

**BISHOP STUART UNIVERSITY**



**FACTORS INFLUENCING ADHERENCE TO IRON AND FOLIC ACID  
SUPPLEMENTATION BY PREGNANT WOMEN ATTENDING  
ANTENATALCARE IN RUBANDA DISTRICT,  
SOUTH WESTERN-UGANDA.**

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**18/BSU/MPH/005**

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UNIVERSITY.**

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## DECLARATION

I, Turanzomwe Stuart, hereby declare that this dissertation entitled “Factors influencing adherence to iron and folic acid supplementation among pregnant women attending antenatal care in Rubanda district, South Western-Uganda” is my original work and has never been submitted to any institution for academic award. I declare that I have no conflict of interest this this dissertation.

Sign.....

Date: 18<sup>th</sup> Feb 2023

## APPROVAL

This is to verify that this dissertation has been written under our direct supervision and is therefore approved for final submission.



Date: 18<sup>th</sup> Feb 2023

Dr Mathias Tumwebaze, PhD



Date: 18<sup>th</sup> Feb 2023

Mr Amanyire Jordan

## **DEDICATION**

This dissertation is dedicated to the almighty God, to my wife, Katushabe Prossy and our sons, Ahumuza Jeremiah and Ahurira Josiah.

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## LIST OF ACRONYMS

ANC	Antenatal care
Hb	Hemoglobin
HC	Health Centre
IFA	Iron and Folic Acid
IFAS	Iron and Folic Acid Supplementation
IPTp	intermittent preventive therapy in pregnancy
MOH	Ministry of Health
UBOS	Uganda Bureau of Statistics
UDHS	Uganda Demographic and Health Survey
WHO	World Health Organization

### **DEFINITION OF TERMS AND OPERATIONAL DEFINITIONS.**

**Adherence:** Adherence to a drug/medication generally means the number of tablets swallowed by a patient in a given period as compared to the number of tablets expected to have been swallowed in the same period.

**Adherence to Iron Folic Acid supplementation:** This means pregnant mothers take the prescribed daily iron folic acid tablets. In this study, adherence was assessed using a five-point Likert scale according to tablets missed during the 30 days preceding the interview as follows.

<b>Tablets missed in previous 30 days</b>	<b>Adherence score</b>
0-2	Excellent
3-4	Good
5-6	Average
7-10	Poor
More than 10	Very poor

For purposes of analyzing the factors influencing adherence to iron folic acid supplements, adherence was dichotomized as adherence or no adherence. A woman was regarded to have adherence to IFAS if she swallowed at least 80% of the dispensed tablets in a month (missed a maximum of 6 tablets) (Kim et al., 2018; WHO, 2003).

**Level of knowledge on anaemia and Iron folic acid supplementation during pregnancy.**

In this study, seven questions were asked to assess the level of knowledge and answers to each question scored as 0 or 1. Mothers with an overall score of 0-1, 2-3, 4, 5-6, and 7 scores will be regarded as having Very low knowledge, Low knowledge, Moderate knowledge, Good knowledge and Very good knowledge respectively.

## ABSTRACT

**Background:** Globally, about 40% of pregnant women have anaemia. Pregnant women are at high risk of iron and folic acid deficiency anaemia due to increased nutrient requirement during pregnancy. Iron/folic acid supplementation with optimal adherence is the main cost-effective strategy for prevention of iron deficiency anemia in pregnant women. However, there remains poor adherence to iron and folic acid supplementation in pregnancy in many countries especially low-income countries. The aim of this study was to evaluate the level of adherence and the factors influencing adherence to iron and folic acid supplementation among pregnant women attending antenatal care in Rubanda district, south western-Uganda.

**Methodology:** A multi-Health facility based Observational and descriptive cross-sectional study was done. 172 pregnant mothers attending antenatal clinic in six selected health facilities in Rubanda district were enrolled in this study between December 2021 to March 2022. An interviewer administered questionnaire was used to study the participant characteristics and logistic regression was used to identify the factors influencing adherence to iron and folic acid supplements.

**Results:** The majority of women were aged between 20-29 years (57.56%), married (94.77%) and unemployed (80.23%). More than half of the respondents (62.21%, 95% CI 54.89%-69.53%) had taken at least 80% of the prescribed iron and folic acid tablets. This reflected good adherence level. Factors independently influencing adherence included maternal age below 20 years (aOR 3.83, 95% CI 1.12-13.08, p-value 0.032), age between 20-29 years (aOR=4.86, 95%CI: 2.03-11.63, pvalue <0.001), adherence partner (aOR=2.82, 95%CI: 1.34-5.91, pvalue <0.001) and being counselled on importance of iron and folic acid tablets (aOR=4.42, 95%CI: 2.08-9.42, p-value <0.001).

**Conclusion and Recommendations:** In Rubanda district, approximately six in every ten pregnant women adhere to iron and folic acid supplementation. Intensive counselling during

antenatal care about the importance of iron and folic acid supplements should be done on a daily basis with particular attention to women aged 30 years and above.

## CHAPTER ONE: INTRODUCTION

### 1.1. Background

Pregnant women are particularly at high risk of iron and folic acid deficiency due to increased nutrient requirement during pregnancy. Folic acid requirements are increased in pregnancy because of the rapidly dividing cells in the fetus and elevated urinary losses. Since the neural tube closes by day 28 of pregnancy, World Health Organization (WHO) recommends that, folic acid supplementation should be initiated as early as possible to decrease the risk delivering babies with neural tube defects (WHO, 2012). Iron/folic acid supplementation with optimal adherence is the main cost-effective strategy for prevention and control of iron deficiency anemia in pregnant women (Boti et al., 2018).

Anaemia during pregnancy is defined as a blood hemoglobin (Hb) concentration below 11.0 g/dl. It is the world's second leading cause of disability, and one of the most serious global public health problems. Globally, above 25% (around 2 billion) of population are highly affected by anaemia (Kapil & Bhadoria, 2014). In 2011, about 42.6 % of children, 38.2 % of pregnant women, and 29 % of non-pregnant women and 29.4 % of all women of reproductive age had anaemia globally (WHO, 2015a). The haemoglobin concentration is lower in pregnant women than non- pregnant women. This means children and pregnant women are the most at-risk sub populations.

The prevalence of anaemia in pregnant women was highest in South-East Asia region (48.7 %) and Africa region (46.3 %) and lowest in Western Pacific region (24.3 %) and Region of the Americas (24.9%) (WHO, 2015a).

Approximately 50% of cases of anaemia are considered to be due to iron deficiency. Other causes of anaemia include other micronutrient deficiencies (e.g. folate, riboflavin, vitamins A and B12), acute and chronic infections (e.g. malaria, cancer, tuberculosis and HIV), and

inherited or acquired disorders that affect haemoglobin synthesis, red blood cell production or red blood cell survival (e.g. haemoglobinopathies) (Balarajan et al., 2011).

Anaemia during pregnancy is a major public health problem especially in low-income countries and contributes to increased maternal and perinatal mortality and morbidity and in Africa, the prevalence of anaemia (>40%) is regarded as a severe public health problem as defined by World Health Organization (Black et al., 2013; WHO, 2015a).

Iron deficiency anemia contributes adverse effects on mother and child health. Fetal and neonatal risks related to this deficiency include low birth weight, prematurity, fetal distress which all contribute to perinatal morbidity and mortality. Infants born to anemic mothers will more likely to become anemic themselves. Similarly, maternal risks may occur including low weight gain, lowered resistance to infection, preterm labor, placenta previa, premature rupture of membrane, cardiac arrest, hemorrhage, poor cognitive development and reduced work capacity (Begum, 2012).

Therefore, to reduce the risk of maternal anaemia, iron deficiency and poor pregnancy outcomes, World Health Organization (WHO) recommends a standard daily oral dose of 30-60 mg of elemental iron and 400µg of folic acid supplements throughout pregnancy, to begin as early as possible as a part of routine antenatal care (ANC) programs. In addition, where the prevalence of anaemia in pregnancy is over 40% like in Africa, a daily dose of 60 mg of elemental iron is preferred over a lower dose of 30 mg (WHO, 2012). Adherence to oral iron and folic acid supplementation is recommended as part of the antenatal care to reduce the risk of low birth weight, maternal anaemia and iron deficiency. WHO therefore recommends that even in absence of folic acid, pregnant women must receive iron supplements.

As a policy, every pregnant woman in Uganda must receive folic acid 5mg throughout the first trimester (preferably starting 90 days before conception) and thereafter ferrous (200mg) /folic

acid (400mcg) once daily throughout pregnancy to prevent iron and folate deficiency (MOH, 2016).

Since malaria worsens the burden of anaemia in pregnancy, in Uganda where malaria is endemic, provision of iron and folic acid supplements is implemented in conjunction with measures to prevent, diagnose and treat malaria like monthly intermittent preventive treatment in pregnancy” (IPTp) with the antimalarial drug sulfadoxine-pyrimethamine (WHO, 2016b). Other key policies being implemented in Uganda to reduce anaemia include fortification of foods, deworming of pregnant women and children less than 14 years and delayed cord cutting. Iron and folic acid supplements are given to mothers during antenatal care at no cost in all public health facilities. However, due to occasional stock outs, over 39% of women in Mulago Hospital receive less than 14 tablets to last a month which affects their adherence to these supplements (Kiwauka et al., 2017).

Some of the factors that have been studied to influence adherence include education level, maternal age, residence, supplies of IFAS, quality of counselling, number of ANC visits and timing of 1<sup>st</sup> ANC visit, experiencing drug side effects and marital status (Assefa et al., 2019; Boti et al., 2018; Kamau et al., 2018; Nisar et al., 2014; Ugwu et al., 2014).

This study will therefore assess the level of adherence to iron and folic acid supplementation by pregnant women attending antenatal care in Rubanda district as well as the factors influencing this adherence.

## **1.2. Problem statement**

Pregnant women are particularly at high risk of suffering from anaemia (38.2%) compared to only 29 % of non-pregnant women who are anemic. 800,000 of the pregnant women have severe anaemia and the prevalence of anaemia among pregnant women in Uganda is estimated at 34% (WHO, 2015a). This high burden of anaemia results into maternal and fetal



adverse outcomes like low birth weight, prematurity, neural tube defects, postpartum hemorrhage and maternal sepsis (Begum, 2012).

To reduce the burden of anaemia and avert the associated complications, its recommended that pregnant women take iron and folic acid supplements throughout pregnancy (WHO, 2016a). However, there still exists low adherence levels to Iron and folic acid supplementation in pregnancy in many countries especially low-income countries like Uganda where only 11.6% of the mothers receiving antenatal care at Mulago National referral hospital adhere to iron supplements (Kiwanuka et al., 2017). The adherence level in a study done in a private not for profit hospital in Kanungu, south western Uganda indicated that only 22% of women adhere to IFAS during pregnancy (Nimwesiga et al., 2021).

There is limited documentation on the adherence level to iron and folic acid supplements and associated factors in rural south western Uganda. This study therefore aimed to assess the factors affecting adherence levels to iron folic acid supplementation during pregnancy among women in rural south western Uganda and subsequently make relevant recommendations to health facilities and policy makers on how adherence can be improved.

### **1.3. Research questions**

- a) What is the level of adherence to iron and folic acid supplements among pregnant women attending antenatal care in Rubanda district?
- b) What are the socio-demographic factors influencing adherence to Iron and folic acid supplements among pregnant women attending antenatal care in Rubanda district?
- c) What are the health system determinants of adherence to iron and folic acid supplements among pregnant women attending antenatal care in Rubanda district?

#### **1.4. Objectives of the study**

##### **a) Main objective**

The main objective was to assess the factors influencing adherence to iron and folic acid supplementation among pregnant women attending antenatal care in Rubanda district, south western-Uganda.

##### **b) Specific Objectives**

- 1) To determine the level of adherence to iron and folic acid supplements during pregnancy among pregnant women attending antenatal care.
- 2) To assess the socio-demographic factors influencing adherence to Iron and folic acid supplements among pregnant women attending antenatal care.

**1.5.** To assess the health system determinants of adherence to iron and folic acid supplements among pregnant women attending antenatal care.

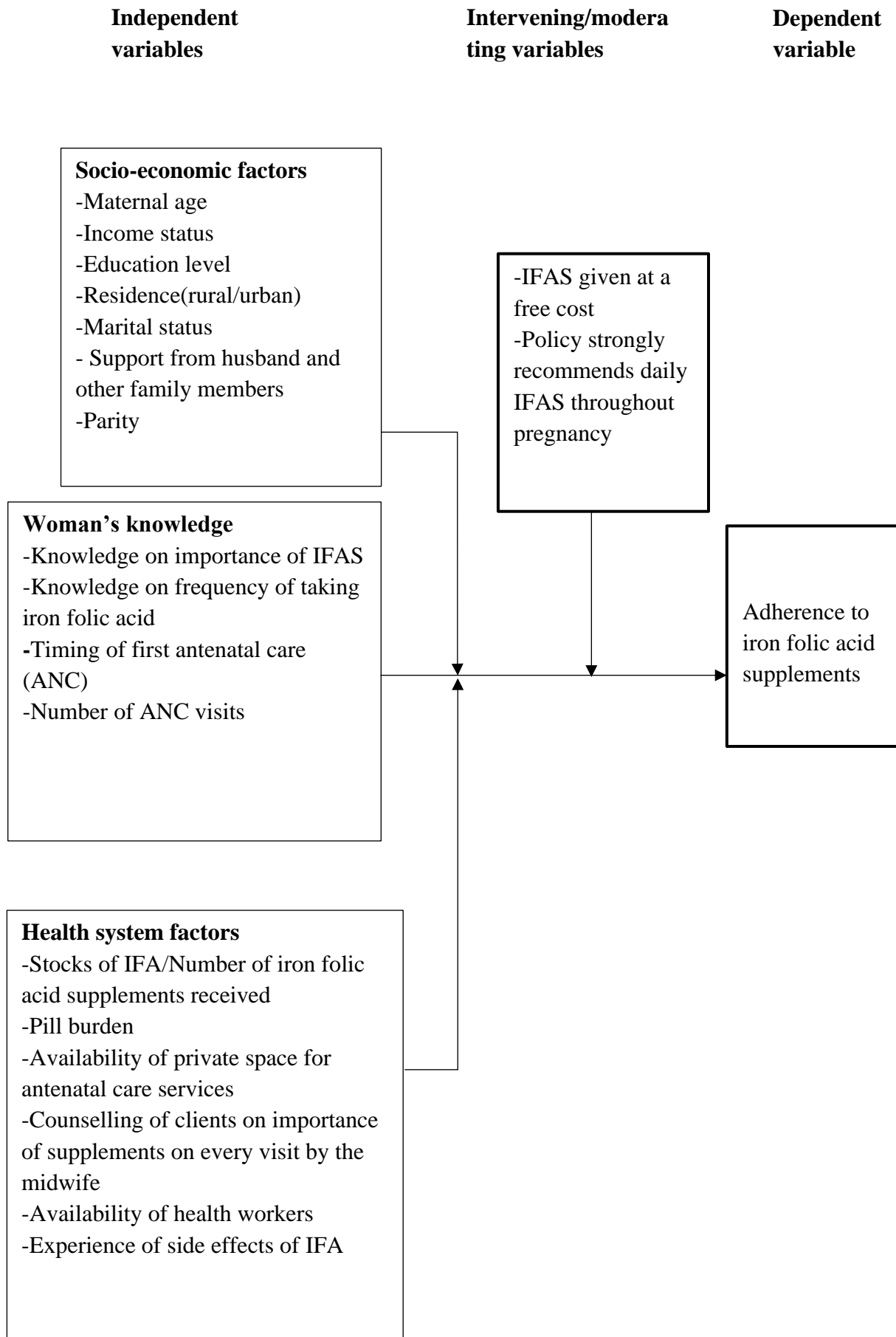
#### **1.6. Justification for the study.**

World health Organization and the Uganda Ministry of Health recommend that iron and folic acid should be taken by the pregnant mother throughout her pregnancy in order to prevent iron deficiency anaemia and associated maternal and fetal complications. Despite this strong recommendation, limited information is available regarding the percentage of pregnant women who adhere well to these supplements as well as factors affecting this adherence rate. This study will therefore assess the adherence of pregnant women to prenatal iron and folic acid supplementation and the associated factors.

Implementation of the recommendations made from this study may improve the adherence to iron folic acid supplements during pregnancy and subsequently reduce anaemia as associated sequelae among pregnant mothers and development of congenital birth defects like neural tube defects hence reducing morbidity and mortality at a community level.

The study will inform policy makers on what recommendations should be put in place to improve adherence to medications given during antenatal care. It will also enable government to spend more resources on interventions that will improve the health indicators of interest.

## 1.7. Conceptual framework



### **1.5.1 Description of the Conceptual Frame Work**

Socio-demographic factors, woman's knowledge and healthy facility factors influence the health behavior of pregnant women to adhere to iron folic acid supplementation given during pregnancy.

Socio-demographic factors include maternal age, income status, education level, residence (rural/urban), marital status, woman's parity and support from husband and other family members.

Woman's knowledge on importance of how and why to take folic acid, the gestational age at first antenatal care (ANC) and the number of ANC visits attended can also influence her behavior towards adherence to these supplements.

Health system factors which can affect adherence include stocks of IFA/Number of iron folic acid supplements received, experience of side effects, availability of private space for antenatal care services, counselling of clients on importance of supplements on every visit by the midwife.

### **1.8. Scope of the study**

#### **a) Geographical scope**

The study was conducted in selected health facilities within Rubanda district, south western Uganda which is about 440 Km from Kampala capital city.

#### **b) Content scope**

The study was confined to assessing factors influencing adherence to iron and folic acid supplementation among pregnant women attending antenatal care in Rubanda district, south western-Uganda.

The study was limited to finding out the percentage of pregnant women adhering to iron folic acid supplementation and factors influencing this adherence level.

c) Time scope.

The study was conducted from December 2021 to March 2022.

## **CHAPTER TWO: LITERATURE REVIEW**

### **2.1. Importance of Iron folic acid supplementation among pregnant women**

World Health Organization (WHO) defines anemia in pregnancy as the hemoglobin (Hb) concentration levels below 11 g/dl. It is defined as a decrease in the concentration of circulating red blood cells or in the hemoglobin concentration and a concomitant impaired capacity to transport oxygen because of low level of circulating erythrocyte than the normal (WHO/UNICEF/UNU, 2001).

Deficiency of iron and folic acid is a leading cause of anemia among pregnant women (Stoltzfus & Dreyfuss, 1998). According to WHO, Anemia in pregnancy has several effects that may be deleterious to mothers and fetuses and it is a known risk factor for many maternal and fetal complications. It is one of the most common preventable causes of maternal morbidity and poor prenatal outcome (WHO, 2015b). It is recommended that all pregnant women must take a standard daily oral dose of 30-60 mg iron and 400µg folic acid tablets throughout pregnancy and this necessary to prevent maternal anemia, low birth weight, preterm birth and puerperal sepsis (WHO, 2016a).

### **2.2. Level of adherence to iron folic acid among pregnant women**

The level of adherence to iron and folic acid among pregnant women remains very low, particularly in low-income countries yet the burden of anemia among pregnant women in these areas is significantly high (WHO), 2015).

In a household survey conducted within 14 districts in Pakistan, only 38.3% of women reported taking IFAS at some stage during their last pregnancy, most of whom initiated these supplements in the late second trimester, with only 5% of these women initiating iron folic supplements in the first trimester (Nisar et al., 2014).

In a cross sectional study conducted in North West province, South Africa among pregnant women, the compliance rate to iron and folic acid supplements was 93% (Mbhenyane & Cherane, 2017).

However, the rate of adherence to iron folic acid supplementation among the pregnant women in the urban and rural communities was 37.2% and 28.9% respectively in a study done in Ethiopia (Gebre, Mulugeta, & Etana, 2015).

In Uganda, the level of adherence to iron folic acid supplementation was much lower at 11.6% in a cross sectional study conducted at Mulago National Referral Hospital and equally low at 22.37% in a study conducted in Bwindi Hospital in south western Uganda (Kiwauka et al., 2017; Nimwesiga et al., 2021).

### **2.3. Knowledge of pregnant women about iron and folic acid supplementation.**

The women's knowledge about IFAS has been cited as one of the factors that significantly influences the level of adherence (Kalipa, Goon, Yako, & Okeyo, 2017). Patients who know why they are taking their medications and how to deal with the possible side effects that may arise are more likely to adhere to treatment. Knowledge is thought to increase the level of awareness about IFAS and in turn increases the attitude and practice towards adherence to IFAS (Gebremariam et al., 2019; Habib et al., 2009; Kalipa, 2017).

The highest level of knowledge is often among women who obtain information from brochures and community health workers although it has been observed that most women (63%) with knowledge on iron and folic acid supplementation receive this information from healthcare workers (Kamau et al., 2019).

In Western Amhara, women who had higher knowledge about anaemia were about four times more likely to adhere to iron foliate supplementation compared to women who had low knowledge (AOR: 3.64, 95%CI: 1.78-7.39). However, knowledge about iron and folic acid supplementation and anaemia was not found to be significantly associated with the mothers'



adherence to iron folic acid supplementation among pregnant women in North Western Zone of Tigray, Ethiopia (Gebre et al., 2015b; Taye et al., 2015).

#### **2.4. Socio-demographic factors affecting adherence to IFAS.**

##### **Education level of the mother.**

The education level of a pregnant woman is one key factor that can determine a woman's understanding of the importance of taking daily supplements during pregnancy hence influencing her adherence levels to iron and folic acid supplements. In a cross-sectional study among pregnant women in Enugu, Southeastern Nigeria, tertiary education was identified as a strong determinant of adherence to iron supplementation during pregnancy where women who had achieved tertiary education were 5.5 times more likely to adhere to IFAS compared to those below tertiary education (Ugwu et al., 2014).

In another study done in Ethiopia, it was found out that pregnant women who had secondary and above education were about 2.5 times more likely to have adhered to IFAS than those pregnant women who had primary education (Boti et al., 2018). Furthermore, among women with no education, 53 percent went on four or more ANC visits compared with 72 percent of women with more than a secondary education which also affects the level of knowledge a women will receive during these visits (UBOS, 2017).

##### **Marital status.**

Marital status has been identified to be one of the factors that can affect a woman's adherence to iron folic acid supplementation during pregnancy. It's believed that married women are more likely to adhere to their supplements compared to their single counter parts partly because married women get support from their husbands and may help in reminding them to take the IFAS (Birhanu et al., 2018).

**Level of Income.**

A woman's income is another socio-economic factor that is also likely to affect a woman's adherence to the prescribed iron folic acid supplementation during pregnancy. In a study done in western Kenya, it was found out that the higher the woman's income, the higher the chances of adhering to iron folic acid supplements (Kamau et al., 2018). This is possibly because clients with high income are more likely to have attained high level of education, hold formal employment, or own good businesses, all factors that favor adherence to medication (Taye et al., 2015).

**Residence.**

It has been noted that women who stay in urban areas are more likely to adhere to their supplements than rural dwellers. This is partly because urban residents have better access to health facilities than those staying in rural areas (Birhanu et al., 2018; Ethiopia & Macro, 2016).

**Maternal age.**

The age of the pregnant woman may affect her adherence to IFAS. It has been found out that young women tend to demonstrate good adherence to IFAS than older women. This is because younger women are fresh from school and are likely to have higher level of knowledge including on IFAS and anemia. Most of these young women are also likely to be first time mothers hence keen on advice given by health care workers while old women may feel they have experience with pregnancy and don't need IFAS (Gebre et al., 2015a; Kamau et al., 2019; Nisar et al., 2014).

**Acceptability of iron folic acid supplementation.**

Adherence levels are better among mothers who believe IFAS improves their chances of a safe and uncomplicated delivery of a healthy, well-nourished baby. However, many mothers may believe that like any other medication, IFAS should not be taken on an empty stomach which

leads to missing doses, particularly during fasting periods and on days where the household does not have food available (Clermont et al., 2018).

## **2.5. Health system factors**

### **Supplies of IFAS**

In most cases, the stock levels of IFAS in government health centres determine the number of tablets a woman receives. Mothers who are given less drugs from the public facilities and asked to buy the rest tend to have poor adherence compared to those who are given all the full dose. According to Galloway & McGuire (1994), most women will take the iron folic acid supplements if provided with adequate stocks to take them up to the next ANC visit. 28.3 % of pregnant women attributed their poor adherence to non-affordability of iron supplements (Galloway & McGuire, 1994; Ugwu et al., 2014).

### **Level of counselling provided**

Women may not adhere to medications if they are not counselled about the relevancy of taking the medications daily (Adeniyi et al., 2018). Counselling about the importance of IFA supplementation is associated with increased odds of adherence due to increased awareness on the dangers of not taking the pills (AOR = 3.72, 95% CI = (1.80–1.71)) (Assefa et al., 2019).

### **Gestational age at time of registration in ANC clinic**

Pregnant women who enroll in antenatal clinics in early trimester are more likely to adhere to the iron folic acid supplementation compared to women who register in late trimester. Pregnant women who register early for ANC service often acquire a better knowledge of perceived risk and benefit of iron folic acid supplementation to prevent anemia during their pregnancy (Gebre et al., 2015a; Gebremariam et al., 2019).

## **Number of ANC visits**

Women who attend antenatal care many times are more likely to adhere to iron folic acid supplements than those who attend few times. In a study done to determine and compare the adherence rate and identify factors associated with iron folic acid supplementation among urban and rural pregnant women attending ANC clinics in North Western Zone of Tigray, Ethiopia, pregnant women who had at least four antenatal visits were about 3.78 times more likely to be adherent to IFA supplementation as compared to pregnant women who were lately registered for antenatal care service. Similar findings were found in other studies conducted Egypt, Tanzania and Philippines (Gebre et al., 2015a; KHATTAB, 2014; Ogundipe et al., 2012).

## **Fear of side effects**

Side effects of iron folic acid supplements may be associated with a low level of adherence. Some of the side effects reported by mothers include heart burn, nausea, vomiting and stomach cramping (Abinet et al., 2015). A study done in Ethiopia revealed that women who experienced iron folic acid related side effects during the previous pregnancy have 8.5 times higher odds to decrease adherence to iron folic acid in current pregnancy than those did not experience iron folic acid related side effects (Kassa et al., 2019).

## **2.6. Knowledge gap**

Despite the various studies that have been done, there still exists a high burden of anaemia among pregnant women in developing countries especially in rural areas and there is paucity of data regarding the adherence levels in these areas including Rubanda district.

## **CHAPTER 3: METHODOLOGY**

### **3.1. Study design.**

A multi-health facility based cross-sectional research design employing quantitative methods was used to collect detailed information from the study participants.

### **3.2. Study area**

The study was conducted in the selected health facilities of Rubanda district, South western region of Uganda. In 2014 National population census, Rubanda had a total population of 196,896 people (92,011 males and 104,885 females) and the projected population of 2019 was 206,600 people implying that about 10,330 women (5% of the population) became pregnant in 2019 (UBOS, 2017). Rubanda district is approximately 440km from Kampala, the capital city of Uganda. The district has a total of 39 health centres (2 health centre IVs, 8 health centre IIIs and 29 health centre IIs). All these facilities are able to provide ANC services, with majority of women seeking care at HC III and IV. During ANC, routine iron and folic acid supplements are provided to mothers to prevent anaemia.

### **3.3. Study population**

The study population included all pregnant women attending antenatal care from the selected facilities within Rubanda district.

#### **3.3.1. Inclusion Criteria**

Pregnant women attending antenatal care for at least the second time were eligible to participate in the study after consent. These mothers were selected because they were expected to be taking iron and folic acid received on their previous visit.

#### **3.3.2. Exclusion criteria**

Pregnant women coming in for their first time were excluded from the study.

### 3.4. Sample size determination

The sample size was estimated using Kish Leslie (1965) formula.

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

Where, n= sample size to be studied,

Z= the standard normal value of  $\alpha$  at 95% confidence level corresponding to =1.96

p=the estimated proportion of pregnant women adhering to iron folic acid supplementation in Mulago National referral hospital=11.6% (0.116) (Kiwanuka, et al., 2017).

$$q=1-p =1-0.116 =0.884$$

d= the maximum error at 5% (0.05)

Therefore, substituting in the formula,

$$n = (1.96^2 * 0.116 * 0.884) / (0.05^2)$$

$$n = 157.57 \approx 156.$$

Adjusting for the non-response, an additional 10% of the sample size was considered.

$$n = 156 + (156 * 10/100)$$

$$n = 156 + 15.6$$

$$n = 171.6 \approx 172.$$

Therefore, with a non-response rate of 10%, the study enrolled 172 eligible participants.

### 3.5. Sampling technique.

#### 3.5.1 Sampling of study area

Participants were from the selected health facilities in Rubanda district. To select the health facilities to participate in the study, multistage sampling was employed. First, the health facilities were stratified as health centre IIIs and IVs. Since there are only two health centre IVs (Muko HC IV and Hamurwa HC IV), both of them were included in the study as they see most of the mothers seeking ANC services.

Secondly, a sampling frame containing all the eight-health centre IIIs was made and entered into a computer software (Microsoft excel 2019) to help generate random numbers so that 50% of these health facilities are selected as a representative sample for the eight facilities. The selected four facilities with the highest random number in order included Rubanda PHC, Bubare HC III, Ikumba HC III and Muko NGO as shown below.

Health facility name	Random Number
Muko NGO	0.389727247
Bufundi HC III	0.222664468
Rubanda PHC	0.982531612
Ruhija HC III	0.168714415
Ikumba HC III	0.42287703
Bubare HC III	0.523866211
Bwindi HC III	0.124960738
mpungu HC III	0.343451975

### 3.5.2 Sampling of the study participants

#### 3.5.2.1 Sampling of mothers

Eligible women were sampled from those who had come for ANC at the selected facility and interviewed. The total sample size of 172 participants was distributed amongst the two selected

health centre IVs and the four health centre IIIs. Proportionate sampling was used and this was based on data extracted from the district health information software (DHIS2) where the total ANC attendance over a period of January 2019 to December 2019 for Hamurwa HC IV, Muko HC IV, Rubanda PHC, Bubare HC III, Ikumba HC III and Muko NGO were 2635, 2554, 2011, 1617, 936 and 1506 mothers respectively. Therefore, proportionate to the ANC attendance, study participants to be interviewed from Hamurwa HC IV, Muko HC IV, Rubanda PHC, Bubare HC III, Ikumba HC III and Muko NGO were 40, 39, 31, 25, 14 and 23 eligible mothers respectively as summarized in the table below.

<b>Name of facility</b>	<b>Antenatal attendance (Jan -Dec 2019)</b>	<b>Proportionate sample size determination formula</b>	<b>Number of mothers to be selected per facility</b>
Hamurwa HC IV	2635	= (2635/11,259) *172	40
Muko HC IV	2554	= (2554/11,259) *172	39
Rubanda PHC	2011	= (2011/11,259) *172	31
Bubare HC III	1617	= (1617/11,259) *172	25
Ikumba HC III	936	= (936/11,259) *172	14
Muko NGO HC III	1506	= (1506/11,259) *172	23
<b>TOTALS</b>	11,259		<b>172</b>

From each selected facility, mothers who came for antenatal care on a clinic day were given unique numbers and 50% of them selected by simple random sampling using the lottery method without replacement. The ANC card was tagged with an identifier after interview to avoid studying the same participant on subsequent visits. This sampling procedure was repeated on every antenatal clinic day until the desired sample size in that facility was achieved.



### **3.6.Data collection tools**

An interviewer-administered, structured questionnaire was used to collect the quantitative data from the study participants. The tool was developed after doing a thorough literature review so that it can capture all the factors likely to influence the adherence level to IFAS.

#### **Independent variables**

The questionnaire was developed after reviewing relevant literature about the topic to capture the independent variables. The variables that were assessed in this study include;

- The socioeconomic determinants of adherence for example age, marital status, education level, occupation, income, gestational age, parity and gravidity.
- Possible factors influencing adherence or non-adherence to iron folic acid supplementation (knowledge on anemia and iron folic acid supplementation, presence of any side effects attributed to IFA, acceptability of iron folic acid supplementation, number of ANC visits, supplies of IFAS).
- Knowledge on anaemia and iron folic acid supplement classified on Likert scale as Very low knowledge, Low knowledge, Moderate knowledge, Good knowledge and Very good knowledge.

#### **Dependent variable**

This was the adherence level that was assessed by considering the number of tablets swallowed and missed in the 30 days preceding the study. The adherence level was put on Likert scale as excellent, good, average, poor and very poor and later dichotomized as Adherent or not. A woman was regarded to have adhered to IFAS if she took at least 80% of the prescribed pills (Kim et al., 2018; WHO, 2003).

### **3.7. Reliability of the study**

To ensure reliability, the questionnaire was pretested on 17 pregnant mothers (10%) attending antenatal care from Bubaare HCIII which was not part of the study sites and Cronbach's Alpha coefficient was calculated using Stata version 17. The coefficient of 0.79 was obtained and hence considered as good reliability.

### **3.8. Data processing and analysis**

The questionnaires were checked on a daily basis for completeness. Data obtained from the questionnaires was entered in Microsoft excel and later exported into Stata version 17 for data cleaning and analysis. Univariate analysis was used to describe the baseline characteristics of participants. To determine the factors associated with adherence, logistic regression was used. At bivariate analysis, all variables with a p value less than 0.2 and those that are biologically plausible were entered into the multivariable logistic regression model. Statistical significance was considered at p-values <0.05 and the Odds ratios with their corresponding 95% confidence intervals were recorded.

### **3.9. Data safety**

Filled questionnaires will be kept under lock and key and be accessed only by the principal investigator.

### **3.10. Ethical Considerations**

#### **3.10.1. Institutional approval.**

Clearance was obtained from the director of Graduate studies, Research and Innovations of Bishop Stuart University while Ethical approval was obtained from The AIDS Support Organisation Research Ethics Committee (TASO REC), Reference **TASO-2021-36** (Appendix 6).

### **3.10.2. Beneficence and non-maleficence.**

Participants were informed that participating in this study carried no risk on their lives or the pregnancy itself, but will instead help policy making towards improving adherence to iron folic acid and subsequently increase the associated benefits to the unborn babies.

### **3.10.3. Autonomy and Informed consent**

Once the study participants understood the benefits of participating in the study, they were asked to provide informed written consent voluntarily before they were interviewed. The respondents were assured that they had the right to be involved or not to be involved in the study, and that non-involvement would not in any way affect the quality of antenatal care services given to them.

### **3.10.4. Privacy and Confidentiality**

Confidentiality was guaranteed throughout the study by ensuring no participant's name is written on the questionnaire and the filled questionnaires were kept in a lockable cupboard accessed only by the principal investigator.

## CHAPTER 4: RESULTS

### 4.1 Characteristics of study participants

Table 1: Baseline characteristics of Participants (N=172)

Patient characteristics	Number (n)	Percentage n/N*100 (%)
<b>Age</b>		
10-19years	28	16.28
20-29years	99	57.56
30+ years	45	26.16
<b>Marital Status</b>		
Unmarried	9	5.23
Married	163	94.77
<b>Education status</b>		
Primary or less	48	27.91
Above Primary	124	72.09
<b>Occupation</b>		
Unemployed	138	80.23
Employed	34	19.77
<b>Reminder</b>		
No	101	58.72
Yes	71	41.28
<b>Residence</b>		
Rural	134	77.91
Town-council	38	22.09

**Average monthly****income**

Less 100,000shs	145	85.80
100,000shs or more	24	14.20

**Gravidity**

Primigravida	33	19.19
Multigravida	139	80.81

**ANC visit number**

ANC 2	55	31.98
ANC 3	31	18.02
ANC 4	52	30.23
ANC 4+	34	19.77

**Tabs received on****previous visit**

Less than 15	19	11.05
15 or more	153	88.95

In this study, majority of women were aged between 20-29years (57.56%), married (94.77%), multigravida (80.81%) and had attained at least primary level education. However, majority were unemployed (80.23%) and earning less than 100,000 shillings in a month (85.8%).

#### **4.2 Level of knowledge on importance of iron folic acid supplementation among women attending ANC in Rubanda district (N=172)**

<b>Level of knowledge</b>	<b>Number (n)</b>	<b>Percentage n/N*100)</b>
Very low knowledge (Total score of 0-1)	0	0

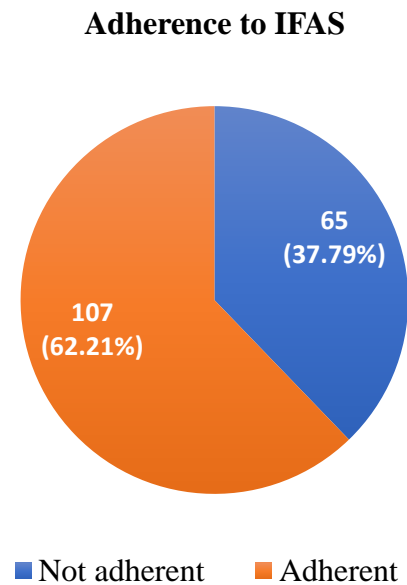
Low knowledge (Total score of 2-3)	16	9.30
Moderate knowledge (Total score of 4)	27	15.70
Good knowledge (Total score of 5-6)	107	62.21
Very good knowledge (Total score of 7)	22	12.79

In this study, majority of the women had good knowledge on importance of taking iron folic acid supplements during ANC. The median score of participants was 5 points out of 7 points and only 33.14% has a score above this median score.

#### **4.3 Level of adherence to iron folic acid supplementation among women attending ANC in Rubanda district (N=172)**

<b>Level Adherence</b>	<b>Number (n)</b>	<b>Percentage (n/N *100)</b>
Excellent	79	45.93
Good	16	9.30
Average	12	6.98
Poor	37	21.51
Very poor	28	16.28

#### 4.4 Proportion of women with adherence to iron folic acid supplementation among women attending ANC in Rubanda district



The proportion women attending antenatal care in Rubanda district who adherence to iron folic acid supplementation defined as taking at least 80% of the prescribed tablets is 62.21% (95% CI 54.89% - 69.53%).

**4.5 Socio-demographic factors influencing adherence to IFAS among women attending ANC in Rubanda district at bivariate analysis.**

Variable	No Adherence	Adherence	Bivariate analysis	p-value
	n/N (%)	n/N (%)	cOR (95% CI)	
Age category (years)				
10-19	11 (16.92)	17 (15.89)	1.93 (0.74-5.04)	0.179*
20-29	29 (44.62)	70 (65.42)	3.02 (1.45-6.26)	0.003**
≥30	25 (38.46)	20 (18.69)	Ref	
Marital status				
Not married	6 (9.23)	3 (2.80)	Ref	
Married /Lives with Partner	59 (90.77)	107 (97.20)	3.53 (0.85-14.62)	0.082*
Highest education Level				
Primary or less	16 (24.62)	32 (29.91)	Ref	
Above Primary	49 (75.38)	75 (70.09)	0.77 (0.38-1.54)	0.454
Employment status				
Unemployed	55 (84.62)	83 (77.57)	Ref	
Employed	10 (15.38)	24 (22.43)	1.59 (0.71-3.58)	0.263
Area of residence				
Rural	52 (80.00)	82 (76.64)	Ref	
Town council	13 (20.00)	25 (23.36)	1.22 (0.57-2.59)	0.606
Current ANC visit				
<4 <sup>th</sup> visit	31 (47.69)	55 (51.40)	Ref	
4 <sup>th</sup> Visit or more	34 (52.31)	52 (48.60)	0.86 (0.46-1.60)	0.637
Average monthly income				



<100,000shs	53 (81.54)	92 (85.98)	Ref	
At least 100,000shs	12 (18.46)	15 (14.02)	0.72 (0.31-1.65)	0.439
Booking visit in 1 <sup>st</sup> trimester				
Yes	30 (46.15)	45 (42.06)	Ref	
No	35 (53.85)	62 (57.94)	1.18 (0.63-2.20)	0.599
Has a reminder to take IFAS				
No	47 (72.31)	54 (50.47)	Ref	
Yes	18 (27.69)	53 (49.53)	2.56 (1.32-4.97)	0.005**
Gravidity				
Primigravida	14 (21.54)	19 (17.76)	Ref	
Multigravida	51 (78.46)	88 (82.24)	1.27 (0.59-2.75)	0.542
No. of living children				
None	20 (30.77)	26 (24.30)	Ref	
1-2	18 (27.69)	32 (29.91)	1.37 (0.60-3.11)	0.455
3-5	20 (30.77)	45 (42.06)	1.73 (0.79-3.80)	0.171*
More than 5	7 (10.77)	4 (3.74)	0.44 (0.11-1.71)	0.236

*cOR: Crude Odds Ratio CI: Confidence Interval Ref: Reference category \* p value <0.2 \*\*p value <0.05*

Among the socio-demographic factors, being between 20-29 years of age and having a reminder were the only factors associated with adherence to IFAS at bivariate analysis. Women who were aged between 20-29 years were about 3 times more likely to adhere to IFAS compared to those age 30 years and above. Women who had any adherence partner to remind them take their supplements were about 2.6 times more likely to adhere to IFAS compared to those who did not have a reminder.

#### 4.6 Health system determinants of adherence to IFAS among women attending ANC in Rubanda district at Bivariate analysis

Variable	No Adherence	Adherence	Bivariate analysis	p-value
	n/N (%)	n/N (%)	cOR (95% CI)	
<b>Taking other medications</b>				
No	47(72.31)	94 (87.85)	Ref	
Yes	18(27.69)	13 (12.15)	0.36 (0.16-0.80)	0.012*
<b>Counselled on IFAS use</b>				
No	40 (61.54)	37 (34.58)	Ref	
Yes	25 (38.46)	70 (65.42)	3.03 (1.60-5.74)	0.001**
<b>Side effects</b>				
No	60 (92.31)	93 (86.92)	Ref	
Yes	5 (7.69)	14 (13.08)	1.81 (0.62-5.27)	0.279
<b>Number of tablets dispensed</b>				
<15 tablets	5 (7.69)	14 (13.08)	Ref	
≥15tablets	60 (92.31)	93 (86.92)	0.55 (0.19- 1.62)	0.279
<b>Availability Private space for ANC</b>				
No	46 (70.77)	88 (82.24)	Ref	
Yes	19 (29.23)	19 (17.76)	0.52 (0.25-1.08)	0.081

*cOR: Crude Odds Ratio CI: Confidence Interval Ref: Reference category \*\*p value <0.05*

In this study, the health system determinants of adherence to IFAS at bivariate analysis were counselling and taking other medications. Women who had been counselled on the

importance of taking IFAS were about 3 times more likely to adhere to the supplements compared to those who had received no counselling (cOR 3.03, CI 1.60-5.74, p value 0.001). Women who were on medications for other illnesses were less likely to adhere to IFAS compared to those who are not on other medications (cOR 0.36, CI 0.16-0.80, p value 0.012).

**4.7 Socio-demographic and Health system factors influencing adherence to IFAS among women attending ANC in Rubanda district at multivariable logistic analysis.**

Variable	No Adherence	Adherence	Bivariate analysis	p-value	Multivariable analysis	p-value
	n/N (%)	n/N (%)	cOR (95% CI)		aOR (95% CI)	
<b>Age (years)</b>						
10-19	11 (16.92)	17 (15.89)	1.93 (0.74-5.04)	0.179	3.83 (1.12-13.08)	0.032**
20-29	29 (44.62)	70 (65.42)	3.02 (1.45-6.26)	0.003	4.86 (2.03-11.63)	0.000 **
≥30	25 (38.46)	20 (18.69)	Ref		Ref	
<b>Has a reminder to take IFAS</b>						
No	47 (72.31)	54 (50.47)	Ref		Ref	
Yes	18 (27.69)	53 (49.53)	2.56 (1.32-4.97)	0.005	2.82 (1.34-5.91)	0.006 **
<b>Gravidity</b>						
Primigravida	14 (21.54)	19 (17.76)	Ref		Ref	
Multigravida	51 (78.46)	88 (82.24)	1.27 (.59-2.75)	0.542	2.28 (0.87-5.99)	0.095
<b>Taking other medications</b>						
No	47(72.31)	94 (87.85)	Ref		Ref	
Yes	18(27.69)	13 (12.15)	0.36 (0.16-0.80)	0.012	0.46 (0.19-1.15)	0.098
<b>Counselled on IFAS use</b>						
No	40 (61.54)	37 (34.58)	Ref		Ref	
Yes	25 (38.46)	70 (65.42)	3.03 (1.60-5.74)	0.001	4.42 (2.08-9.42)	0.000**

*cOR: Crude Odds Ratio aOR: Adjusted Odds Ratio CI: Confidence Interval Ref: Reference category \*\*p value*

*<0.05*

At multivariable analysis, the sociodemographic factors influencing adherence to IFAS were maternal age and having a reminder. Women who were aged between 10-19 years were about 3.8 times more likely to adhere to IFAS compared to those age 30 years and above (aOR 3.83, CI 1.12-13.08, p value 0.032) while women who were 20-29 years were about 4.9 times more likely to adhere to IFAS compared to women aged 30 years and above (aOR 4.86, CI 2.03-11.63, p value 0.000). Women who had any form of reminder to take their supplements were about 2.8 times more likely to adhere to IFAS compared to those who did not have a reminder (aOR 2.82, CI 1.34 -5.91, p value 0.006).

In this study, the only health system factor associated with adherence to IFAS was counselling. Women who had been counselled on the importance of taking IFAS and anaemia were about 4.4 times more likely to adhere to the supplements compared to those who had received no counselling (aOR 4.42, CI 2.08- 9.42, p value 0.000).

## CHAPTER 5: DISCUSSION

### 5.1 Adherence to IFAS

In this study, the adherence level to IFAS was at 62.21% representing the proportion of women who had taken 80% of the prescribed medications over one month preceding the study. This adherence level is relatively high and could be explained by the regular stocks of IFAS in the health facilities as well as provision of ANC on a daily basis.

This finding was similar to a study conducted in Addis Ababa, Ethiopia among pregnant women attending ANC from various government health facilities in Gulele Sub city where the level of adherence was 62.3% (Tegodan et al., 2021). Similar levels of adherence were found in other studies like one conducted at Tikur Anbessa Specialized Hospital, Ethiopia (63.6%), Kenya at Kakamega level 5 hospital where the adherence level was 60.6% and a study done in South India where adherence level to iron folic acid supplements was 64.7% (Bahati et al., 2021; Mithra et al., 2014; Nasir et al., 2020). The possible explanations why adherence level in our study is similar to all these studies include similarities in the study settings, study population as well as the criteria used to consider a woman to be adherent to iron folic acid supplements.

The women's level of adherence in this study is higher than the findings in 22 countries within Sub-Saharan Africa where the pooled level of adherence was 28.7% (Ba et al., 2019). This study considered findings from the countries' demographic health survey day which are often community based and therefore tend to underestimate the adherence level. The adherence also depended on taking IFAS for at least 90 days which also explains why the adherence level in this study is high. Other findings with a low prevalence were found in Uganda (11.6% in Mulago National Referral Hospital and 34.5% in Bwindi Community Hospital) and Tanzania (20.3%) (Kiwanuka et al., 2017; Lyoba et al., 2020; Nimwesiga et al., 2021). This is explained by the stringent criteria used for classifying Adherence in these studies.

Some studies have also reported higher levels of adherence to IFAS among women attending antenatal care. A study conducted among pregnant women attending antenatal care in public hospitals of Dire Dawa, Eastern Ethiopia reported an adherence level of 71.8% and a cross sectional study conducted in North West province, South Africa reported an adherence level of 93% (Mbhenyane & Cherane, 2017; Solomon et al., 2021). The possible explanation in these studies include differences in study populations and the less strict criteria used to classify women as adherent or not. For example, in the study done in Eastern Ethiopia, 59% of the women had attained at least secondary education, majority were government employees and hence these are likely to have knowledge on importance of adhering to IFAS and also considered anyone who took at least 4 tablets per week to have adhered to IFAS.

## **5.2. Sociodemographic factors influencing adherence to IFAS**

In this study, the sociodemographic factors affecting adherence to IFAS among pregnant women attending ANC in Rubanda district included maternal age and having somebody to remind her to take the tablets.

### **Maternal age**

In this study, women younger than 30 years were likely to adhere to IFAS compared to those women who are 30 years or more. Similar findings have been found in other studies in Pakistan and Ethiopia for example in a study done in ay Ethiopia, women who are more than 25 years were 0.527 times less likely to adhere to IFAS than those aged less than 25 years and in Pakistan, women above 45 years were about 3.6 times more likely to have poor adherence to IFAS compared to those below 25 years of age (Gebre et al., 2015a; Nisar et al., 2014). The possible explanation is that most of the young women are also of low parity and therefore likely to adhere to their medications to optimise fetal outcomes as opposed to old women who may feel they have experience with pregnancy. Therefore, policy makers and health care providers should focus on women who are 30 years or more to improve adherence in this age category.

## **Support from a husband, family members or peers**

In this study, women who received a reminder to take their tablets were 2.8 times more likely to adhere to their medication than those who did not. This observation has also been found in other studies. In a cross-sectional study conducted among pregnant mothers in governmental health institutions of Adwa town, Tigray, Ethiopia, women who had support from their partners were about 2.2 times more likely to adhere to IFAS compared to their counterparts (Gebremichael & Welesamuel, 2020). In Kenya and Ethiopia, adherence partners have been identified to change women's behaviour towards iron and calcium supplementation during pregnancy (Martin et al., 2017). Spouses, family members and peers help remind women to take their tablets hence minimising forgetfulness which has been identified as a common reason for not taking the pills (Mamo et al., 2021; Mbhenyane & Cherane, 2017; Mithra et al., 2014). 57.1% of participants in our study highlighted forgetfulness as the sole reason for not taking the IFAS, other reasons being drug side effects, pill burden and feeling unwell.

Efforts should therefore be made to engage the potential adherence partners for example spouses, other family members and peer pregnant mothers to facilitate adherence to IFAS.

### **5.3. Health system factors influencing adherence to IFAS.**

#### **Counselling.**

In this study, the only health system factor associated with adherence to IFAS was counselling. Women who had received counselling from health workers regarding IFAS were 4.4 times more likely to adhere compared to those who did not receive counselling. This has also been found in studies done in Tanzania, Senegal and Ethiopia (Lyoba et al., 2020; Seck & Jackson, 2008; Sendeku et al., 2020).

Counselling increases the mothers' knowledge about the importance of taking IFAS and consequences of non-adherence and this in turn facilitates adherence to IFAS. Some studies have identified the number of antenatal care visits attended by the woman as independent



factor that increases adherence to IFAS since women get many sessions of counselling, however this was not found to be an independent factor in this study (Gebre et al., 2015a; KHATTAB, 2014; Sendeku et al., 2020).

To improve adherence, health care providers are there encouraged to dedicate adequate time to counsel women on importance of IFAS, potential side effects of IFAS and impact of poor adherence on maternal and perinatal outcomes.

## **CHAPTER 6: CONCLUSIONS AND RECOMMENDATIONS**

### **6.1 Conclusion**

1. The level of adherence to IFAS among women attending ANC in Rubanda district is relatively high (6 in every 10 women).
2. Women who are less than 30 years, those who have an adherence partner and those who receive full counselling from health workers are more likely to adhere to IFAS.

### **6.2 Recommendations and areas of future research**

1. We recommend that intensive counselling about the importance of IFAS during pregnancy be embraced by all health care providers especially to mothers who are 30 years of age or older.
2. We recommend a qualitative study to be done to have an in-depth understanding of why some women do not take IFAS as prescribed.
3. Research is recommended to compare the obstetric outcomes among women who adhere to IFAS and those who do not adhere.
4. Research should be done to assess the 90-day adherence to IFAS.

### **6.3 Limitations**

The level of adherence was assessed basing on the participants' self-report. This could have overestimated the adherence.

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## APPENDICES

### **Appendix 1A: INFORMED CONSENT FORM – English version**

Study Title: **FACTORS INFLUENCING ADHERENCE TO IRON AND FOLIC ACID SUPPLEMENTATION AMONG PREGNANT WOMEN ATTENDING ANTENATAL CARE IN RUBANDA DISTRICT, SOUTH WESTERN-UGANDA.**

Principle Investigator:

Dr Stuart Turanzomwe

077740880

BISHOP STUART UNIVERSITY

### **INTRODUCTION**

#### **What you should know about this study:**

- You are being asked to join a research study.
- This consent form explains the research study and your part in the study.
- Please read it carefully and take as much time as you need.
- You are a volunteer. You can choose not to take part and if you join, you may quit at any time. There will be no penalty if you decide to quit the study.

#### **Brief background to the study**

We are here to speak with you about a study on factors influencing adherence to iron and folic acid supplementation among pregnant women attending antenatal care in Rubanda district, South western-Uganda. The study aims at assessing the proportion and factors

influencing adherence to iron and folic acid supplementation among pregnant women and eventually help us address any gaps identified. The net result will be reducing anaemia in pregnancy.

### **Purpose of this research.**

The aim of this study is to assess the factors influencing adherence to iron and folic acid supplementation among pregnant women attending antenatal care in Rubanda district, South western-Uganda.

The researcher is a student of Bishop Stuart University and this research is a partial fulfilment of the requirement for the award of Masters of Public Health of BSU.

The information we collect from this study will also help us to address any factors that influence adherence and eventually reduce maternal mortality associated with anaemia in pregnancy.

### **Procedure:**

If you choose to participate in this study, we will ask you and then record your personal information like age, education level, residence, income level, your knowledge on anaemia etc

This interview will take at most 30minutes.

### **Risks and discomfort.**

We will only ask you a few questions and won't interfere with the kind of treatment or care you are to receive. Therefore, apart from your time, there is no harm in participating in this study.

### **Incentives**

Your participation in this study is completely on voluntary basis. No incentives will be given.

### **Compensation**

As a way of appreciating you for your time to respond to us, we shall give you a small token of 1 bar of soap.

### **Privacy and Confidentiality.**

We will talk to you from a private place so that people cannot hear our conversation. We will not tell anyone the information shared and we will try as much as possible to keep the information recorded in a locked cabin.

### **Right to refuse or withdraw**

Your participation in this study is completely voluntary. If at any time you no longer want to be involved in the study, it is your right to decline. You will continue to receive the same standard of care with no penalty or loss of benefits.

### **What happens if you leave the study?**

If at any time you no longer want to be involved in the study, again it is your right to withdraw and we will not ask you any more questions. You will continue to receive the same standard of care with no penalty

### **Who do I ask/call if I have questions or a problem?**

#### **You may contact the researcher**

1. Dr Turanzomwe Stuart  
Study principle investigator  
Telephone:0777408890
2. Dr Jjuuko Adrian  
TASO REC Chairperson  
Telephone: 0782169505

**What does your signature or thumbprint on this consent form mean?**

Your signature on this form means

- You have been informed about this study’s purpose, procedures, possible benefits and risks
- You have been given the chance to ask questions before you sign
- You have voluntarily agreed to be in this study

-----  
Name of adult participant                      Signature/Thumbprint of participant                      Date

-----  
Name of person obtaining consent                      Signature                      Date

-----  
Name of Witness                      Signature                      Date

## **Appendix 1B: INFORMED CONSENT FORM – Runyakitara version**

Omutwe gw’omushomo: **Enshonga eziraretera abakazi abarikuchebeza enda omu distrikiti ya Rubanda okumira gye nari okutamira gye obujuma bw’okugaruramu eshagama.**

### **Omuchondozi mukuru:**

Dr Stuart Turanzomwe

077740880

BISHOP STUART UNIVERSITY

### **OKWANJURA**

#### **Ebi oshemereire kumanya aha mushomo gwokucondooza oku:**

- Nooshabwa kwejumbira omu mushomo gw’okucondooza ogu.
- Ekihandiiko ky’okwikiriza eki nikishoboorora omushomo gw’okucondooza, hamwe n’omwoga gwawe omu mushomo.
- Nooshabwa kukishoma oketegyereza kandi okatwara obwire bwoona obworikwenda.
- Ori nyekundeire. Oine obugabe obutejumbiramu kandi wayejumbiramu, nobasa kurugamu eshaaha yona. Tihariho ekiheneso kyoona ekirakuheebwe washaramu kuruga omu mushomo.

#### **Bikye ahabwihiriro bw’omushomo**

Turi hanu ahabwokugambaho niiwe ahamushomo gwokucondooza ogugyendereire kumanya Enshonga ezirahwera abakazi abarikuchebeza enda omu distrikiti ya Rubanda bamira kurungi obujuma bw’okuraruramu eshagama. , ekigyendererwa nekyokugira ngu tukore ahabizu ebirikutuma mutabasa kumira gye omubaazi nikwo tukachendeza ekizibu kyokugyira eshagama nkye omu bakazi b’enda.

### **Ekigyendererwa ky'okucondooza oku:**

Ekygyendererwa ky'okuchondoza oku ni kumanya Enshonga ezirahwera abakazi abarikuchebeza enda omu distrikiti ya Rubanda bamira kurungi obujuma bw'okuraruramu eshagama

Omucondoozi nomwegi wa masitazi aheitendekyero erya Bishop Stuart yunivasite kandi okukyondooza oku ni kimwe ahabyetago by'abarikwenda kutunga diguri yabo ya masitazi omu byamagara g'abantu boona.

Amakuru agaturayihe omukuchondoza oku nigatuhwera omukukora aha nshonga ezakubasa kutuma abakaazi batamira gye obujuuma nikwo tukakyendeza abakazi b'enda abarikufa ahabw'eshagama nkye.

### **Entwaza**

Washaramu kwetaba omu kuchondoza oku, nituza kukubuza kandi tuhandikye bikye ebirikukutaho nka emyaka, emishomo yaawe, ahokutura, entasya yaawe, ebi orikumanaya ahashagama nkye omumubiri na n'endi.

Ekyi nikiza kutwara nkendakika 30.

### **Akabi / obutaguubwa gye:**

Nituza kukubuza kyonka, nahabwekyo oyihire obwire bwawe, tihariho obuzibu bwona oburakuhikyeho

### **Amagoba**

Tihariho amagoba gamani. Okwetaba omukuchondoza oku ni nyekundire.

### **Ebihembo byokwejumbira omukwetaba oku.**

Nkomuringo gw'okukusima ahabw'okutugarukamu, nituza kukuhereza akahembo kakye k'omuti rwesabuni

**Okukuuma nkekihama ebyarundanwa na Okukuma kibuuze nkekihama omukurundana amakuru aga:**

Nituza kugambaho niwe omumwanya ogwehereire kugira ngu abandi abantu batabasa kuhurira ebibuuzo ebiturabe nitukubuza nginga ebigarukwamu byawe. Tituragambire abantu abandi ahabwenki twaba nitugambaho niwe.

Okwenda kukuma ebihama byawe, nituza kubika amakuru gawe omumwanya ogukingirwe negufuru

**Obugabe bw'okwanga / bw'okurugamu:**

Okwetaba kwawe omushomo ugu nokwokedundira. Eshaha yoona wareeba ngu tokyenda kwetaba omushomo, nobugabe bwawe okurugamu. Noyija kugumizamu notunga obureberezi obuhikire obwobire oshemereire kuba notunga hatariho kifubiro kyona nginga okuferwa amagoba.

**Nihabaho ki waruga omu mushomo?**

Nkawahurira eshaha yoona ngu tokyetenga kwetaba omushomo, ninkigarukamu nobugabe bwawe okurugamu kandi tituragarukye kubuza ebibuuzo byoona. Noyija kugumizamu notunga okurebererwa okuhikire hatariho kihensho kyoona.

**Nooha ou nakubuuza nginga kuhikiraho naaba nyine ekibuuzo naari oburemeezi?**

**Nobaasa kuterera omucondoozi**

1. Dr Turanzomwe Stuart

Omucondoozi mukuru w'omushomo

Enamba ye y'esimu: 0777408890

2. Dr Jjuuko Adrian

Mukuru wakakiko k'ebiyokuchondooza-TASO

0782169505

**Omukono (ninga ekinkuumu) kyaawe nikimanyisa ki aha kihandiiko eki?**

Omukono gwawe aha kihandiiko eki nikimanyisa ngu:

- Wamanyisibwa aha emigasho, entwaza, amagooba hamwe nebihikirizi by'omushomo ugu
- Wahebwa omugisha kubuza ebibuuzo kandi wagarukwamu otakatireho omukono gwaawe
- Wayekundira kusharamu kwetaba omu mushomo ugu

-----

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Eizina ry'omuntu omukuru owayetabamu      Omukono/Ekinkumu kyonwetabi/      Ebiiro  
omuzaire/Omureberezi/omusika

-----

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Eiziina ryomuntu orikushaba                      Omukono                      Ebiiro

Orusa

-----

—

Eiziina ryomurinzi                      Omukono                      Ebiiro



**Appendix 2: QUESTIONNAIRE FOR MOTHERS.**

SNo.....

Instructions: The Interviewer circles/ticks the appropriate answer given by the research participant

**Section A: SOCIO-DEMOGRAPHIC INFORMATION**

1. Age

- 0. 10-19 years
- 1. 20-24 years
- 2. 25-29 years
- 3. 30-34 years
- 4. 35 years and above

2. Marital status

- 0. Married
- 1. Widowed
- 2. Separated
- 3. Never married

3. Highest Education level

- 0. No formal education
- 1. Primary
- 2. Secondary
- 3. Tertiary

4. Occupation

- 0. Peasant
- 1. Trader

2. Formal employment
3. Handcraft
5. Residence
0. Rural
1. Peri-urban/Town council
6. Average income per month in Ugandan shillings
0. <50,000
1. 50,000-100,000
2. 100,000-200,000
3. >200,000
7. Gravidity
0. Nulliparous
1. Multi parous (2-4)
2. Grand multipara (>4)
8. Number of living children
0. None
1. One
2. 2-4
3. More than 4
9. Gestational age at registration (first ANC)
0. First trimester
1. 2<sup>nd</sup> trimester
2. 3<sup>rd</sup> trimester
10. Current ANC Visit number
0. ANC 2
1. ANC 3
2. ANC 4

3. ANC 4+

11. Who reminds you to take you tablets often?

0. None

1. Peer

2. My husband/Other family member

**Section B. KNOWLEGDE OF IFAS AND ANAEMIA**

12. Have you ever heard about iron folic acid supplements?

0. No

1. Yes. If No, jump to Question 16.

13. How often should one take IFA during pregnancy?

0. Don't know or 'other answer'

1. Once daily

14. Can you tell me the importance of taking IFA tablets?

0. Don't know

1. Either; To prevent anemia and its signs, to prevent maternal death, to prevent excessive bleeding at childbirth, to prevent preterm infants,  prevent low birth weight infants, Others; Specify.....

15. Have you been informed that you may get some side effects when you take iron folic acid?

0. No

1. Yes

16. What do you do when you experience side effects?

0. Don't know

1. Either; Swallow with food, persevere the effects, go back to health facility,  
take while going to bed, Others, Specify.....

17. What are the signs and symptoms of anaemia (low blood levels)?

0. Don't know
1. Either; Feels weak, looks pale, palpitations, headaches, dizziness, tiredness  
and easily fatigued, Others, Specify.....

18. Which foods can you eat to increase your blood levels?

0. Don't know
1. Either; liver, meat (red meat and white meat), green vegetables, whole  
grain, Others, Specify.....

### Section C. HEALTH FACILITY FACTORS

19. Other than IFA, are you on any other medication?

0. No
1. Yes

20. Did you get enough information from a health worker explaining why you must take  
the IFA tablets in this pregnancy?

0. No
1. Yes

21. How many iron folic acid tablets were provided on your last visit?

0. <15 tablets
1. =>15tablets

22. Do you have a private space where you can ask anything you want to know about this  
pregnancy during antenatal visit?

0. No
1. Yes

23. Do you experience any side effects whenever you take iron folic acid tablets?

0. Yes

1. No

24. If Yes to Qn 22 above, which side effect(s) do you often experience?

0. Nausea

1. Hurt burn

2. Stomach cramps

3. Others, specify.....

**Section D. ADHERENCE LEVEL**

25. Number of tablets missed over the last one month.

0. 0-2 tablets

1. 3-4 tablets

2. 5-6 tablets

3. 7-10 tablets

4. 10+ tablets

26. What are some reasons that make you forget taking iron folic acid tablets?

0. None

1. Forgetting to take drug

2. Side effects

3. Pill burden

4. Feeling very well

5. Others, Specify.....

## Appendix 3: Total ANC Attendance for selected facilities: Snapshot from DHIS2

DHIS 2 Pivot Tables

hmis2.health.go.ug/hmis2/dhis-web-pivot/

Untitled

Update Favorites Layout Options Download Embed

Table Chart

Adult and Children (< 15 yrs)

Adults and Children

Age (0-23 Months, 24-59 Months)

Age (0-4, >5 yrs)

Age (10-19 yrs, 20-24 yrs, >=25 yrs)

Data	105-2.1 A3.Total ANC visits (New clients + Re-attendances)						Total
	Period / Organisation unit	Hamurwa HC IV	Muko HC IV	Rubanda Phc HC III	Bubare HC III	Ikumba HC III	
January 2019	251	183	155	121	87	147	944
February 2019	219	186	194	130	72	135	936
March 2019	240	234	175	131	85	147	1 012
April 2019	234	201	182	132	61	125	935
May 2019	227	238	263	142	93	153	1 116
June 2019	222	214	195	132	77	130	970
July 2019	265	231	186	146	96	120	1 044
August 2019	220	244	180	149	92	122	1 007
September 2019	196	212	124	130	77	104	843
October 2019	181	208	138	133	55	113	828
November 2019	219	206	120	134	71	113	863
December 2019	161	197	99	137	70	97	761
<b>Total</b>	<b>2 635</b>	<b>2 554</b>	<b>2 011</b>	<b>1 617</b>	<b>936</b>	<b>1 506</b>	<b>11 259</b>

#### **APPENDIX 4: COVID-19 MITIGATION PLAN**

Due to the prevailing circumstances of COVID-19 pandemic, and our desire to protect the participants, the following must be adhered to by all research assistants and participants;

1. Use the provided alcohol-based hand sanitizer as you enter the interview room.
2. Wear face mask at all times
3. Ensure at least 2metres between the researcher and the respondent. The respondents shall follow the sitting arrangement within the facility as per the set standard Operating procedures.
4. No hand shake between the researcher and the respondent.

## Appendix 5: REC APPROVAL



01/12/2021

To: STUART TURANZOMWE

0777408890

Type: Initial Review

**Re: TASO-2021-36: FACTORS INFLUENCING ADHERENCE TO IRON AND FOLIC ACID SUPPLEMENTATION AMONG PREGNANT WOMEN ATTENDING ANTENATAL CARE IN RUBANDA DISTRICT, SOUTH WESTERN-UGANDA, 3, –**

I am pleased to inform you that at the 86<sup>th</sup> convened meeting on 26/11/2021, the The AIDS Support Organization (TASO) REC, committee meeting, etc voted to approve the above referenced application.

Approval of the research is for the period of 01/12/2021 to 01/12/2022.

As Principal Investigator of the research, you are responsible for fulfilling the following requirements of approval:

1. All co-investigators must be kept informed of the status of the research.
2. Changes, amendments, and addenda to the protocol or the consent form must be submitted to the REC for re-review and approval **prior** to the activation of the changes.
3. Reports of unanticipated problems involving risks to participants or any new information which could change the risk benefit: ratio must be submitted to the REC.
4. Only approved consent forms are to be used in the enrollment of participants. All consent forms signed by participants and/or witnesses should be retained on file. The REC may conduct audits of all study records, and consent documentation may be part of such audits.
5. Continuing review application must be submitted to the REC **eight** weeks prior to the expiration date of 01/12/2022 in order to continue the study beyond the approved period. Failure to submit a continuing review application in a timely fashion may result in suspension or termination of the study.
6. The REC application number assigned to the research should be cited in any correspondence with the REC of record.
7. You are required to register the research protocol with the Uganda National Council for Science and Technology (UNCST) for final clearance to undertake the study in Uganda.

The following is the list of all documents approved in this application by The AIDS Support Organization (TASO) REC:



No.	Document Title	Language	Version Number	Version Date
1	Protocol	English	3	--
2	Consent form	English	2	--
3	Informed Consent forms	Runyankole	2	--
4	Data collection tools	English	1	2020-05-31

Yours Sincerely



Dr. Adrian Jjuko  
For: The AIDS Support Organization (TASO) REC