insufficiency. It was basic to evaluate KAP (that is, foundations, merits, prerequisite in pregnancy, utilization of Folic corrosive

supplementation, Folic corrosive admission in pregnancies) of these essential micronutrients that is, Folic corrosive and after that extend the news with respect to its significance to pre-origination and antenatal duration as to keep the main preventable infection i.e. infant irregularity (Silva and Pinto, 2017).

The need of this examination was to make mindfulness in network with respect to the concealed appetite by making mindfulness in regards to significance of this micronutrient insufficiency (folic corrosive) particularly from the very helpless group of ladies who are capable of having children because of their age (between 21 and 42 yrs.) going by tertiary care healing center in Rawalpindi. Relationship between the instruction level and routine with regards to folic corrosive admission was additionally investigated.

This possible lack of urgency stems from an inadequate indulgent of anemia and the crucial function of iron supplements. No participants in the Patience, (2016) study mentioned ever having spoken with a healthcare professional about using folic acid supplements. Instead, they were given advice about supplementing with iron pills. Results showed no evidence of resistance to folic acid supplementation. Ninety percent of pregnant women in a separate study said they had taken iron supplements during their most recent pregnancies, with the majority having begun doing so in the first trimester (Chandyo & Strand, 2016). Stakeholders advocate that health professionals counsel patients on nutrition; doing so requires them to have some understanding of the community's perspective on anemia in order to present patients with information that is most likely to help them (Compaore et al., 2014).

Deori et al. (2021) examined IFA tablets at the ANC clinic at SDH, Ballabgarh. To gather information about the subjects' socio-demographic characteristics, the IFA therapy they get, their compliance, and the circumstances behind missed doses. Stata 13.0 was used for the statistical

analysis, while Epicollect 5 was utilized to enter the data. Our study included 484 pregnant women in total. More than 77% of the pregnant women took the IFA pill supplement that was prescribed to them. Higher compliance was seen among those with hemoglobin levels over 11 g/dl, those from weaker socioeconomic backgrounds, and those in the older age groups. Among the many reasons given for not following through, forgetfulness (63%) and fear of consequences (49.5%) were most commonly cited. Pregnant women who were not anemic had better compliance with IFA pills, and those with strong compliance also had higher hemoglobin levels.

Sununtnasuk et al. (2016) sought to find barriers internationally. Attendance at ANCs, IFA purchases or receipts, IFA consumption, and the quantity of tablets consumed. 22 nations with significant undernutrition problems. a sample of 162 958 females. 95% of individuals who received IFA pills ate at least one. However, only 8% of participants adhered to the recommended supplementation schedule on a regular basis and a few do so in sufficient amounts.

Begum (2018) conducted a baseline household survey, interviewing 923 pregnant women. Of the population, 60.1% had access to ANC, whereas only 43.6% had access to IFA. Just 71.7% of the ladies who went to ANC received IFA. According to the survey, 68.6% of the 401 women who claimed to use IFA supplements really did so, and 99.3% of these women had attended some form of ANC during their current pregnancy. It was shown that women who had been pregnant for a total of 27 weeks were more likely to have attended ANC than those who had been pregnant for a shorter amount of time. Attendance at ANC and compliance with IFA advice were both more prevalent among women who reported receiving direction from their husbands. It is crucial for pregnant women in Zinder to attend ANC in order to guarantee that they will receive IFA supplements.

Desta et al. (2019) did a meta-analysis comprised 20 trials with a total of 16,818 pregnant women. Adherence to iron and folic acid supplementation at the national level was 46.15% (95% CI: 34.75, 57.55). Tigray came in second with 58.9% (95% CI: 33.86, 84.03) and Addis Abeba had the greatest rate of compliance (60% (95% CI: 55.93, 64.07)). A stronger adherence to supplement use among women was connected with having more information, having good knowledge, beginning ANC visits prior to 16 weeks, and having less than four ANC visits. The most prevalent reasons people gave for not taking their supplements were worries about their potential adverse effects and forgetfulness.

Mabuza et al. (2021) evaluated supplement usage and related factors in Eswatini. In Eswatini, 330 pregnant women under the age of 18 who were in their third trimester participated in a cross-sectional questionnaire survey. From July to October 2019, responders were gathered from eight carefully chosen healthcare amenities. Throughout pregnancy, good consumption was deemed to mean taking all or almost all IFA supplements. 10.3% ingested all or nearly all IFA supplements throughout the first trimester. It was shown that between 37.7% and 39.7% of pregnant women took their iron supplement and between 37.6% and 40.9% took their folic acid supplement during. Factors such as adverse reactions to IFA, forgetfulness, previous healthy pregnancies without IFA, advice from friends and family members to avoid IFA, IFA stock-outs, insufficient funds for travel, and a lack of available IFA tablets. Difficulties had a negative association with adequate IFA supplementation. Good use of IFA supplements was favorably correlated with better IFA knowledge, attitude, and maternal age.

The purpose behind this low utilize was not obviously seen, along these lines this investigation endeavors to discover factors deciding the utilization with press and Folic corrosive

supplementation amongst expectant mothers to assist enhance the viability of IFAS plan for expectant mothers in Kenya.

2.4 Challenges and Gaps for IFAS in Kenya

According to the information that was presented earlier, a number of studies have indicated how the knowledge of expectant mothers influences the need for IFAS. One such study is the one that was conducted by Lacerete et al., (2011) and Kouadio et al., (2013) as well as the one that was conducted by Alam et al (2015). They discovered that the likelihood of women seeking the services increases in proportion to the degree to which they are aware of the effectiveness of iron supplements. On the other hand, these research did not reveal either the amount of awareness or the level of influence. As a result, the purpose of this study is to ascertain the level of awareness in Kenya as well as its influence on the supplementation of iron and folic acid.

Some studies (Gebre & Etana, (2015), Gebreamlak & Atnafu, (2017) and Zakia *et al*, (2011), have also shown how medicinal services framework factors impacts the use of Iron and Folic corrosive supplements amongst expectant mothers, the vast majority of these investigations have demonstrated that availability and reasonableness of antenatal care administrations were factually huge autonomous positive indicators of the IFAS utilize. The studies did not show the significance level hence, there was need to determine the significance level.

2.5 Conceptual Framework

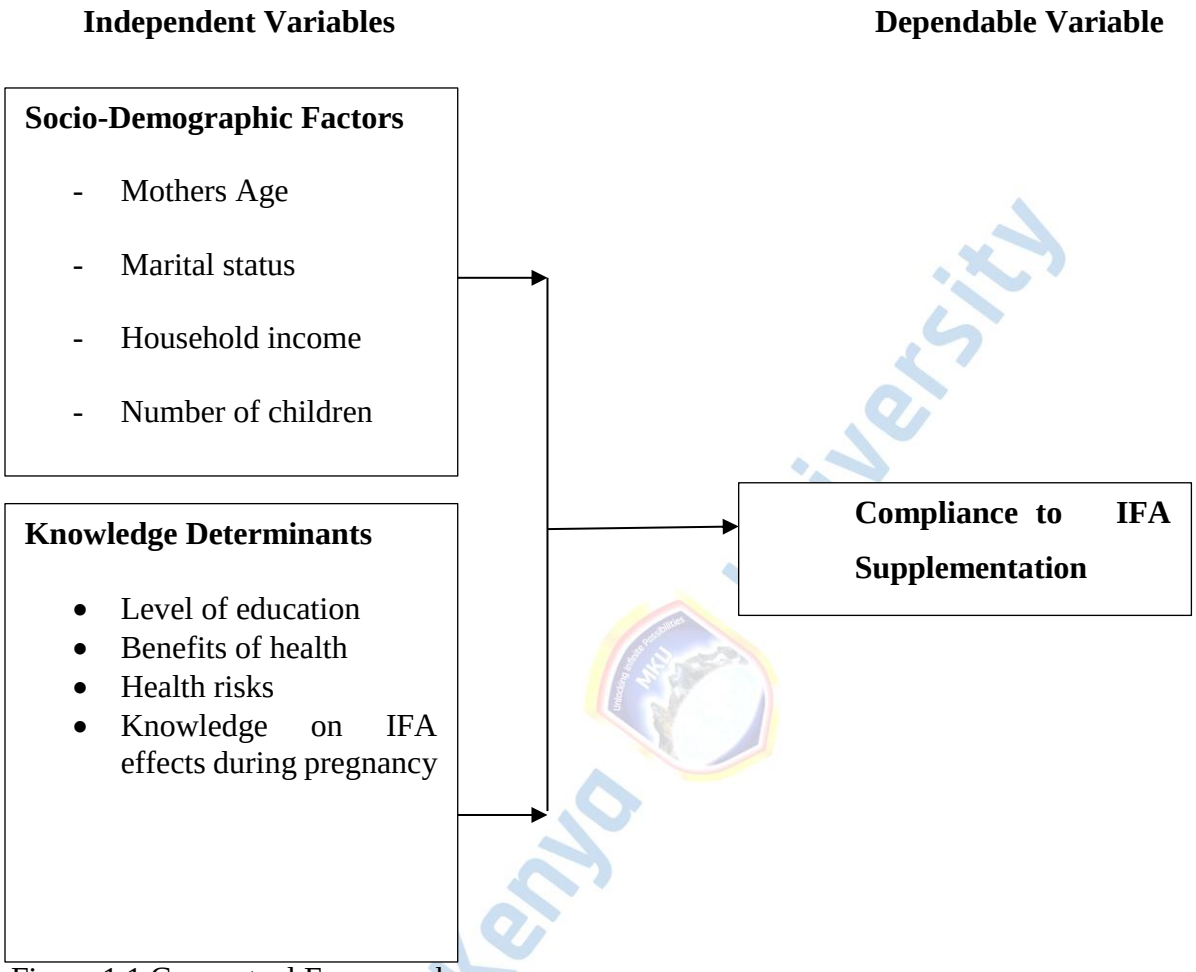

Figure 1.1 Conceptual Framework

The use of IFA supplements among expecting mothers is linked to the complex interaction of a variety of factors, including social and demographic factors, knowledge factors, and health framework factors. Utilization of IFAS is connected to a variety of social and demographic factors, including age, domestic income, employment status, trimester of the women, married status, children, religious inclination, and locality.

The level of education of the expectant mother, the presumed benefits to health, awareness to health programs on IFA supplements, awareness to the to the difficulties of defiance for IFA supplements, and an understanding of the flavor of the medicine are all knowledge features that are linked with the use of IFAS. Alternately, the Level of usage of iron IFA accounts for access to supplement providers as well as the amount of times supplements are used.

CHAPTER THREE

METHODS AND MATERIALS

3.1 Introduction

In this chapter, methodology of the research is covered which includes; research design, sample size, data collection tools, among others.

3.1 Research Design

In order to achieve the goal of the study, a descriptive cross-sectional study design was used. Both approaches were taken in order to complete the study. Quantitative and qualitative approaches were utilized in the data analysis portion of the study, which focused on pregnant patients at Pumwani Maternity Hospital.

3.2 Study Population

The study population was drawn from pregnant women who were attending the free maternity services at Pumwani Maternity Hospital, Nairobi, willing and consenting to participate in the study. The study was conducted over a two weeks period in in the month of October 2018.

3.3 Eligibility criteria

3.3.1 Inclusion Criteria

The study included all expectant mothers seeking antenatal care at Pumwani Maternity Hospital.

3.3.2 Exclusion Criteria

Those women that were not pregnant and those who were not willing to take part in the research were excluded in the study.

3.4 Study Site

The investigation was conducted at a prenatal clinic in Nairobi, Kenya. This study site is the largest maternity hospital in Kenya and Sub-Sahara Africa (savethecradle.org/Pumwani-maternity-hospital/). Pumwani Maternity Hospital is a referral hospital for other Nairobi hospitals. 350 maternity beds and 150 neonatal beds are available. The hospital features a prenatal ward, a labor ward, two operating rooms, four postnatal wards, and a newborn unit. Normal daily hospital deliveries range from 50 to 100, with 10 to 15 Caesareans. It's a teaching hospital for Pumwani Midwifery Nursing School and other medical schools.

It borders populations in informal settlements with little income which includes, Majengo, Shauri Moyo, Kariakoo, Eastleigh, Muthurwa and Mathare. It has 186 nurses, 20 doctors, 4 OB/GYNs, 3 pediatricians, and 14 clinical officers. Up to the time of this study, the health facility is the biggest public maternity Hospital in the locality. It corresponds to a level 5 health facility in status and reports indicate being the most visited facility.

3.5: Study Variables

3.5.1: Independent Variable

The independent factors that was incorporated into this investigation are; demographics attributes, information components and the use of iron folic.

Demographic components were age, occupation status, and family salary, trimester of the pregnancy, marital status, and number of kids, religion and household income.

The respondent’s knowledge was measured based using a knowledge composite score as either poor knowledge or good knowledge.

3.5.2: Dependent Variable

The dependent variable was the use of IFA supplements and was measures as a binary variable as yes and no.

3.6 Sample size Calculation

To establish the needed sample size, Kish-Leslie Formula (Kish 1965) was utilized.

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

In which **n** = sample size

$\mathbf{Z^2}$ = 1.96

σ = 0.05 (5%).

P = proportion of expectant mothers

q = (1-P), approximation of pregnant women who do not take Iron supplement.

e = error.

Hence, the sample size was as follows.

$$n = \frac{(1.96)2(0.28)(0.72)}{(0.05)2}$$

$$n = \frac{(3.8416)\ (0.2016)}{(0.0025)}$$

$$n = \frac{(0.7745)}{(0.0025)}$$

n = 309.79 ≈ **310**

contingency 10% = 310 X 10%

= 31

n = 341

However, the sample size was enhanced by 10 percent to 341 to cater for any attrition during the study.

3.7 Sampling Procedures

This study adopted probability and non-probability sampling methods. Pumwani Maternity Hospital was purposively selected since it is the biggest maternity hospital in the country serving at least 300 patients per day. The study adopted simple random sampling in selection of research participants. This method was used to minimize any form of bias and to ensure that the population was well represented. Out of 100 deliveries, the study randomly sampled 15 women to participate in the study. Lastly, to get other relevant information, an arrangement for Key Informants interviews including health workers, Multi-gravida and Prima-para mothers was carried out in Pumwani Maternity Hospital.

3.8 Data collection methods

Data was gathered via a pre-designed questionnaire and an interview guide for key informants. Research participants were asked for their permission by enumerators who described the study's purpose. The questionnaire was administered by the researcher. Key Informants including health workers, multi-gravida and prima-gravidas were assessed, by use of Key Informant Interview guide, to seek further data on the likely factors that inform the use of IFAS among expectant mothers. Instructional enumerators: prior to data collection exercise, four research assistants were appointed from the surrounding location of Pumwani area. To minimize the aspect of non-response to both genders amongst the respondents, the research assistants were all females. The assistants had to have not less than secondary education and were provided with basic guidance for a day on

the content of the questionnaire. At the stage of collecting data, the researcher ensured that accurate data was collected from the field through close monitoring of enumerators.

Pre-test: prior to data collection from the field, 15 respondents were identified for pretesting, from the target population. This was for purposes of identifying inquiries which didn't make sense to respondents, together with other related issues contained in the questionnaire that might elicit biased responses. The collected data would then be entered, edited and analyzed. Those queries that were not important were deleted.

Translation: for understanding the questions, the data tools were translated from English to Kiswahili language verbally.

3.8 Data collection tools

3.8.1 Structured Questionnaire

After gaining their permission, researchers used a standardized questionnaire to conduct interviews with each participant in their own time and at their own convenience.

3.8.2 Key Informant interview

The key informants were asked with Key Informant Interview Guide to provide comprehensive insights on the research field. Key Informants were chosen expediently from the medical professionals and expectant mothers that are willing to reveal detailed information on the logical determinants that do influence use IFAS amongst expectant mothers.

3.10 Data Management & Analysis

The data was collected, edited, and entered by the researcher in Epi-Data before being transferred to SPSS version 23 for analysis. Information was summarized using frequency and percentage distributions. At the bivariate level, we used the Chi-square test of independence to look for

associations between our categorical variables. Binary logistic regression was used to establish predictors to the use of IFA supplements. Associations between the dependent and independent variable were considered significant at $P>0.05$. Odds ratio was also used.

3.11 Ethical Consideration

The researcher sought ethical clearance from the Mount Kenya University Ethics and Clearance Committee before obtaining participants' informed permission (Appendix I). The National Commission of Science, Technology and Innovation NACOSTI (Appendix II) granted permission for the study to be carried out in Nairobi County after it was presented with a research permit. Prior to the collecting of data, additional permission was requested from the administration of the hospital, who ultimately gave their blessing to the project. The respondent handed over a signed copy of their informed consent. Throughout the length of the period that was spent gathering information, there was a strong focus placed on participation on a voluntary basis. The confidentiality of the survey takers was a primary concern, as evidenced by the fact that none of their identities appeared anywhere on the questionnaire.

CHAPTER FOUR

RESEARCH FINDINGS AND DISCUSSIONS

4.1 Introduction

This chapter presents the study findings, analysis and presentation. This study used a sample of 341 mothers. This implied that the response rate was 100%. The response rate was 100%

4.2: Social Demographic Characteristics of respondents

Table 4.1 illustrates that of the 341 respondents, a large proportion of respondents aged between 22-27 years old (32%) and 18-22 years old (29%) respectively. Three quarters of respondents were married and that slightly more than half (54%) had secondary school level of education. Less than one quarter (24%) were employed and that household income was less than 10,000 Kenyan shillings among 77.4% of respondents.

Table 4.1: Social demographic characteristics (a)

Age	Frequency	Percent
<18	16	4.7
18-22	99	29
23-27	109	32
28-32	83	24.3
33-37	28	8.2
38-42	6	1.8
Total	341	100
Marital status	Frequency	Percent
Married	257	75.4
Single	79	23.2
Divorced	5	1.5
Total	341	100
Level of education	Frequency	Percent
None	5	1.5
Primary	92	27
Secondary	185	54.3
Tertiary	59	17.3
Total	341	100
Employment Status	Frequency	Percent
Not employed	263	77.1

Employed	78	22.9
Total	341	100

Religion	Frequency	Percent
Islam	52	15.2
Christians	275	80.6
Other	14	4.1
Total	341	100

Maternal Characteristics of respondents

The majority of respondents, which represents 32% of the total, had two children, as shown in figure 4.1. While 26.7% of respondents had either one or three children, 11% had four children, and less than 3% of the total respondents had at least five children, the number of respondents with at least five children was less than 3%.

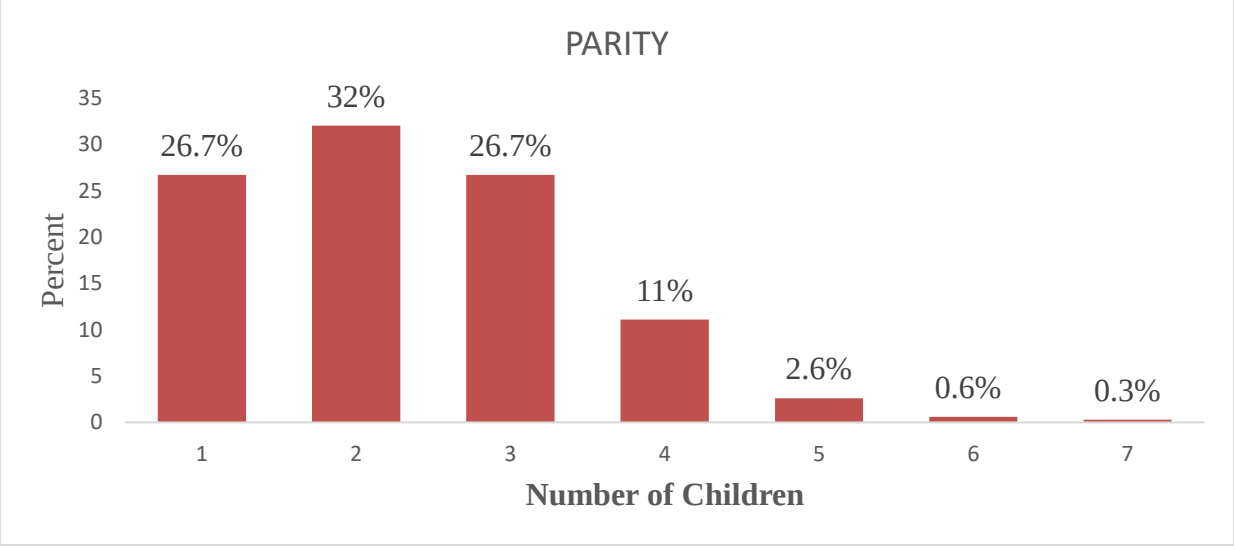

Figure 4.1: Parity

Figure 4.2 illustrates the trimester in which the mothers were in at the time of data collection. From figure 4.2, the majority of the mothers were in third (46%) and second (40%) trimester and only 14% were in their first trimester.

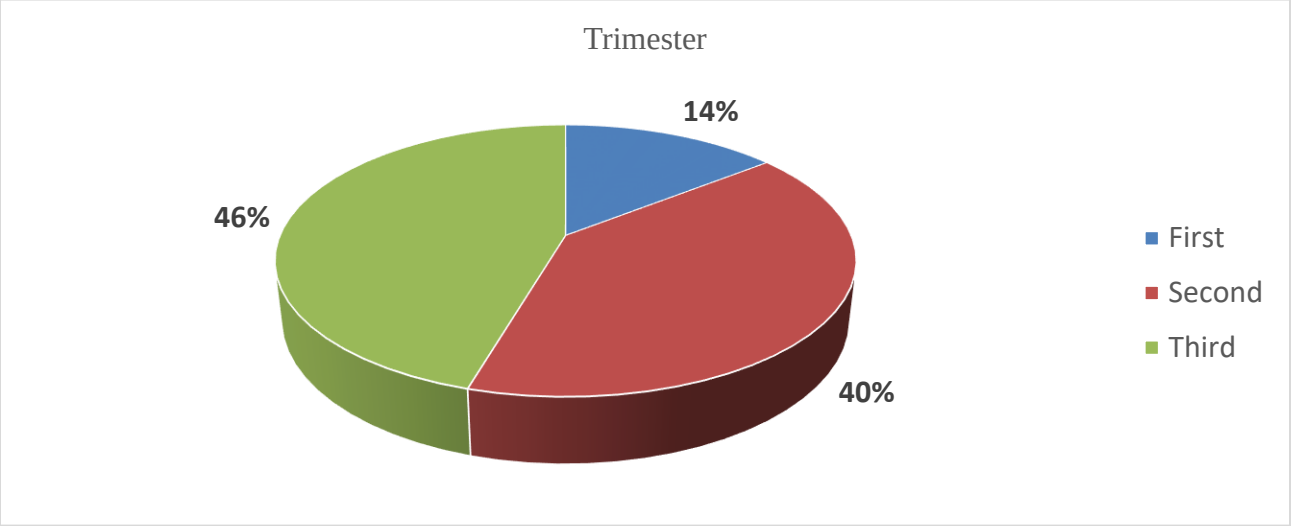

Figure 4.2: Trimesters period of respondents

Figure 4.3 illustrates that at the time of data collection, 34.3% of respondents had made four or more antenatal care visits, 29.9% were on their tthird visit, 26.1% on the second visit and only 10% were on the first antenatal visit.

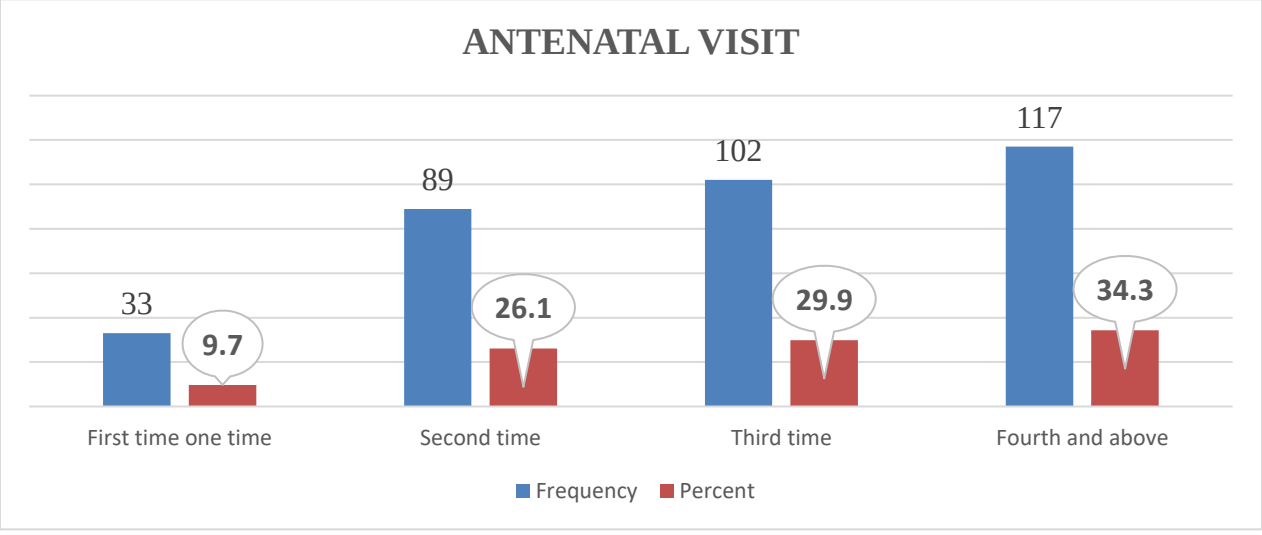

Figure 4.3: Antenatal visit

4.3 Uptake of IFAS

A large proportion of respondents 70% (N=240) as displayed in table 4.3 were using iron and folate supplements. A third of them did not.

Table 12: Use of IFAS for current pregnancy

Level of Compliance to IFAS Supplementation	Frequency	Percent
No	101	29.6
Yes	240	70.4
Total	341	100

4.4 Level of Knowledge on use of IFAS Supplements

Table 4.3 illustrates that 65% of respondents were not aware that IFAS supplements prevents anaemia though 90% were knowledgeable that the use of IFAS enhances maternal health. Slightly more than half were not aware that IFAS usage has some side effect while only percent thought that IFAS supplementation was not beneficial during pregnancy.

Table 4.3: Expectant mothers' knowledge on IFAS

IFAS supplements prevents Anaemia	Frequency	Percent
No	222	65.1
Yes	119	34.9
Total	341	100
IFAS usage enhance maternal health		
No	33	9.7
Yes	308	90.3
Total	341	100
IFAS usage has some side effects		
No	188	55.1
Yes	153	44.9
Total	341	100
IFAS supplementation is beneficial during pregnancy		
No	36	10.6
Yes	305	89.4
Total	341	100

Multiple response analysis indicate that of the all the respondent in the survey who answered yes in the individual knowledge questions, (N=885) a paltry 13.4 % were aware that the use of iron and folate supplement prevents anaemia. Close to a third of respondents in the survey 34.8% attested that IFAS usage enhances maternal health. Only 17.3% claimed to have experienced side effects after use of IFAS.

Table 4.4: Knowledge of IFAS usage

	Responses		Percent of Cases
Knowledge Items	N	Percent	
IFAS supplements prevents Anaemia	119	13.40%	34.9%
IFAS usage enhance maternal health	308	34.80%	90.30%
Side effects experienced after use of IFAS	153	17.30%	44.9%
Information on the benefits of daily ingestion of IFAS during pregnancy	305	34.50%	89.4%
Total	885	100.00%	

Overall, as displayed on table, knowledge composite score illustrates more than half 52% had good knowledge on the use of IFAS supplementation. The rest, 42.5% were categorized as having poor knowledge on the use of IFAS supplementation.

Table 4.5: Level of Knowledge on Use of IFAS Supplementation

level of Knowledge	Frequency	Percent
Poor Knowledge	162	47.5
Good Knowledge	179	52.5
Total	341	100

4.5: Test of Hypothesis

This study sought to test the following hypothesis

1. $H0_1$: There exist no statistically significant association among sociodemographic features and the use of IFA supplements among expectant mothers in Pumwani Maternity Hospital, Kenya.
2. $H0_2$: There is no statistically significant relationship between knowledge of expectant mothers on the need of IFA supplements and the use IFA amongst expectant mothers in Pumwani Maternity Hospital, Kenya.

Social demographic characteristics and uptake of IFAS

Table below shows bivariate analysis between socio-demographic characteristics and uptake of iron and folate supplements. It is evident that the level of education χ^2 *(df=3)* (15.15, N=341), *p=0.02* and use of iron folate supplements is statistically significant. Age χ^2 *(df=5)* (2.183, N=341), marital status χ^2 *(df=2)* (0.401, N=341), *p=0.1818* employment status χ^2 *(df=1)* (2.16, N=341) *p=0.15* household income χ^2 *(df=)* (3.639, N=341), *p=0.457* and religion χ^2 *(df=2)* (0.268, N=249), *p=0.875* were not statistically significant at bivariate level.

Table 4.6: Cross-tabulation: Demographic characteristics and use of IFAS

	Use of IFAS		χ^2 *(df)*	*p-value*
Age	No	Yes		
<18	4(25%)	12(75%)		
18-22	31(31.3)	68(68.7%)		
23-27	34(31.2%)	75(68.8%)	2.183(5)	0.823
28-32	20(24.1%)	63(75.9%)		
33-37	10(35.7%)	18(64.3%)		
38-42	2(33.3%)	4(66.7%)		
Marital status	No	Yes		
Married	75(29.2%)	182(70.8%)		
Single	25(31.6%)	54(68.4%)	0.401(2)	0.818
Divorced	1(20%)	4(80%)		
Level of Education	No	Yes		
None	4(80%)	1(20%)		
Primary	33(35.9%)	59(64.1%)	15.15(3)	**0.002**
Secondary	56(30.3%)	129(69.7%)		
Tertiary	8(13.6%)	51(86.4%)		
Employment status	No	Yes		
Not employed	83(31.6%)	180(68.4%)	2.160(1)	0.15
Employed	18(23.1%)	60(76.9%)		
Household Income	No	Yes		
<10000	81(30.7%)	183(69.3%)		
10001-20000	16(25.8%)	46(74.2%)		
20001-30000	3(23.1%)	10(76.9%)	3.639(4)	0.457
30001-40000	1(100%)	0(0%)		
>40001	0(0%)	1(100%)		
Religion	No	Yes		
Islam	15(28.8%)	37(71.2%)		
Christianity	81(29.5%)	194(70.5%)	0.268(2)	0.875
Other	5(35.7%)	9(64.3%)		

**significant at 0.05*

Table 4.6illustrate that at bivariate level, the level of knowledge on iron and folate supplements is directly associated with its uptake χ^2 (*df*=1) (22.6, N=341) *p=0.001.*

Table 4.6: Cross-tabulation: Level of Knowledge and use of IFAS supplementation

	Using IFAS for current pregnancy		Total				
Level of Knowledge	No	Yes	χ^2 *(df)*	*p-value*		Odd Ratio	
Poor Knowledge	68(42%)	94(58%)	22.6*(1)*	***0.001****		Upper	Lower
Good Knowledge	33(18.4%)	146(81.6%)			3.201	1.961	5.224

**Significant p<0.05*

Regression Analysis

Binary logistic regression analysis was further used to test hypothesis. Table below illustrates that the level of education A.O.R=3.331 (CI 2.0119-5.496) *p=0.0001*, level of knowledge A.O.R=1.886 (CI 1.317-2.701) p=0.001 and number of pregnancies A.O.R=0.154, (CI 0.010-1.413) were significant predictors of use of Iron folate supplementation.

Table 4.7: Logistic Regression Analysis

Variable in the Equation	Sig.	Exp. (B)	95% C.I. for EXP(B)	
			Lower	Upper
level of Knowledge	0.001	3.358	2.031	5.552
Age	0.989	1.002	0.793	1.265
Marital status	0.99	0.997	0.586	1.695
Level of education	0.001	1.896	1.298	2.768
Employment status	0.537	1.259	0.606	2.617
Household Income	0.433`	0.817	0.492	1.355
Number of Pregnancies	**0.018**	0.154	0.010	1.413
level of Knowledge	**0.001**	3.331	2.019	5.496
Level of education	**0.001**	1.886	1.317	2.701
Constant	0.001	0.128		

4.6 Discussion of the Research Findings

4.6.1 Sociodemographic Characteristics and use of IFAS

This study used a sample of 341 mothers to establish determinants of use of IFAS amongst expectant mothers visiting free maternity services at Pumwani Maternity Hospital, Kenya. Most of the sampled mothers were Christians, aged 23 to 27 years, married, had secondary education, and were unemployed. About 26.7% mothers had 3 children, 30.2% had 2 child, and 11% had 4 children while less than three percent of the total respondents had at least five children. . For those enrolled in the study, this being a first pregnancy for 31.4% of the mothers, second for 24.6% mothers and third pregnancy for 23.2% mothers. About 46% and 40.% mothers were in third and second trimester respectively and only 14% were in their first trimester.

In this study, bivariate analysis show that other demographic factors including age, marital status, employment status, religion trimester of pregnancy, and frequency in attending antenatal care were not associated with use of IFAS. This finding was contrary to study findings in India where age had significant association with use of IFAS (Mithra et al., 2014) and in Pakistan where expectant mothers above maternal ages of 45 years did not use IFAS (Nisar et al., 2014). Moreover, women in India who visited early ANC and frequently (at least four visits), received additional services and counseling were likely to take IFAS for more than 90 days (Wendt et al., 2015). Similarly, in Pakistan, non-utilization of ANC services reduced the chances of using IFAS by 13.4 times (Nisar et al., 2014). Uptake of IFAS increased with an increase in household income. A correlation was found between an increase in the number of children and a rise in the utilization of IFAS. A study in south India similarly reported significant association between birth order and socio economic

and use of IFAS (Mithra et al., 2014). In Pakistan, women belonging to the lowest socio economic class were significantly associated with the nonuse of IFAS (Nisar et al., 2014).

In another study done in Kenya; age, Status of marriage and size of family did not have a big effect on uptake and adherence to IFAS (Dinga et al., 2013). Consistently, Felipe-Dimog et al. (2021) investigated how people followed recommendations for IFA supplementation and what motivated them to do so. Specifically, they were interested in what factors led people to follow the recommendations. A variety of characteristics, including residency, birth count, enrollment in antenatal care (ANC), and total number of ANC visits, were among those that were investigated. These factors included age, level of education, occupation, wealth, ethnicity, and religion. The degree to which individuals followed the recommendation to use IFA supplements for a minimum of three months was the outcome variable. The research looked at 7983 pregnant women ranging in age from 15 to 49 years old. The results showed that 25.8% of these people took the recommendation to take IFA supplements. A multivariate logistic regression study found that pregnant Muslims and Muslims of non-Indigenous descent were less likely to follow the advice to use IFA supplements than other types of Muslims. Greater compliance with IFA supplementation was associated with being between the ages of 25 and 34, having higher levels of education and wealth, and living in rural areas. There was a significant disparity in the effects that housing had on IFA adherence across different wealth classes.

4.6.2 Level of Knowledge and use of IFAS

Many mothers (93%) were aware that IFAS usage enhances maternal health (Table 4.6). Mothers had information on the benefits of daily ingestion of IFAS during pregnancy. Further, mothers were aware that frequent use of IFAS during pregnancy could minimize dangers associated with

maternal anaemia and spina-bifida among children (Table 4.6). Knowledge from different sectors including formal education, experience, and sensitization was vital in use of IFAS. Mothers with no formal education were 25.5%, 3.6%, and 3% less likely to take up IFAS compared to mothers who had tertiary, secondary and primary education respectively. This implied that higher levels of education increased the use of IFAS. Expectant mothers' knowledge on the benefits of daily ingestion of IFAS during pregnancy; knowledge that IFAS usage enhances maternal health increased use of IFAS by 4.3 times; and knowledge that frequent use of IFAS during pregnancy could minimize dangers associated with maternal anaemia and spina-bifida among children increased use of IFAS by 3.5 times significantly increased the use of IFAS. In Pakistan, non-maternal knowledge and lack of formal education increased chances of not using IFAS. Acquaintance on the paybacks of IFAS reduced fear of side effects and discarded the belief that the tablet was a contraceptive (Nisar et al., 2014). A decline in adherence to IFAS was caused by a lack of understanding regarding the advantages of IFAS (Mithra et al., 2014). According to the findings of a study that was carried out in Kenya, there was not a significant link found between the degree of education and the uptake of IFAS. However, lack of information that IFAS is a requirement to ensure adequate nutrients was among the reasons for not taking the IFAS (Dinga et al., 2013). This implied that knowledge was fundamental and should be used to enhance uptake of IFAS. In this study, the number of pregnancies was not significantly associated with IFAS uptake. Similarly, a different study in northern Tanzania reported that multiparous mothers were unlikely to use supplementations as compared to primiparous women (Ogundipe et al., 2012). The study asserts that casual attitude could be a contributory factor to decreased uptake of iron folate supplements

In this study it was observed that there was adequate accessibility to health facilities that were operational and met health care needs. IFAS was affordable and most mothers were able to access IFAS whenever needed. This implied that the low use of IFAS was not due to unavailability. Health care workers in the facilities were also indicated to be hospitable and offered satisfying prescription of IFAS. Better service delivery defined by hospitability and patient satisfaction increased the odds of IFAS use. This implied that health workers and patient attitude and satisfaction were a major component in of IFAS use. Similarly, a study done in Pakistan observed that trust in the health care providers increased odds of taking IFAS among expectant mothers (Nisar et al., 2014).

4.6.3 Iron-folate Supplementation

Approximately 70% of the mothers were using IFAS for the current pregnancy. This implied that a third of respondents did not use IFAS. The prevalence of IFAS use fell below the target of the Ministry of Health of Kenya to expand Iron and Folic Acid supplements scope to 80%. Findings in this study implied that about a third of the mothers were at risk of anaemia which is similar to the findings of a study in Ethiopia which observed that out of three mothers one suffers from anaemia and lack of Folic Acid (Haidar and Pobocik, 2012). Among the 68.3% mothers, 38.1% of them reported to have used IFAS seven times within the last one week; while the rest reported using IFAS either more or less than seven times. This implied poor use of the IFAS. The hiatus in usage of IFAS could be attributed to the side effects experienced. Perceived side effects including vomiting, constipation and gastritis lead to decreased adherence to IFAS (Mithra et al., 2014). In addition, it has been demonstrated that a decreased adherence to IFAS is caused by the fear of experiencing adverse consequences (Nisar et al., 2014). Constipation, stomach cramping, nausea and vomiting, and other unpleasant side effects were among the causes that made it difficult to adhere to the IFAS protocol (KuMar et al., 2014). In Vietnam, one of the variables that contributed

to a higher uptake of IFAS was the fact that patients experienced adverse effects less frequently (Casey et al., 2013). In a prior study that was carried out in Kenya, one of the reasons stated for not taking the IFAS was that it caused adverse effects such as vomiting, heartburn, and unpleasant taste (Dinga et al., 2013). This suggests that a sizeable proportion of pregnant women are deficient in iron, which can have a role in a variety of unfavorable outcomes, including low birth weight, stillbirth, preterm birth, stillbirth, as well as maternal and neonatal mortality (Haidar and Pobocik, 2012). As a result, the potential for adverse consequences is a key worry regarding the administration of IFAS. About 33.1% and 48.8% mothers had contracted maternal anaemia in life and at the time of pregnancy respectively. Occurrence of anaemia in this study was high but similar to a study that reported a prevalence of 55 percent in Kenya (USAID, 2014) and 52% in sub Saharan Africa against 23% in developed countries (WHO, 2013). In this study, use of IFAS reduced the occurrence of anaemia by 2.1 times; and occurrence of anaemia at the time of pregnancy by 5.3 times. A Study in Kenya reported significant association between history of current anaemia with uptake and adherence to IFAS (Dinga et al., 2013). Low uptake of IFAS was a health risk factor for occurrence of anaemia.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATTIONS

5.1: Summary of the result findings

This study used a sample of 341 mothers to establish determinants of use of IFAS amongst expectant mothers visiting free maternity services at Pumwani Maternity Hospital, Kenya. Most of the sampled mothers were Christians, aged 18 to 32 years, married, had secondary education, and were unemployed. About 26.7% mothers did not have children, 30.2% had one child, and 40.7% had between two and six children. This was the first pregnancy for 31.4% mothers, second pregnancy for 24.6% mothers and third pregnancy for 23.2% mothers. Sections of 45.5% and 40.2% mothers were in third and second trimester respectively. Most mothers (64.2%) had attended ANC for more than two times. The level of education was associated with use of IFAS (p value= 0.008). Number of pregnancies was associated with use of IFAS (p value=0.018). An increase in the number of pregnancies was associated with an increased use of IFAS. Other mothers' factors including age, marital status, employment status, religion trimester of pregnancy, and number in attending antenatal care were not associated with use of IFAS.

Based on their own knowledge, majority (52%) of the mothers were aware that IFAS usage enhances maternal health. Approximately 87.1% of the mothers had information on the benefits of daily ingestion of IFAS during pregnancy. Further, 92.4% of the mothers were aware that frequent use of IFAS during pregnancy could minimize dangers associated with maternal anaemia and spina-bifida among children. The level of education of the mothers in this study was significantly associated with the use of IFAS (p value=0.002). Mothers with no formal education were 25.5%, 3.6%, and 3% less likely to take up IFAS compared to mothers who had tertiary, secondary and primary education respectively. The mothers' knowledge on the benefits of daily

ingestion of IFAS during pregnancy; IFAS usage enhances maternal health (own assessment); and knowledge that frequent use of IFAS during pregnancy could minimize dangers associated with maternal anaemia and spina-bifida among children was associated with use of IFAS (p value<0.05). Expectant mothers' knowledge on the benefits of daily ingestion of IFAS during pregnancy increased the use of IFAS by 2.8 times. Expectant mothers' knowledge that IFAS usage enhances maternal health increased use of IFAS by 4.3 times. Expectant mothers' knowledge that frequent use of IFAS during pregnancy could minimize dangers associated with maternal anaemia and spina-bifida among children increased use of IFAS by 3.5 times. The number of pregnancies were not associated with IFAS uptake.

Majority (83%) of the mothers were located within a radius of 1km of a health facility. A section of 90.9% mothers reported that health facilities were operational and met health care needs. A greater proportion of 84.2% mothers reported that they were able to access IFAS whenever needed. In addition, 78% of the mothers reported that IFAS was affordable. Health care workers were hospitable and offered satisfying prescription of IFAS as reported by 96.8% and 93.0% mothers respectively. Health care workers hospitability and provision of satisfying prescription of IFAS increased use of IFAS by 9.5 and 2.8 times respectively. Closeness to health facility; facilities' operations; accessibility and affordability of IFAS did not significantly influence use of IFAS in this study.

Approximately 68.3% of the mothers were using IFAS for the current pregnancy. Among the 68.3% mothers, a group of 38.1% mothers reported to have used IFAS seven times within the last one week; while the rest reported using IFAS either more or less than seven times. Upon using IFAS, 42.2% mothers experienced side effects mostly vomiting (40%).

A group of 33.1% and 48.8% mothers had contracted maternal anaemia in life and at the time of pregnancy. Contracting maternal anaemia in life and or at the time of pregnancy was associated with use of IFAS (p value<0.05). Use of IFAS reduced occurrence of anaemia in life by 2.1 times; and occurrence of anaemia at the time of pregnancy by 5.3 times.

5.2: Conclusions

This study sought to establish determinants of use of IFAS amongst expectant mothers visiting free maternity services at Pumwani Maternity Hospital, Kenya. Based on the study findings, the following conclusions were made;

i. Social demographic factors that significantly influenced use of IFAS were household income and number of children. An increase in the household income and number of children was associated with an increase in the use of IFAS. Other mothers' factors including age, marital status, employment status, religion, trimester of pregnancy, and number in attending antenatal care were not significantly associated with use of IFAS.

ii. Majority mothers were aware that IFAS usage enhance maternal health (83.3%). Most mothers (87.1%) had information on the benefits of daily ingestion of IFAS during pregnancy. In addition, 92.4% mothers were aware that frequent use of IFAS during pregnancy could minimize dangers associated with maternal anaemia and spina-bifida among children. Formal education and mothers' knowledge on use of IFAS significantly increased the odds three folds using IFAS. Use of IFAS reduced the chances to experience of anaemia in life or during pregnancy.

iii. The vast majority of mothers had access, whenever it was necessary, to medical facilities as well as IFAS. IFAS was not prohibitively priced. The medical facilities were functional and satisfied patients' need for medical care. The friendliness of health care staff and the

availability of IFAS prescriptions that satisfied patients contributed to a 9.5 and 2.8 times rise in IFAS use, respectively.

iv. The prevalence of IFAS use was 70%.

5.3: Recommendation

i) Recommendations for practice to immediate stakeholders for implementation

a) The Pumwani Maternity Hospital, Nairobi County Government, Ministry of Health of Kenya (MoHK), and other stakeholders should applaud the hospital health workers for the commendable job of good service delivery that enhanced uptake of IFAS. Other service providers can benchmark from them.

b) All stakeholders should take a further step on promoting IFAS use to ensure 100% compliance.

ii) Recommendations for practice to the Service users/ beneficiaries

a) Expectant mothers should heed to teachings on importance of IFAS and encourage one another to effective use.

iii) Recommendations for practice to other stakeholders

a) All family and community members need to be sensitized to monitor, mentor, and encourage their own to use IFAS during pregnancy.

b) Recommendations for further research in this field of study

a) The study recommends further research on individual factors, especially ignorance due to illiteracy and beliefs, that influence attitude for the uptake of IFAS.

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APPENDICES

APPENDIX I: INFORMED CONSENT FORM

Assessment of compliance with iron and Folic Acid Supplementation among ANC women attending Pumwani maternity hospital, Nairobi County

Dear respondents,

I am Mohamed Ali Roble, doing a Masters degree in Public Health from Mount Kenya University (MKU). I am interested in seeking your opinion on the factors that influence the use of Folic Acid and Iron supplementation on expectant mothers amongst attending Pumwani Maternity Hospital, Kenya. The purpose of this study will inform on policy to help in improving the use of IFA supplements amongst expectant mothers and will assist in designing better approaches for caring them during pregnancy. Generally, improvement in health care service in related areas. The data collected will be for purpose of academic. Question which will be asked to you will be prepared by the researcher being a student which will be specific questions. Interview questions will last for 5 to 8 minutes and should there be any question that you might be not be in a position to respond, you will are at liberty to by pass. There are no risks involved in this study but it comes with a lot of benefits which includes enhancements in the health of expectant mothers, reduction in mortality rate of infants, better care for infants and reducing the prevalence. Your direction will be highly appreciated should there be any questions that are infringing your privacy. All information collected will be treated with a lot of confidentiality and subject to ethical research. You can wish to withdraw any time. In case there arises some ethical issues during the study, kindly contact The Chairman, MKU ERC, P.O Box 342-01000, Thika

Regards

Name _____ Sing _____

APPENDIX II: Questionnaire

ASSESMENT OF COMPLIANCE WITH IRON AND FOLIC ACID SUPPLEMENTATION AMONG ANC WOMEN ATTENDING PUMWANI MATERNITY HOSPITAL, NAIROBI-KENYA

Dear Participant,

I am Roble Ali Mohamed, doing a Masters degree in Public Health from Mount Kenya University (MKU). In my effort to obtain information on the above topic, I request to obtain answers from the topic with assurance that all the information will treated with confidentiality and will be for the purpose for only academic. Should I now ask you the following question?

Yes _____

No. of Questionnaire: _____

Part A: Response on Social demographic Factors

1. What age are you? _____
2. Give us you status on marriage.
    i. Married
    ii. Single
    iii. Divorced
    iv. Separated
3. What level of education are you?
    i. Primary education
    ii. Secondary education
    iii. Tertiary education
    iv. None of the above
4. What is the number of children do you have? _____
5. What is you employment status?

i. Employed

ii. Not employed

6. How much is your house-hold monthly income? _____?

7. What are the number of pregnancies have you carried the current one included? _____

8. In what trimester are you in your pregnancy?

i. First Trimester

ii. Second Trimester

iii. Third Trimester

9. Which religion do you belong to?

i. Islam

ii. Christianity

iii. other

PART B: Use of participants that utilize IFAS

10. What number are you in attending antenatal care for this pregnancy?

i. First time One time

ii. Second time

iii. Third time

iv. Four and above

11. Are you using IFAS for this pregnancy?

i. Yes

ii. No

12. If your answer is yes, give the number of days you have taken the dose prescribed in for the previous week? _____

PART C: Expectant mothers knowledge on IFAS

13. Use of IFAS prevents maternal Anemia

i. Yes

ii. No

14. IFA usage enhance your maternal health

i. Yes

ii. No

15. use of IFAS can result to side effects

i. Yes

ii. No

16. Daily use of IFAS is beneficial to your pregnancy

i. Yes

ii. No

BEST REGARDS

APPENDIX III: Key Informant Interview Guide

1. What is your understanding of IFAS?
2. In your own judgment, what encourages use of IFAS amongst expectant mothers in your locality?
3. Can you agree that IFAS use can enhance maternal health?
4. Do you have the information on the benefits of daily ingestion of IFAS during your pregnancy?
5. How much does IFAS cost?
6. Are costs of IFAS affordable to you and other expectant mothers?
7. What are your recommendation that would improve usage of IFAS by expectant mother?

APPENDIX IV: NACOSTI PERMIT

NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY AND INNOVATION

Telephone:+254-20-2213471, 2241349,3310571,2219420
Fax:+254-20-318245,318249
Email: dg@nacosti.go.ke
Website : www.nacosti.go.ke
When replying please quote

NACOSTI, Upper Kabete
Off Waiyaki Way
P.O. Box 30623-00100
NAIROBI-KENYA

Ref: No. **NACOSTI/P/18/10714/25347**

Date: **8th October, 2018**

Mohamed Ali Roble
Mount Kenya University
P.O. Box 342-01000
THIKA

RE: RESEARCH AUTHORIZATION

Following your application for authority to carry out research on ***"Assessment of compliance with iron and folic acid supplementation among ANC women attending Pumwani Maternity Hospital, Nairobi County"*** I am pleased to inform you that you have been authorized to undertake research in **Nairobi County** for the period ending **8th October, 2019.**

You are advised to report to **the County Commissioner, the County Director of Education and the County Director of Health Services, Nairobi County** before embarking on the research project.

Kindly note that, as an applicant who has been licensed under the Science, Technology and Innovation Act, 2013 to conduct research in Kenya, you shall deposit **a copy** of the final research report to the Commission within **one year** of completion. The soft copy of the same should be submitted through the Online Research Information System.

BONIFACE WANYAMA
FOR: DIRECTOR-GENERAL/CEO

Copy to:

The County Commissioner
Nairobi County.

COUNTY COMMISSIONER
NAIROBI COUNTY
P. O. Box 30124-00100, NBI
TEL: 341666
15/10/2018

The County Director of Education
Nairobi County.

APPENDIX V: ETHICAL CLEARANCE

Mount Kenya University

AUGUST 7, 2018

Ref. No. MKU/ERC/0930

CERTIFICATE OF ETHICAL CLEARANCE

This is to certify that the proposal titled **"ASSESSMENT OF COMPLIANCE WITH IRON AND FOLIC ACID SUPPLEMENTATION AMONG ANC WOMEN ATTENDING PUMWANI MATERNITY HOSPITAL, NAIROBI COUNTY"** Whose Principal Investigator is Mr Mohamed Ali Roble (MPH/43622/2016) has been reviewed by Mount Kenya University Ethics Review Committee (ERC), and found to adequately address all ethical concerns.

Dr. Francis W. Makokha
Secretary, Mount Kenya University ERC

Sign: _____ **Date:** 07.08.2018

Prof. Francis W. Muregi
Chairman, Mount Kenya University ERC

Sign: _____ **Date:** 7/8/2018

The Chairman
Mount Kenya University
Ethics Review Committee
P. O. Box 342 - 0100, Thika

APPENDIX V: Map of Study Area