BISHOP STUART UNIVERSITY

FACULTY OF HEALTH SCIENCES

FACTORS INFLUENCING ADHERENCE TO IRON AND FOLIC ACID AMONG PRIMIGRAVIDAS SEEKING ANTENATAL CARE IN MBARARA DISTRICT, SOUTH WESTERN UGANDA.

BY

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23/BSU/MPH/2809

A RESEARCH REPORT SUBMITTED TO THE DIRECTORATE OF GRADUATE STUDIES, RESEARCH AND INNOVATIONS IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF A MASTER OF

PUBLIC HEALTH OF BISHOP

STUART UNIVERSITY, UGANDA.

SEPTEMBER, 2025

DECLARATION

I, **Ankunda Hector**, a student of Bishop Stuart University, hereby declare that this research report titled "Factors Influencing Adherence to Iron and Folic Acid Among Primigravidas Seeking Antenatal Care in Mbarara District, Southwestern Uganda" has never been submitted to Bishop Stuart University or any other institution of higher learning for an academic award or publication. I therefore submit it for the award of a Masters of Public Health of Bishop Stuart University.

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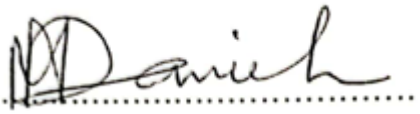
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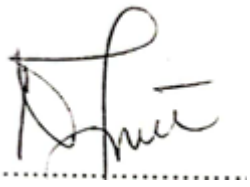
APPROVAL

This research was submitted to BSU-REC for ethical review in partial fulfillment of the requirements for the award of a Masters of Public Health of Bishop Stuart University with my approval as a University Supervisor.

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DEDICATION

This research report is dedicated to my fellow public health enthusiasts and all those willing to undertake responsibilities concerning disease prevention, control and surveillance within communities.

ACKNOWLEDGEMENTS

I would like to extend my heartfelt gratitude to the almighty God for his continued protection and guidance as I pursued this program of study.

Sincere appreciations to my research supervisors; Dr. Matovu Daniel and Mr. Amanyire Jordan for the indispensable guidance as I traversed the journey of this research and to my lecturers in Public Health department for profound and insightful academic support rendered to me during the course of this program.

Special appreciations to my family for social and financial support extended to me during the course of this program.

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LIST OF ACRONYMS/ABBREVIATIONS

PG	Primigravida
PGs	Primigravidas
IFAS	Iron and Folic Acid Supplementation
ANC	Antenatal Care
HC	Health Centre
BSU	Bishop Stuart University
FGDs	Focus Group Discussions (FGDs)
UBOS	Uganda Bureau of Statistics
MOH	Ministry of Health
MPH	Master of Public Health
UDHS	Uganda Demographic and Health Survey
SSA	Sub Saharan Africa
UN	United Nations
WHO	World Health Organization

DEFINITION OF TERMS AND OPERATIONAL DEFINITIONS

Primigravida: Refers to a woman who is pregnant for the first time.

Pregnancy: Refers to the period during which one or more fetuses implant and develop within a woman's uterus until the time for delivery, usually between 37 completed weeks to 42 weeks of gestation.

Public Health Facilities: Refer to: regional referral hospital, district general hospitals, health centre IVs, health centre IIIs and health centre IIs that are aided by government funding and are able to offer antenatal care services to expectant mothers.

Adherence: May be defined as how closely an individual or patient follows a treatment regimen prescribed by a clinician, which includes the patient's willingness to start prescribed treatment and the ability to take medications exactly as directed by a clinician. Therefore, adherence basically refers to the number of tablets or capsules taken by a patient in a certain duration of time as compared to the number of tablets or capsules anticipated to have been taken in the same duration of time.

Anaemia: Refers to a condition in which haemoglobin concentration in blood is lower than normal. (Normal haemoglobin levels, for females: 12.1-15.1 g/dL and for males: 13.8-17.2 g/dL)

Self-report: Refers to a method of determining the level of adherence to a treatment in which an individual (primigravida for this study) willingly and voluntarily reports to a researcher or clinician about the number of pills of iron and folic acid missed over a given duration of time.

Adherence to iron and Folic acid pills: This indicates that expectant mothers (Primigravidas for this study) ingest daily prescribed iron and folic acid pills. Under this study, adherence to iron and folic acid pills will be ascertained using a five-point Likert scale following the number of prescribed iron and folic acid pills not taken during a 30-day period prior to the study interview as shown in the table below;

Number of prescribed Iron and folic acid pills not taken in previous 30 days	**Adherence levels**
0-2	Very good
3-4	Good
5-6	Fair
7-10	Poor
More than 10	Very poor

To enable analysis of the determinants of adherence levels to prescribed iron and folic acid pills among Primigravidas in this study, adherence was dichotomized as either adherence or no adherence. A primigravida was considered to have adherence to iron and folic acid pills if she ingested at least 80% of prescribed iron and folic acid pills in a 30-day period. (that is: missed a maximum of 6 pills) (WHO, 2003, Kim et al., 2018).

ABSTRACT

Background: This study aimed at determining the factors influencing adherence to iron and folic acid supplements among Primigravidas seeking antenatal care in Mbarara district, South western Uganda.

Methodology: This was a cross-sectional study done within Mbarara district among Primigravidas seeking antenatal care. Proportionate probability sampling and simple random sampling techniques were used to select 172 Primigravidas seeking antenatal care in Mbarara district. Interviews were done using a researcher-administered questionnaire with a quantitative approach. Data was entered in excel, cleaned and exported to stata version 17 for analysis. Logistic regression was used to determine factors associated with adherence to iron and folic acid supplements among Primigravidas.

Results: The proportion of Primigravidas attending antenatal care in Mbarara district whose adherence to IFAS was defined as taking at least 80% of the prescribed iron and folic acid supplements was 64.53% (95% CI 0.52 – 0.63).

Adherence was associated with age bracket; 20-29 years (AOR=4.57, 95%CI: 2.05-11.13), having a reminder to take iron and folic acid supplements (AOR=2.81, 95% CI: 1.33-5.92) and being counselled on the importance of taking iron and folic acid supplements (AOR=4.45, 95% CI: 2.07-9.31).

Conclusion: Six in every ten Primigravidas adhere to IFAS during pregnancy (64.13%).

Recommendation: Intensive and daily counselling about the importance of IFAS during pregnancy to be done by antenatal care providers especially to Primigravidas who are 30 years of age or older.

CHAPTER ONE: INTRODUCTION

1.1. Background

Expecting mothers are at a high risk of iron and folic acid deficiencies because of increased iron requirements during the period of pregnancy(Pradhan et al., 2024). Folic acid requirements are particularly elevated during pregnancy due to rapidly dividing fetal cells, especially neuronal cells in a growing fetus and increased urinary losses of folic acid by an expecting mother during pregnancy(Balcha et al., 2023; Oiye et al., 2020). Due to the fact that fetal neural tube closes by 28th day of pregnancy, The World Health organization, WHO has come up with a recommendation that folic acid supplementation should be initiated at least three months before conception to mitigate the likelihood of delivering babies with neural tube defects, such as Spina bifida (WHO, 2012). Iron and folic acid supplements combined with excellent adherence is the main cost-effective strategy for prevention and control of iron deficiency anemia among expecting mothers (Boti et al., 2018).

Anaemia in pregnancy has been defined as a blood hemoglobin, Hb concentration below 11.0 g/dl(WHO, 2012). Anaemia in Pregnancy is the world's second leading cause of disability among children born to such mothers and one of the most severe global public health concerns(WHO, 2012). In the whole world, above 25%, that is around 2 billion of the population are highly affected by anaemia (Kapil and Bhadoria, 2014). In the year 2011, about 42.6 % of children, 38.2 % of expecting mothers, 29 % of non-expecting mothers and 29.4 % of all women of reproductive age had anaemia globally (World Health Organization, 2015) Haemoglobin concentration is often lower in expecting mothers than non-expecting mothers which indicates children and expecting mothers are the most-at-risk sub populations(Balcha et al., 2023; Saragih et al., 2022)

Prevalence of anaemia among expecting mothers was highest in South East Asia ,48.7 % ; Africa, 46.3 % and lowest in Western pacific region, 24.3 % and the Americas, 24.9% (World Health Organization, 2015).

It is estimated that 50% of cases of anaemia are due to iron deficiency (Balarajan et al., 2011). Other causes of anaemia include: micronutrient deficiencies such as folate and vitamin B12; acute and chronic infections for example: Malaria, cancer, mycobacterium Tuberculosis, and inherited or acquired disorders that usually affect haemoglobin synthesis, red blood cell production or red blood cell survival for example haemoglobinopathies, such as Sickle Cell Disease (Balarajan et al., 2011).

Anaemia during the period of pregnancy is one of the major public health challenges especially in developing countries and contributes to increased maternal and perinatal mortality and morbidity rates in Africa, especially Sub-Saharan Africa. (Black et al., 2013, WHO, 2015).

Prevalence of anaemia (>40%) is regarded as a severe public health problem as defined by World Health Organization (Black et al., 2013, WHO, 2015).

Iron deficiency anaemia during a period of pregnancy contributes to adverse effects on both mother and child health. Fetal and neonatal adverse effects include: low birth weight-below 2.5 Kgs, prematurity, fetal distress during delivery; which all contribute to perinatal morbidity and mortality. Children born to anaemic mothers will more likely become anaemic themselves due to insufficient iron supplementations delivered to them during the period of pregnancy. (Begum, 2012)

Similarly, Iron deficiency anaemia is associated with maternal risks such as: low weight gain during pregnancy, reduced immunity during pregnancy, cardiac arrest, especially after delivery, antepartum hemorrhage (Begum, 2012).

In a bid to mitigate the risk of iron deficiency anaemia during pregnancy and related poor pregnancy outcomes, World Health Organization recommends a standard daily oral dose of 30-60 mg of elemental iron and 400µg of folic acid supplements throughout pregnancy, to begin at least three months before conception as part of routine antenatal care programs. (WHO, 2012). Furthermore, where the prevalence of iron deficiency anaemia in pregnancy is over 40% like in Sub Saharan Africa, a daily dose of 60 mg of elemental iron is preferred over a lower dose of 30 mg (WHO, 2012). Adherence to iron supplements is recommended as part of antenatal care to reduce the risk of low birth weight and maternal iron deficiency anaemia.

Every pregnant woman in Uganda must receive folic acid 5mg throughout first three months of pregnancy (preferably starting 90 days before conception) and thereafter ferrous (200mg) /folic acid (400mcg) once daily throughout pregnancy to prevent iron and folate deficiency (Uganda Clinical Guidelines, 2016).

Since malaria exacerbates iron deficiency anaemia in pregnancy, provision of iron and folic acid supplements is implemented with measures to prevent, diagnose and treat malaria such as monthly intermittent preventive treatment in pregnancy (IPT) with an antimalarial drug sulfadoxine-pyrimethamine (World Health Organization, 2016). Other key policies being implemented in Uganda to mitigate anaemia within general population include; fortification of foods, deworming of pregnant women and children less than 14 years and delayed cord cutting after delivery. Iron and folic acid supplements are given to expecting mothers during antenatal care at zero cost in all Uganda's 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 iron supplements (Kiwanuka et al., 2017).

1.2. Statement of the problem

It has been noted that there is increasing poor adherence to iron supplements among Primigravidas most commonly within low-income Sub-Saharan Countries (WHO, 2015). In Uganda, only 8.3% of expecting Primigravidas receiving antenatal care at Mulago National referral hospital take iron supplements as prescribed (Kiwanuka et al., 2017). In addition to the low iron supplement adherence levels among Primigravidas, iron and folic acid supplement coverage in Uganda is also low at 75.1% with only 2.1% of Primigravidas taking such iron supplements for at least 90 days of pregnancy (Fiedler et al., 2014). Expecting mothers are particularly at a high risk of developing iron deficiency anaemia (38.2%), with majority being first time expecting mothers, compared to 29 % of non-expecting mothers who are anaemic (Fiedler et al., 2014). It is further stipulated that 200,000 of Primigravidas have severe iron deficiency anaemia and the prevalence of iron deficiency anaemia among Primigravidas in Uganda is estimated at 13.9 % (WHO, 2015).

The interventions that are tailored towards prevention of iron deficiency anaemia and its related complications such as children born with neural tube defects (Spina bifida, Anencephaly, Encephalocele, lipomyelomeningocele, lipomeningocele and tethered cord) among Primigravidas include: iron supplementations, fortification of staple foods with iron, health and nutritional education (Christian et al., 2009).

To come up with a solution to poor adherence among Primigravidas to iron supplements during pregnancy, clinicians

should deliver regular health education talks about the importance of iron supplements to Primigravidas receiving antenatal care (Gebre et al., 2015b), Iron and folic acid supplements are on the essential medicines list supplied to all levels of health care facilities by the Uganda national medical stores so as to ensure expecting mothers do not have to purchase such iron

supplements. Folic acid and iron supplements are administered throughout pregnancy starting as early as possible, preferably three months before conception (WHO, 2012).

Despite such strong and seemingly effective interventions, there still exists a higher prevalence of iron deficiency anemia among expecting mothers especially first time mothers in Uganda's rural areas (33.2%) than those living in urban areas (27.4%)(UBOS, 2017). This is attributed to poorer adherence levels to prescribed iron and folic acid supplements that is usually observed among expecting mothers in rural areas compared to their counterparts in urban areas (Gebre et al., 2015b)

It has been noted that no studies have been done to ascertain adherence levels of Primigravidas to iron and folic acid supplements and associated factors in south western Uganda. Therefore, this study is aimed at assessing the factors affecting adherence levels to prescribed iron and folic acid supplements during pregnancy among Primigravidas in urban south western Uganda and subsequently make relevant evidence-based recommendations and strategies to health policy makers and health care facilities providing antenatal care on how adherence to such iron supplements can be boosted among Primigravidas

1.3 Study objectives:

1.3.1 Main objective:

To assess the factors influencing adherence to iron and folic acid supplementations among primigravidas seeking antenatal care in Mbarara district, south western-Uganda.

1.3.2 Specific objectives:

i. To evaluate the level of adherence to iron and folic acid supplementations among primigravidas seeking antenatal care services in Mbarara district.
ii. To determine the socio-demographic factors influencing adherence to Iron and folic acid supplementations among primigravidas seeking antenatal care services in Mbarara district.

iii. To determine the health system determinants of adherence to iron and folic acid supplementations among primigravidas seeking antenatal care services in Mbarara district.

1.4 Research Questions:

What are the underlying factors influencing adherence to iron and folic acid supplementations among primigravidas seeking antenatal care in Mbarara district, south western-uganda?

What are the socio-demographic factors influencing adherence to Iron and folic acid supplementations among primigravidas seeking antenatal care services in Mbarara district, south western-Uganda?

What are the health system determinants of adherence to iron and folic acid supplementations among primigravidas seeking antenatal care services in Mbarara district,south western-uganda?

1.5 Significance of the study:

Study findings were of profound importance to the researcher, research fraternity and the nation as indicated below;

The study findings brought out a deeper understanding of how socio-demographic factors such as age and family background can impact adherence to iron and folic acid supplements among first time expecting mothers in the country. Such findings will be vital in designing antenatal care guidelines, recommendations and possible interventions by relevant health institutions such as ministry of health tailored towards addressing such socio-demographic challenges faced by first time expecting mothers while trying to access iron and folic acid supplementations during pregnancy.

The study findings helped to ascertain the role of good adherence to iron and folic acid supplementations among Primigravidas in fight against neural tube defects such as Spina

bifida, anencephaly, meningocele and tethered spinal cord syndrome which are on the rise in Uganda especially among children born to first time mothers.

The study findings laid a ground on which future researchers conducting studies concerning adherence to iron and folic acid supplementations among first time expecting mothers can draw ideas and quotations.

The study enabled the researcher to acquire a fulfilment of the requirements for the award of a master's of science in public health of Bishop Stuart University.

1.6 Study Justification

According to WHO in line with Uganda's ministry of health, it is recommended that iron and folic acid supplementations should be prescribed and taken by all expecting mothers throughout pregnancy, starting three months before conception. This is aimed at preventing iron deficiency anaemia during pregnancy as well as avoiding associated maternal and fetal complications such as spina bifida. Despite such strong recommendations, scanty literature has been documented regarding proportions of expecting first time mothers who adhere well to prescribed iron and folic acid supplementations as well as factors that could explain such adherence levels. This study therefore assessed the adherence levels of Primigravidas to iron and folic acid supplementations during pregnancy and the associated factors.

This study came up with antenatal care recommendations tailored towards boosting adherence to iron and folic acid supplementations among primigravidas and subsequently cracked down on iron deficiency anaemia among first time expecting mothers and mitigated the likelihood of developing congenital neural tube defects hence with an overall impact of reducing morbidity and mortality at a community level.

The study informed health authorities, such as ministry of health about possible interventions that can boost adherence to iron and folic acid supplementations among primigravidas during antenatal care.

1.7 Scope of the study:

1.7.1 Geographical scope:

This study was conducted within selected health facilities offering antenatal care services in Mbarara district. Mbarara district is situated in south western Uganda, about 272 km from Kampala capital city and its headquarters are found within Mbarara city.

1.7.2 Content scope:

The study was confined to assessing factors influencing adherence to iron and folic acid supplementations among primigravidas attending antenatal care in Mbarara district, south western-Uganda.

The study was limited to ascertaining the percentage of primigravidas adhering to iron and folic acid supplementations and factors influencing such adherence levels.

1.7.3 Time Scope:

The study was carried out between 14th July and 21st July 2025. The researcher enrolled 172 participants within that period, targeted to recruit 24 participants daily. Proportionate to size sampling technique was used to get participants from selected health facilities.

1.8 Theoretical frame work:

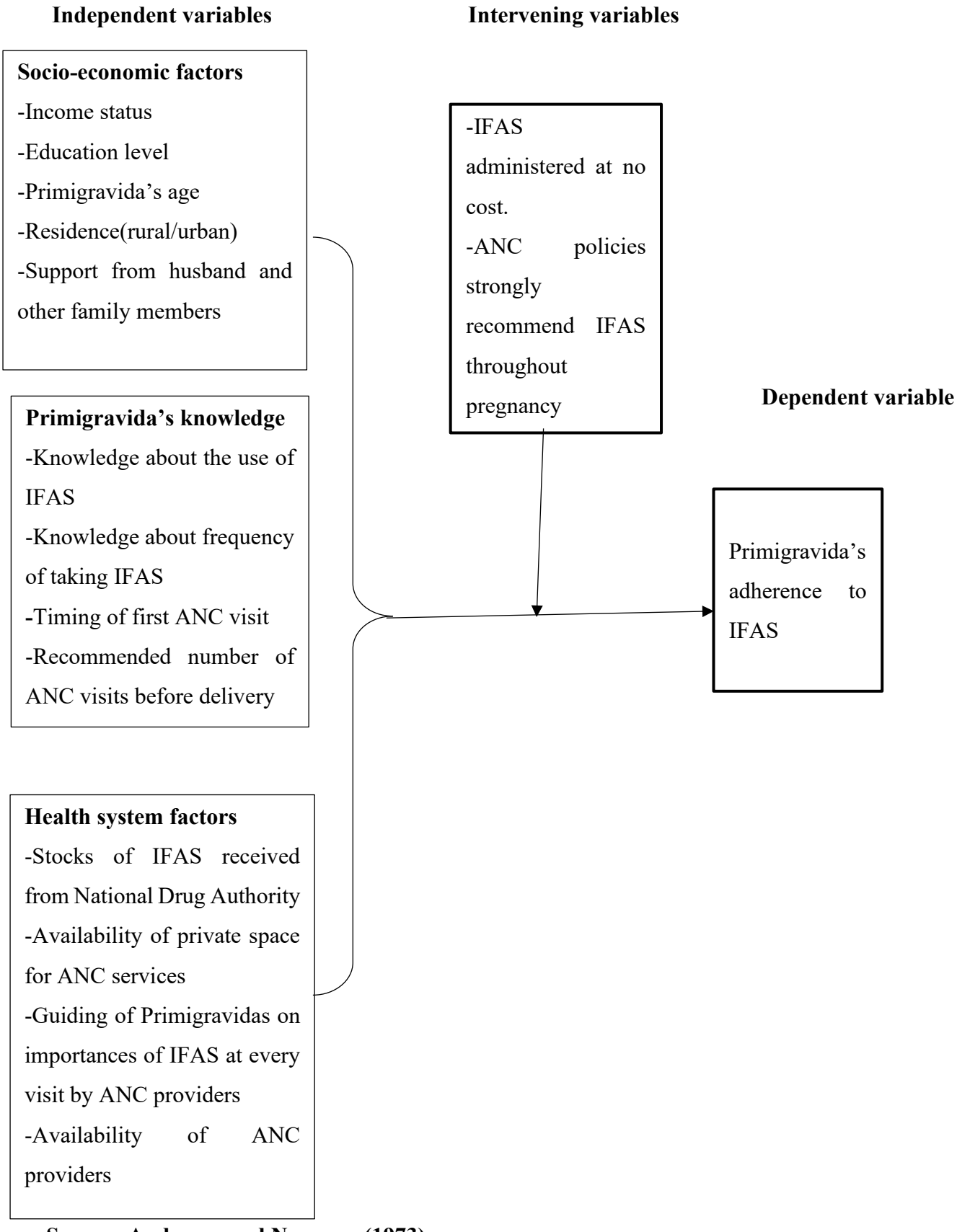
Levels of adherence to iron and folic acid supplementations among primigravidas have been linked to social and economic inequity. Poor adherence to iron and folic acid supplementations among primigravidas is common among the groups that are of a lower socio-economic status at a disproportionately higher rate. A primigravida's socio-economic status greatly affects her

adherence to prescribed iron and folic acid supplementations during pregnancy. In addition, a primigravida's socioeconomic status is a key factor in determining the quality of life during pregnancy as well as determining the financial capability of acquiring all other medicines required during pregnancy. It is therefore theorized that:

Limited financial capabilities are associated with poor adherence to prescribed iron and folic acid supplementations during pregnancy among primigravidas, for example failing to afford transport to health facilities to access such iron supplements. Living in poverty is also associated with food shortage which negatively impacts adherence to prescribed iron supplements during pregnancy.

Primigravidas in rural areas face unique challenges such as long distances to access health care facilities offering antenatal care services as well as lack of health care facilities offering antenatal care services. There is also limited availability of supportive or ancillary services such as Village Health Teams to aid in encouraging such primigravidas to take their iron supplements as prescribed.

1.9 Conceptual frame work:



Source: Andersen and Newman (1973)

1.9.1 Description of conceptual frame work:

Socio-demographic factors, primigravida's knowledge and ANC facility factors influence the health behaviour of primigravidas to adhere to IFAS given during pregnancy.

Socio-demographic factors include: Primigravida's age, financial status, education level, area of residence (rural/urban), marital status and level of support from husband and other family members.

Primigravida's level of knowledge and awareness about importances of how often and reasons for taking IFAS, the recommended gestational age for first ANC visit and the recommended number of ANC visits can also influence PG's behaviour towards adherence to prescribed IFAS.

Health system factors which can influence primigravida's level of adherence to IFAS include: stocks of IFAS supplied at Antenatal care facilities from National Drug Authority, availability of private spaces for antenatal care services especially for young Primigravidas, guiding of Primigravidas about roles of IFAS at every visit by ANC providers.

CHAPTER TWO: LITERATURE REVIEW

Relevant literature on published work about IFAS and adherence to IFAS among Primigravidas and the associated factors is provided in this chapter.

2.0. Background:

Folic acid, also known as folate or Vitamin B9, is a member of the B vitamin family and an essential cofactor for enzymes involved in DNA and RNA synthesis.(*Folic Acid*, n.d.) More specifically, folic acid is required by the body for the synthesis of purines, pyrimidines, and methionine before incorporation into DNA or protein.(Bánhidy et al., 2011; *Folic Acid*, n.d.) Folic acid is particularly important during phases of rapid cell division, such as infancy, pregnancy, and erythropoiesis, and plays a protective factor in the development of cancer.(*Folic Acid*, n.d.; Nimwesiga et al., 2021) As humans are unable to synthesize folic acid endogenously, diet and supplementation is necessary to prevent deficiencies. For example, folic acid is present in green vegetables, beans, avocado, and some fruits.(*Folic Acid*, n.d.)

In order to function within the body, folic acid must first be reduced by the enzyme dihydrofolate reductase (DHFR) into the cofactors dihydrofolate (DHF) and tetrahydrofolate (THF).(*Folic Acid*, n.d.) This important pathway, which is required for de novo synthesis of nucleic acids and amino acids, is disrupted by anti-metabolite therapies such as methotrexate as they function as DHFR inhibitors to prevent DNA synthesis in rapidly dividing cells, and therefore prevent the formation of DHF and THF.(*Folic Acid*, n.d.; Martínez García, 2016) When used in high doses such as for cancer therapy, or in low doses such as for Rheumatoid Arthritis or psoriasis, methotrexate impedes the body's ability to create folic acid.(*Folic Acid*, n.d.) This results in a deficiency of coenzymes and a resultant buildup of toxic substances that are responsible for numerous adverse side effects. As a result, supplementation with 1-5mg of folic acid is recommended to prevent deficiency and a

number of side effects associated with MTX therapy including mouth ulcers and gastrointestinal irritation.(*Folic Acid*, n.d.) Leucovorin (also known as folinic acid) supplementation is typically used for high-dose MTX regimens for the treatment of cancer.(*Folic Acid*, n.d.) Levoleucovorin and leucovorin are analogs of tetrahydrofolate (THF) and are able to bypass DHFR reduction to act as a cellular replacement for the co-factor THF.

There are also several antiepileptic drugs (AEDs) that are associated with reduced serum and red blood cell folate, including Carbamazepine (CBZ), Phenytoin (PHT), or barbiturates. Folic acid is therefore often provided as supplementation to individuals using these medications, particularly to women of child-bearing age.(Bahati et al., 2021; *Folic Acid*, n.d.)

Inadequate folate levels can result in a number of health concerns including cardiovascular disease, megaloblastic anemias, cognitive deficiencies, and neural tube defects (NTDs).(*Folic Acid*, n.d.) Folic acid is typically supplemented during pregnancy to prevent the development of NTDs and in individuals with alcoholism to prevent the development of neurological disorders, for example Folic acid is indicated for the treatment of folic acid deficiency, megaloblastic anemia, and in anemias of nutritional origins, pregnancy, infancy, or childhood.(Martínez García, 2016; Oiye et al., 2020; Pradhan et al., 2024)

2.1. Pharmacodynamics of Folic acid:

Folic acid is a water-soluble B-complex vitamin found in foods such as liver, kidney, yeast, and leafy, green vegetables.(*Folic Acid*, n.d.) Also known as folate or Vitamin B9, folic acid is an essential cofactor for enzymes involved in DNA and RNA synthesis.(*Folic Acid*, n.d.) More specifically, folic acid is required by the body for the synthesis of purines, pyrimidines, and methionine before incorporation into DNA or protein. Folic acid is the precursor of tetrahydrofolic acid, which is involved as a cofactor for transformylation reactions in the biosynthesis of purines and thymidylates of nucleic acids.(*Folic Acid*, n.d.; Saragih et al.,

2022) Impairment of thymidylate synthesis in patients with folic acid deficiency is thought to account for the defective deoxyribonucleic acid (DNA) synthesis that leads to megaloblast formation and megaloblastic and macrocytic anemias.(*Folic Acid*, n.d.) Folic acid is particularly important during phases of rapid cell division, such as infancy, pregnancy, and erythropoiesis, and plays a protective factor in the development of cancer.(*Folic Acid*, n.d.; Oiye et al., 2020) As humans are unable to synthesize folic acid endogenously, diet and supplementation is necessary to prevent deficiencies.(*Folic Acid*, n.d.) In order to function properly within the body, folic acid must first be reduced by the enzyme dihydrofolate reductase (DHFR) into the cofactors dihydrofolate (DHF) and tetrahydrofolate (THF). (*Folic Acid*, n.d.)This important pathway, which is required for de novo synthesis of nucleic acids and amino acids, is disrupted by anti-metabolite therapies such as Methotrexate as they function as DHFR inhibitors to prevent DNA synthesis in rapidly dividing cells, and therefore prevent the formation of DHF and THF.(*Folic Acid*, n.d.)

In general, folate serum levels below 5 ng/mL indicate folate deficiency, and levels below 2 ng/mL usually result in megaloblastic anemia(*Folic Acid*, n.d.)

2.2. Mechanism of action of Folic acid:

. Folic acid, as it is biochemically inactive, is converted to tetrahydrofolic acid and methyltetrahydrofolate by dihydrofolate reductase (DHFR).(*Folic Acid*, n.d.) These folic acid congeners are transported across cells by receptor-mediated endocytosis where they are needed to maintain normal erythropoiesis, synthesize purine and thymidylate nucleic acids, interconvert amino acids, methylate tRNA, and generate and use formate. (*Folic Acid*, n.d.)Using vitamin B12 as a cofactor, folic acid can normalize high homocysteine levels by remethylation of homocysteine to methionine via methionine synthetase.(*Folic Acid*, n.d.)

2.3. Role and relevance of Iron and folic acid supplementations among Primigravidas:

According to WHO, anaemia in pregnancy is defined as haemoglobin concentration below 11 g/dl. Anaemia in pregnancy involves a decrease in concentration of circulating red blood cells and a subsequent impaired capacity to transport oxygen around the body because of lower levels of circulating red blood cells than normal (WHO/UNICEF/UNU, 2001).

Iron and folic acid deficiency is a leading cause of anaemia among expecting mothers (Stoltzfus and Dreyfuss, 1998). Anaemia in pregnancy has several adverse effects that may be detrimental to both mothers and fetuses as it is known as a risk factor for multiple maternal and fetal complications. Anaemia in pregnancy is among the most common preventable causes of maternal morbidity, mortality and poor prenatal outcomes (WHO, 2015). All expecting mothers must take a standard daily oral dose of 30-60 mg iron and 400µg folic acid tablets throughout pregnancy. This is necessary to prevent anaemia in pregnancy, low birth weight, preterm birth and puerperal sepsis (WHO, 2016).

2.4. Adherence levels to IFAS among Primigravidas:

Adherence levels to IFAS among expecting mothers remain very low, especially among Primigravidas, particularly in low-income countries yet the burden of anaemia in pregnancy among expecting mothers in such areas is significantly high (WHO, 2015).

According to a household survey that was carried out within 14 districts of Pakistan, only 38.3% of expecting mothers reported to have taken IFAS at some point during their last pregnancy, most of them reportedly started taking such iron supplementations during late second trimester, with only 5% of them starting to take IFAS during first trimester (Nisar et al., 2014).

According to a cross sectional study that was carried out among expecting mothers, with majority of them being primigravidas in North West province, South Africa, the compliance rate to IFAS was 93% (Mbhenyane and Cherane, 2017).

However, according to a study done in Ethiopia, the rate of compliance to IFAS among expecting mothers in urban and rural communities was 37.2% and 28.9% respectively (Gebre, Mulugeta, & Etana, 2015).

Level of adherence to IFAS among expecting mothers was much lower at 11.6% in a cross sectional study carried out at Mulago National Referral Hospital and also low at 22.37% in a study conducted at Bwindi Hospital in south western Uganda (Kiwanuka et al., 2017, Nimwesiga et al., 2021).

2.5. Knowledge levels of Primigravidas about IFAS:

Primigravidas' knowledge about IFAS has been stipulated as one of the major factors that significantly influence adherence levels to IFAS during pregnancy (Kalipa, Goon, Yako, & Okeyo, 2017). Primigravidas that are aware of the reasons they are taking their prescribed medicines and how to handle potential side effects are more likely to adhere to a given treatment as prescribed. Knowledge is believed to boost awareness about roles of IFAS and subsequently increase adherence levels to IFAS during pregnancy (Kalipa, 2017, Habib et al., 2009, Gebremariam et al., 2019).

Highest levels of knowledge about IFAS are often observed among Primigravidas who access ANC information from brochures and ANC community health workers. However, it has been noted that most Primigravidas (43%) with adequate knowledge about roles of IFAS during pregnancy access such information from ANC providers at health care facilities (Kamau et al., 2019).

According to a study conducted in western Amhara, expecting mothers who had higher knowledge levels about anaemia in pregnancy were about four times more likely to adhere to IFAS as compared to expecting mothers who had lower knowledge levels about anaemia in pregnancy (AOR: 3.64, 95%CI: 1.78-7.39). However, knowledge levels about IFAS and anaemia in pregnancy was not found to be significantly associated with expecting mothers'

adherence levels to IFAS in North Western Zone of Tigray, Ethiopia (Gebre et al., 2015a, Taye et al., 2015).

2.6. Socio-demographic factors affecting adherence to IFAS among Primigravidas:

2.6.1. Education level of a Primigravida:

Education level of a Primigravida is regarded as a key factor that can influence a mother's understanding and appreciation of importance of taking daily IFAS during pregnancy thereby determining her adherence levels to IFAS. According to a cross-sectional study conducted among Primigravidas in Enugu, South-Eastern Nigeria, tertiary education was cited as a strong determinant of good adherence to IFAS during pregnancy where Primigravidas who had achieved tertiary education level were 3.4 times more likely to adhere to IFAS as per the prescriptions compared to those below tertiary education level (Ugwu et al., 2014).

According to a study done in Ethiopia, it was ascertained that Primigravidas who had attained secondary education level and above were about 2.1 times more likely to adhere to IFAS as compared to Primigravidas who had attained only primary education (Boti et al., 2018).

2.6.2. Marital status of a Primigravida:

It has been ascertained that marital status significantly contributes to good adherence to IFAS among Primigravidas(Birhanu et al., 2018). Married Primigravidas are more likely to adhere to IFAS compared to single or divorced Primigravidas partly because married Primigravidas have support and encouragement from their husbands and may help in reminding them to adhere to IFAS as prescribed (Birhanu et al., 2018).

2.6.3. Income level of a Primigravida:

According to a study conducted in western Kenya, it was ascertained that the higher the income of a Primigravida, the higher the chances of good adherence to iron and folic acid supplementations during pregnancy (Kamau et al., 2018). This is usually because

Primigravidas with high income levels are a lot more likely to have had higher level of education, have formal employment, all of which favour good adherence to Iron and Folic acid supplementations during pregnancy (Taye et al., 2015).

2.6.4. Residence of a Primigravida:

It has been ascertained that urban Primigravidas are more likely to adhere to their prescribed IFAS as compared with rural Primigravidas. This discrepancy can be partly explained by urban Primigravidas having better access to better antenatal care health facilities as compared with Primigravidas in rural areas (Birhanu et al., 2018, Ethiopia and Macro, 2016)

2.6.5. Age of a Primigravida:

It has been ascertained that younger Primigravidas have a better adherence to IFAS compared to older Primigravidas. This is partly because younger Primigravidas have recently finished school or even still in school and are more likely to have higher levels of knowledge regarding IFAS and anaemia in pregnancy. Many of such younger first-time expecting mothers are very obedient and eager to take medical advice given by antenatal care providers as compared to older Primigravidas who may falsely believe they do not require IFAS during pregnancy (Kamau et al., 2019, Nisar et al., 2014, Gebre et al., 2015b).

2.7. Health system factors determining adherence to IFAS among Primigravidas:

2.7.1. Supplies of Iron and Folic acid Supplementations:

Stock levels of IFAS within government aided health facilities determine the number of iron and folic acid tablets dispensed to expecting mothers at their antenatal visits. Expecting mothers that are given lesser IFAS from government aided health facilities and advised to purchase the rest tend to have a poorer adherence as compared to expecting mothers who are given full doses of IFAS. According to Galloway & McGuire (1994), most expecting mothers will take IFAS if provided with adequate IFAS to last up to next ANC visit. It was ascertained

that 28.3 % of expecting mothers attributed their poor adherence to non-affordability of IFAS (Galloway and McGuire, 1994, Ugwu et al., 2014).

2.7.2. Counselling and guidance levels administered to Primigravidas:

Primigravidas may have a poor adherence to IFAS when they are not guided and counselled about roles and relevancy of taking daily IFAS during pregnancy (Adeniyi et al., 2018). Guidance and counselling about roles of daily IFAS was associated with increased odds of adherence due to increased sensitization on the risks of not daily IFAS during pregnancy (AOR = 3.72, 95% CI = (1.80–1.71)) (Assefa et al., 2019).

2.7.3. Primigravida's gestational age at the time of registering with Antenatal care Clinic:

Primigravidas who have their booking antenatal care visit within first trimester are a lot more likely to better adhere to daily IFAS during pregnancy as compared to Primigravidas who do their booking antenatal care visits within second or third trimesters. Primigravidas that do their booking antenatal care visits within first trimesters usually attain a lot better understanding of benefits of daily IFAS such as prevention of anaemia during pregnancy (Gebremariam et al., 2019, Gebre et al., 2015b).

2.7.4. Number of antenatal care visits performed by a Primigravida:

Primigravidas who do more antenatal care visits are a lot more likely to better adhere to IFAS as compared with Primigravidas who attend fewer antenatal care visits. According to a study that was conducted to determine and compare adherence rates to IFAS and ascertain factors that influence adherence to IFAS among urban and rural Primigravidas attending antenatal care clinics in North Western Zone of Tigray, Ethiopia, Primigravidas who had at least four antenatal visits were about 2.32 times more likely to adhere to IFAS as compared to Primigravidas who registered late for their booking antenatal care visits. Similar research

findings were ascertained in other related studies conducted in: Egypt, Tanzania and Philippines (Gebre et al., 2015b, KHATTAB, 2014, Ogundipe et al., 2012).

2.7.5. Side effects of IFAS to Primigravidas:

Side effects and some adverse effects of IFAS are associated with lower adherence levels to IFAS among Primigravidas. Common side effects reported by Primigravidas include: heart burn, nausea, vomiting and stomach cramping (Abinet et al., 2015). According to a study conducted in Ethiopia, Primigravidas that suffered IFAS related side effects or adverse effects during their previous pregnancies had 6.3 times higher odds to decrease their adherence to IFAS in subsequent pregnancies as compared to Primigravidas that did not suffer IFAS related side effects (Kassa et al., 2019).

2.8. Gaps Identified During Literature Review:

It has been noted that no studies have been done to ascertain adherence levels of Primigravidas to iron and folic acid supplements and associated factors in south western Uganda. Therefore, this study is aimed at assessing the factors affecting adherence levels to prescribed iron and folic acid supplements during pregnancy among Primigravidas in south western Uganda and subsequently make relevant evidence-based recommendations and strategies to health policy makers and health care facilities providing antenatal care on how adherence to such iron supplements can be boosted among Primigravidas

CHAPTER THREE: RESEARCH METHODOLOGY

3.0 Introduction:

This chapter presents a detailed description of research design, sample size and strategy as well as the sampling technique used during the study. Study methodology further expounds on the way research was arranged by involving the description of the study area, design and sampling techniques used. It as well explains the study units, variables, methods and tools that were used during data collection, ethical considerations and limitations of the study.

3.1 Study Design:

A multi-health facility based analytical cross-sectional study design with a quantitative approach was used to interact with and collect detailed information from Primigravidas.

3.2 Study Area:

The study was conducted in Mbarara district which is located in South-western region of Uganda at approximately 270.3 Km from Kampala city which is the capital of Uganda. Mbarara district borders Ibanda district to the North, Kiruhura district to the East, Isingiro district to the South-East, Rwampara district to the South-West and Buhweju District to the North-West. Coordinates of Mbarara district are: 0.6072 º S, 30.6545 º E. Mbarara is divided into two counties: Mbarara North and Mbarara South. Mbarara Regional Referral hospital is the biggest health facility in the city and is located along Mbarara-Kabale road at approximately 2 kilometers from Mbarara city centre. Therefore, health facilities offering antenatal care services where the study was carried out included but not limited to: Bwizibwera HC IV, Rubindi Health Centre III, Rubaya Health Centre III, Bubare HC III and Bucuro HC III.

3.3 Study Population:

The study involved selected first-time expecting mothers seeking antenatal care services at: Bwizibwera HC IV, Rubindi Health Centre III and Rubaya Health Centre III

3.3.1 Target Population:

The study targeted selected first-time expecting mothers seeking ANC services at selected heath facilities in Mbarara district.

3.4 Selection Criteria:

3.4.1 Inclusion Criteria:

The study included selected first-time expecting mothers seeking ANC services for the second time and above, who consented to participate in the study. Such Primigravidas were selected because they were expected to be taking iron and folic acid supplements received on their previous Antenatal care visit.

3.4.2 Exclusion Criteria:

The study excluded Primigravidas attending antenatal care for the first time. This was because they had not yet received any iron and Folic acid supplements.

3.5 Sample Size Determination:

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

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

Where, n= sample size to be studied,

Z= the standard normal value of α at 95% confidence level corresponding to =1.96

p=the estimated proportion of expecting mothers adhering to iron and folic acid supplementations. According to a study conducted in Mulago National referral hospital, the estimated proportion of expecting mothers adhering to IFAS was 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 Kish Leslie formula,

n= (1.96*1.96*0.116*0.884)/ (0.05*0.05)

n= 157.57 ≈ 156.

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

n=156 + (156*10/100)

n=156+15.6

n=171.6 ≈ 172.

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

3.6 Sampling technique:

3.6.1 Sampling of the study area:

Study participants were obtained from selected health facilities offering ANC services in Mbarara district. To select the health facilities to participate in the study, multi-stage sampling was employed. First, the health facilities were stratified as health centre IIIs and IVs. Since there is only one health centre IV (Bwizibwera HC IV) in Mbarara district, it was included in the study since it handles most of the Primigravidas seeking ANC services.

Secondly, a sampling frame containing all the health centre IIIs was made and entered into a Microsoft excel 2016 to help generate random numbers so that 2 of health centre IIIs are selected as a representative sample for health centre IIIs. The selected two health centre IIIs with the highest random numbers in order included: Rubindi HC III and Rubaya HC III.

3.6.2 Sampling of study participants:

3.6.2.1 Sampling of primigravidas:

Eligible Primigravidas were sampled from those who had come for ANC at the selected health facilities and interviewed. The total sample size of 172 participants was distributed amongst one selected HC IV and two health centre IIIs. Proportionate sampling was used and this was based on data extracted from Mbarara District Health Information Software (DHIS2) where the total ANC attendance over a period of January 2024 to December 2024 for Bwizibwera HC IV, Rubindi HC III and Rubaya HC III were 3115, 1516, and 1306 expecting mothers respectively. Therefore, proportionate to the ANC attendance, study participants that were interviewed from Bwizibwera HC IV, Rubindi HC III and Rubaya HC III were: 90, 44 and 38 eligible Primigravidas respectively as summarized in the table below;

Name of facility	**Antenatal attendance (Jan 2024 -Dec 2024)**	**Proportionate sample size determination formula**	**Number of Primigravidas selected per facility**
Bwizibwera HC IV	3115	= (3115/5937) *172	90
Rubindi HC III	1516	= (1516/5937) *172	44
Rubaya HC III	1306	= (1306/5937) *172	38
TOTALS	5937		**172**

From each selected health facility, Primigravidas who came for antenatal care services on a particular 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.

3.6.2.2 Sampling of key informants (ANC providers):

To obtain a deeper understanding on the adherence levels to IFAS among Primigravidas, a midwife from each sampled health facility was purposively selected to give key information regarding Primigravida adherence to iron and folic acid supplements within the facility. The health worker was chosen if he or she was attending to antenatal care mothers and therefore able to provide the necessary information and details.

3.7. Definition of Variables:

The **dependent variable** was the adherence level to iron and folic acid supplementations among first time expecting mothers. This was the adherence level that was determined by considering the number of tablets taken and missed within 30 days prior to the study. The adherence level was put on Likert scale as excellent, good, average, poor and very poor and later dichotomized as Adherence or No Adherence. A Primigravida was considered to have adhered to IFAS if she took at least 80% of the prescribed iron and Folic acid supplements (Kim et al., 2018, WHO, 2003).

Independent variables were the individual factors and health facility factors associated with adherence to IFAS among first time expecting mothers.

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

- The socio-economic determinants of adherence to IFAS for example age, marital status, education level, occupation, income and gestational age

- Possible factors influencing adherence or non-adherence to iron folic acid supplements (knowledge on anemia and iron folic acid supplementation, presence of any side effects attributed to IFAS, acceptability of iron and folic acid supplements, number of ANC visits, supplies and stocks of IFAS at health facilities).
- Knowledge on anaemia and IFAS as classified on Likert scale as: Very low knowledge, Low knowledge, Moderate knowledge, Good knowledge and Very good knowledge.

3.8 Data Collection Instruments, Quality Control and Data Management:

3.8.1 Researcher-Administered Questionnaire:

A researcher-administered questionnaire was used to collect quantitative data from Primigravidas seeking ANC services regarding their adherence levels to IFAS. Both structured and semi structured questions were asked to the study participants.

A separate semi-structured questionnaire for Antenatal care providers was administered to health care providers to further assess the health system factors that influence adherence to iron and folic acid supplements among Primigravidas seeking ANC services in Mbarara district.

3.8.2 Validity and Reliability:

To ensure remarkable validity and reliability of study results, a pilot study was conducted to test and construct validity of the study instruments and identify changes that were needed before they were utilized. The researcher first visited the study sites to get acquainted with their set-ups and operations before initiating data collection arrangements. The researcher worked with the help of research assistants who were adequately trained before going to the field. The selected research assistants were able to speak both English and the local language

(Runyankore) in given study areas and were taught about study objectives and trained about using a researcher-questionnaire in data collection.

3.8.3 Data Collection Procedures:

Data was obtained using structured researcher administered questionnaire with a quantitative approach. Daily coding was done every after-field data collection. Responses from study participants were grouped into categories and entered by use of tally marks.

3.8.4 Data Processing and Analysis:

Data collection 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 Primigravida adherence to IFAS, logistic regression was used. At bivariate analysis, all variables with a p value less than 0.2 and those that were 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.

Descriptive statistics were used to describe adherence levels to IFAS among first-time expecting mothers and the associated factors influencing such adherence levels. Chi square, confidence intervals and p-values were reported after data analysis and data was presented using tables and graphs.

3.9 Ethical Considerations:

3.9.1 Institutional approval.

Scientific approval was obtained from graduate school of Bishop Stuart University while Ethical approval was obtained from The Bishop Stuart University Research Ethics Committee (BSU REC), Reference: **BSU-REC-2025-498**

3.9.2 Beneficence and non-maleficence.

Study participants were informed that participating in the study carried no risk on their lives or the pregnancy itself, but would instead assist in policy formulation tailored towards improving adherence to iron and folic acid supplements among Primigravidas and subsequently increase the associated benefits to the unborn babies.

3.9.3 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.

3.9.4 Privacy and Confidentiality

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

3.10 Study Limitations:

Limited resources including time, human resource and financial constraints limited the scope of the study. This was worsened by high costs of typing, printing, photocopying and purchasing stationery to use during the study.

Some potential study participants declined to participate in the study which negatively challenged the researcher regarding attaining target numbers of study participants.

3.11 Dissemination of study results:

Study findings were disseminated to individual health facility administrators, DHO's Office-Mbarara district, Local Council leadership & Village Health Team, VHT Coordinator, Bishop Stuart University School of Nursing and Health Sciences at the department of postgraduate studies.

The study participants obtained feedback about study results through text messages and phone calls which included details of the study results.

The study findings were published and a community sensitization campaign in liaison with the facility and community leadership were done.

CHAPTER 4: RESULTS

This chapter discusses results of the study in line with study objectives, including results of data analysis at Monovariate, Bivariate and Multivariate analysis.

4.1 Characteristics of study participants (Primigravidas)

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

Primigravida characteristics	Number (n)	Percentage n/N*100 (%)
Age		
10-19years	15	8.72
20-29years	107	62.21
30+ years	50	29.07
Marital Status		
Unmarried	29	16.86

Married	143	83.14
Education status		
Primary or less	58	33.72
Above Primary	114	66.28
Occupation		
Unemployed	148	86.05
Employed	24	13.95
Reminder		
No	117	68.02
Yes	55	31.98
Residence		
Rural	145	84.30
Town-council	27	15.70
Average monthly income (ugx)		
Less 100,000shs	157	91.28
100,000shs or more	15	8.72
ANC visit number		
ANC 2	50	29.07

ANC 3	36	20.93
ANC 4	56	32.56
ANC 4+	30	17.44
IFAS tabs received on previous ANC visit		
Less than 15	10	5.82
15 or more	162	94.19

In this study, majority of Primigravidas were aged between 20-29years (62.21%), Married (83.14%) and had attained at least primary level education. However, majority of the Primigravidas were unemployed (86.05%) and earning less than 100,000 Ugandan shillings in a month (91.28%).

4.2 Level of knowledge on importance of iron and folic acid supplements among Primigravidas attending ANC in Mbarara district (N=172)

Level of knowledge	**Number (n)**	**Percentage n/N*100)**
Very low knowledge (Total score of 0-1)	0	0
Low knowledge (Total score of 2-3)	11	6.40
Moderate knowledge (Total score of 4)	32	18.60

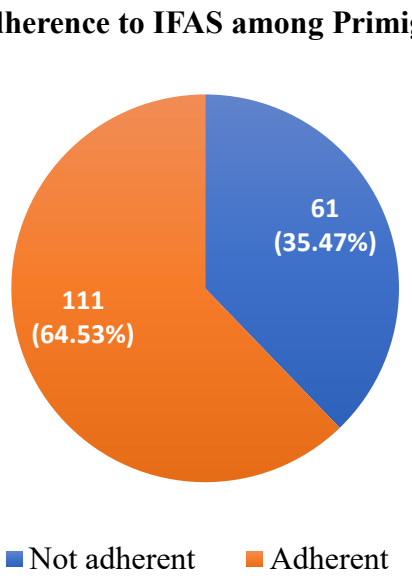
Good knowledge (Total score of 5-6)	112	65.12
Very good knowledge (Total score of 7)	17	9.88

In this study, majority of the Primigravidas had good knowledge regarding importance of taking iron and folic acid supplements during pregnancy. The median score of participants was 5 points out of 7 points and only 31.17% has a score above this median score.

4.3 Level of adherence to iron and folic acid supplements among Primigravidas attending ANC in Mbarara district (N=172)

Level of Adherence to IFAS among Primigravidas	**Number (n)**	**Percentage (n/N *100)**
Excellent	71	41.27
Good	24	13.95
Average	10	5.81
Poor	35	20.35
Very poor	32	18.60

4.4 Proportion of Primigravidas with adherence to iron and folic acid supplements among Primigravidas attending ANC in Mbarara district



The proportion of Primigravidas attending antenatal care in Mbarara district whose adherence to iron and folic acid supplements was defined as taking at least 80% of the prescribed IFAS was 64.53% (95% CI 0.52 – 0.63).

4.5 Socio-demographic factors influencing adherence to IFAS among Primigravidas attending ANC in Mbarara district at bivariate analysis.

Variable	No Adherence	Adherence	Bivariate analysis	p-value
	n/N (%)	n/N (%)	cOR (95% CI)	
Age category (years)				
10-19	14 (20.29)	15 (14.02)	1.74 (0.62-4.09)	0.167*
20-29	31 (44.93)	74 (69.16)	3.06 (1.67-5.28)	0.003**
≥30	24 (34.78)	18 (16.82)	1	

Marital status				
Not married	8 (12.31)	5 (4.55)	1	
Married /Lives with Partner	57 (87.69)	105 (95.45)	3.21 (0.72-13.32)	0.072*
Highest education Level				
Primary or less	14 (21.54)	30 (28.04)	1	
Above Primary	51 (78.46)	77 (71.96)	0.69 (0.29-1.38)	0.415
Employment status				
Unemployed	52 (80)	80 (74.77)	1	
Employed	13 (20)	27 (25.23)	1.63 (0.76-3.19)	0.291
Area of residence				
Rural	55 (84.61)	80 (74.77)	1	
Town council	10 (15.39)	27 (25.23)	1.24 (0.68-2.61)	0.607
Current ANC visit				
<4th visit	29 (44.62)	51 (47.66)	1	
4th Visit or more	36 (55.38)	56 (52.34)	0.72 (0.35-1.71)	0.641
Average monthly income				
<100,000shs	51 (78.46)	90 (84.11)	1	
At least 100,000shs	14 (21.54)	17 (15.89)	0.63 (0.34-1.56)	0.457
Booking visit in 1st trimester				
Yes	32 (49.23)	47 (43.92)	1	

No	33 (50.77)	60 (56.08)	1.19 (0.64-2.42)	0.691
Has a reminder to take IFAS				
No	45 (69.23)	54 (50.47)	1	
Yes	20 (30.77)	53 (49.53)	2.56 (1.32-4.97)	0.005**

*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 among Primigravidas at bivariate analysis. Primigravidas who were aged between 20-29 years were about 3 times more likely to adhere to IFAS compared to those aged 30 years and above. Primigravidas who had any adherence partner to remind them to take their IFAS 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 Primigravidas attending ANC in Mbarara district at bivariate analysis

Variable	No Adherence	Adherence	Bivariate analysis	p-value
	n/N (%)	n/N (%)	cOR (95% CI)	
Taking other medications other than IFAS				
No	45(69.23)	90 (84.11)	1	

Yes	20(30.77)	17 (15.89)	0.32 (0.15-0.70)	0.022*
Counselled on IFAS importance				
No	42 (64.62)	35 (32.71)	1	
Yes	23 (35.38)	72 (67.29)	3.05 (1.63-5.71)	0.002**
Side effects of IFAS				
No	57 (87.69)	90 (84.11)	1	
Yes	8 (12.31)	17 (15.89)	1.93 (0.69-5.32)	0.213
Number of IFAS tablets dispensed				
<15 tablets	4 (6.15)	17 (15.89)	1	
≥15tablets	61 (93.85)	90 (84.11)	0.58 (0.17- 1.69)	0.215
Availability of Private space for ANC				
No	44 (67.69)	80 (74.77)	1	
Yes	21 (32.31)	27 (25.23)	0.64 (0.27-1.27)	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 among Primigravidas attending ANC in Mbarara district at bivariate analysis were counselling and taking other medications other than IFAS. Primigravidas who had been counselled on the importance of taking IFAS were about 3 times more likely to adhere to IFAS compared to those who had not received counselling concerning importance of IFAS during pregnancy (cOR 3.05, CI 1.63-5.71, p value 0.002). Primigravidas who were on medications other than IFAS were less likely to adhere to IFAS compared to those who were not on any other medications (cOR 0.32, CI 0.15-0.70, p value 0.022).

4.7 Socio-demographic and health system factors influencing adherence to IFAS among Primigravidas attending ANC in Mbarara district at multivariable logistic analysis.

Variable	No Adherence	Adherence	Bivariate analysis	p-value	Multivariate analysis	p-value
	n/N (%)	n/N (%)	cOR (95% CI)		aOR (95% CI)	
Age category (years)						
10-19	14 (20.29)	15(14.02)	1.74 (0.62-4.09)	0.167	3.71 (1.13-12.04)	0.031**
20-29	31 (44.93)	74 (69.16)	3.06 (1.67-5.28)	0.003	4.57 (2.05-11.13)	0.001 **
≥30	24 (34.78)	18 (16.82)	1		1	
Has a reminder to take IFAS						
No	45 (69.23)	54 (50.47)	1		1	
Yes	20 (30.77)	53 (49.53)	2.56 (1.32-4.97)	0.005	2.81 (1.33-5.92)	0.007 **
Taking other medications other than IFAS						
No	45(69.23)	90 (84.11)	1		1	
Yes	20(30.77)	17 (15.89)	0.32 (0.15-0.70)	0.022	0.43 (0.17-1.13)	0.078
Counselled on IFAS importance						
No	42 (64.62)	35 (32.71)	1		1	
Yes	23 (35.38)	72 (67.29)	3.05 (1.63-5.71)	0.002	4.45 (2.07-9.31)	0.001**

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

At multivariate analysis, the sociodemographic factors influencing adherence to IFAS among Primigravidas attending ANC in Mbarara district were maternal age and having a reminder. Primigravidas who were aged between 10-19 years were about 3.7 times more likely to adhere to IFAS compared to the Primigravidas aged 30 years and above (aOR 3.71, CI 1.13-12.04, p value 0.031) while Primigravidas who were aged 20-29 years were about 4.6 times more likely to adhere to IFAS compared to Primigravidas aged 30 years and above (aOR 4.57, CI 2.05-11.13, p value 0.001). Primigravidas who had reminders to take their IFAS were about 2.8 times more likely to adhere to IFAS compared to Primigravidas who did not have any reminders (aOR 2.81, CI 1.33 -5.92, p value 0.007).

In this study, the only health system factor that was associated with adherence to IFAS among Primigravidas seeking ANC in Mbarara district was counselling. Primigravidas who had been counselled on the importance of taking IFAS during pregnancy were about 4.5 times more likely to adhere to IFAS compared to Primigravidas who had not received any counselling regarding the importance of IFAS during pregnancy (aOR 4.45, CI 2.07- 9.31, p value 0.001).

4.8 Information and opinions from health workers (ANC providers) about health facility factors influencing Primigravida Adherence to IFAS during pregnancy

Parameter assessed	**Number of health facilities**	**Percentage**
Facilities providing ANC services daily	3	100%
Facilities experiencing stock outs of IFAS	0	0%
Facilities providing specific counselling about IFAS on a daily basis	1	33.33%
Facilities providing 30 tablets to Primigravidas on a monthly basis	3	100%
Outreaches that provide ANC to Primigravidas	1	33.3%
Understanding of the importance of IFAS among health workers (ANC providers)	3	100%

All the health facilities in Mbarara district that participated in the study provided ANC services on a daily basis, did not experience stock outs of IFAS and gave at least 30 IFAS tablets to all Primigravidas who came for ANC. However, only a third provided counselling to Primigravidas that was specific to importance of IFAS during pregnancy on a daily basis.

CHAPTER 5: RESULTS, CONCLUSIONS AND RECOMMENDATIONS.

5.0 Introduction:

This chapter discusses results, conclusions and recommendations of the study in line with the study objectives. It discusses factors influencing adherence to IFAS among Primigravidas attending ANC in Mbarara district, conclusions and recommendations.

5.1 Adherence to IFAS among Primigravidas

In this study, the adherence level to IFAS among Primigravidas was at 64.53% representing the proportion of Primigravidas who had taken 80% of the prescribed IFAS over one month prior to the study. This adherence level to IFAS among Primigravidas is relatively high and could be explained by the regular stocks of IFAS in the health facilities, counselling about importance of IFAS during pregnancy as well as provision of ANC on a daily basis at the health facilities.

This finding was similar to a study that was conducted in Addis Ababa, Ethiopia among Primigravidas attending ANC from various government health facilities in Gulele Sub-city where the level of Primigravida adherence was at 63.1% (Tegodan et al., 2021). Similar level of adherence to IFAS among Primigravidas was found in a study conducted at Tikur Anbessa Specialized Hospital, Ethiopia (62.4%), similar findings in a study conducted in Kenya at Kakamega level 5 hospital where Primigravida adherence level to IFAS was 61.3% and similar findings in a study conducted in South India where Primigravida adherence level to IFAS was 64.9% (Nasir et al., 2020, Bahati et al., 2021, Mithra et al., 2014). Possible explanations as to why Primigravida adherence level to IFAS in this study is similar to findings in some other related studies include: similarities in study settings, study population as well as the criteria used to consider a Primigravida to be adherent to IFAS.

Primigravidas' level of adherence to IFAS in this study is higher than the findings in 22 countries within Sub-Saharan Africa where the pooled level of adherence to IFAS was 27.5%

(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 level also depended on taking IFAS for at least 90 days which also explained why the adherence level in this study was high. Other findings concerning Primigravida adherence to IFAS with a low prevalence were found in Uganda (10.7% in Mulago National Referral Hospital and 32.6% in Bwindi Community Hospital) and Tanzania (21.4%) (Kiwanuka et al., 2017, Nimwesiga et al., 2021, Lyoba et al., 2020). This could be explained by stringent criteria used for classifying Adherence in these studies.

Some studies have also reported higher levels of adherence to IFAS among Primigravidas attending antenatal care for example a study conducted among Primigravidas attending antenatal care in government hospitals of Dire Dawa, Eastern Ethiopia reported an adherence level of 70.9% and a cross sectional study conducted in North West province, South Africa reported Primigravida adherence level to IFAS of 91% (Solomon et al., 2021, Mbhenyane and Cherane, 2017). This could be explained by the differences in study populations and the less strict criteria used to classify Primigravidas as adherent or not. For example, in the study done in Eastern Ethiopia, 57% of the Primigravidas had attained at least secondary education, majority were government employees and hence these were 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. Socio-demographic factors influencing Primigravida adherence to IFAS

In this study, the socio-demographic factors affecting adherence to IFAS among Primigravidas attending ANC in Mbarara district included: maternal age and having somebody to remind them to take IFAS.

Age of a Primigravida

In this study, Primigravidas younger than 30 years were more likely to adhere to IFAS compared to Primigravidas who were 30 years and above. Similar findings have been found in other studies for example in a study done in Tigray Ethiopia, Primigravidas who were aged more than 25 years were 0.54 times less likely to adhere to IFAS and Primigravidas above 45 years were about 3.6 times more likely to have poor adherence to IFAS compared to Primigravidas below 25 years of age (Gebre et al., 2015b, Nisar et al., 2014). The possible explanation is that most of the younger Primigravidas are more learned and informed, therefore likely to adhere to IFAS to optimise fetal outcomes as opposed to old Primigravidas who are often less learned and informed, thus less likely to adhere to IFAS.

Support from a husband, family members or peers regarding adherence to IFAS

In this study, Primigravidas who had a reminder to take their IFAS were 2.6 times more likely to adhere to IFAS as compared to Primigravidas that did not have any reminders. This observation has also been found in other studies for example a cross-sectional study conducted among Primigravidas in government health facilities of Adwa town, Tigray, Ethiopia, Primigravidas who had support from their partners were about 2.4 times more likely to adhere to IFAS compared to Primigravidas that did not have any partner support (Gebremichael and Welesamuel, 2020). In Kenya and Ethiopia, adherence partners have been identified to improve Primigravidas' adherence to IFAS during pregnancy (Martin et al., 2017). Spouses, family members and peers often help to remind Primigravidas to take IFAS hence minimising forgetfulness which has been identified as a common reason for not taking IFAS (Mithra et al., 2014, Mbhenyane and Cherane, 2017, Mamo et al., 2021).

5.3. Health system factors influencing Primigravida adherence to IFAS.

Counselling about importance of IFAS during pregnancy

In this study, the only health system factor associated with Primigravida adherence to IFAS was counselling about importance of IFAS during pregnancy. Primigravidas who had received counselling from health workers regarding IFAS importance during pregnancy were 4.5 times more likely to adhere to IFAS compared to Primigravidas that did not receive any counselling regarding importance of IFAS during pregnancy. This has also been found in studies conducted in Tanzania, Senegal and Ethiopia (Lyoba et al., 2020, Seck and Jackson, 2008, Sendeku et al., 2020).

Counselling about importance of IFAS increases Primigravida's knowledge about the importance of taking IFAS and consequences of non-adherence and this in turn improves adherence to IFAS. Some studies have identified the number of antenatal care visits attended by a Primigravida as independent factor that increases adherence to IFAS since Primigravidas get many sessions of counselling about importance of IFAS, however this was not found to be an independent factor in a study conducted in Ethiopia (Sendeku et al., 2020, Gebre et al., 2015b, KHATTAB, 2014).

5.4 Conclusions

1. The level of adherence to IFAS among Primigravidas attending ANC in Mbarara district is relatively high (6 in every 10 Primigravidas).
2. Primigravidas who are less than 30 years, with a reminder to take IFAS and counselling from health workers about importance of IFAS during pregnancy are more likely to adhere to IFAS.

5.5 Recommendations

1. We recommend that intensive and daily counselling about the importance of IFAS during pregnancy be done by Antenatal care providers especially to Primigravidas who are 30 years of age or older.
2. We recommend a qualitative study to be conducted to have an in-depth understanding of why some Primigravidas do not take IFAS as prescribed.

5.6 Limitations

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

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APPENDICES

Appendix 1A: INFORMED CONSENT FORM – English version



BISHOP STUART UNIVERSITY

RESEARCH ETHICS COMMITTEE

P.O. Box 09 Mbarara-Uganda Tel: +256

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INFORMED CONSENT FORM

Study Title: **THE FACTORS INFLUENCING ADHERENCE TO IRON AND FOLIC ACID AMONG PRIMIGRAVIDAS SEEKING ANTENATAL CARE IN MBARARA DISTRICT, SOUTH WESTERN UGANDA.**

Principal Investigator: Ankunda Hector **(**0786 496 096) **-**BISHOP STUART UNIVERSITY

INTRODUCTION

What you should know about the study:

- You are being requested to join a research study.
- This consent form explains the research study and your part as a participant in the study.
- Read through carefully and take your time to understand various aspects of the study
- You may choose not to participate in the study and if you join, you may drop out at any time of your choice as there will be no penalty if you choose to drop out of the study.

Brief background of the study:

The study is about factors influencing adherence to iron and folic acid supplementations among primigravidas seeking antenatal care services in Mbarara district, South western-Uganda. The study aims at assessing the proportion and factors influencing adherence to iron and folic acid supplementations among first time expecting mothers and subsequently help us address any gaps and challenges identified while trying to access antenatal care services as well as adhering to iron and folic acid supplementations among first time expecting mothers. The net result will be reducing iron deficiency anaemia among first-time expecting mothers.

Purpose of the study:

The study is aimed at assessing the factors influencing adherence to iron and folic acid supplementations among first time expecting mothers seeking antenatal care services in Mbarara district, South western-Uganda.

The researcher is currently a student of Bishop Stuart University, BSU and this research is a partial fulfilment of the requirements for the award of Master of Public Health of BSU.

The information collected from the study will help us to address any factors or challenges that influence adherence to iron and folic acid supplementations among first time expecting mothers and eventually reduce maternal mortality associated with iron deficiency anaemia during pregnancy among first time expecting mothers.

Procedure of participating in the study:

To participate in the study, you be interviewed and then your personal information like age, education level, residence, income level, your knowledge on iron deficiency anaemia will be

recorded or written down. Interview sessions will take about 30 minutes of interaction with the researcher.

Risks and discomfort during the study:

Only a few questions will be asked and will not interfere with or alter the kind of antenatal care treatment or service that you are scheduled to receive. Therefore, apart from your time offered for the study, there is absolutely no harm encountered while participating in the study.

Incentives for participating in the study:

Each study participant will be provided with a bar of soap and two rolls of toilet papers.

Monetary compensation for participating in the study:

As a small token of appreciation for your participation in the study, you will be given 5000/=

Privacy and confidentiality during the study:

Interviews and interactions with the researcher will be conducted from a private place and no obtained information from a study participant will be shared in anyway without first obtaining consent from that particular study participant.

Right to refuse or withdraw from the study:

Participation in the study is absolutely voluntary and study participants are at liberty to drop out of the study at any time without any negative repercussions.

Who do I ask if I have questions or a problem?

You may contact the researcher:

Dr. Ankunda Hector, principal investigator

Telephone: 0786 496 096

What does your signature or thumbprint on this consent form imply?

Your signature on this consent form implies;

- You have been adequately informed about the study's purpose, objectives, goals, procedures and possible benefits to the participants and community at large.
- You have been given a chance to ask questions and seek for clarifications before appending your signature or thumbprint
- You have agreed to be in the study on a voluntary basis.

_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _	_ _ _ _ _ _ _ _ _ _ _ _ _ _	_ _ _ _ _ _ _ _
Participant's name	Participant's signature/thumbprint	Date

_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _	_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _	_ _ _ _ _ _ _ _ _
Researcher's name	Signature	Date

_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _	_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _	_ _ _ _ _ _ _ _ _
Witness' name	Signature	Date

Appendix 1B: INFORMED CONSENT FORM – Runyakitara version (OKUSHABA ORUSHA RWOKUKUTEKA OMUMUSHOMO OGU)

BISHOP STUART UNIVERSITY

RESEARCH ETHICS COMMITTEE

P.O. Box 09 Mbarara-Uganda Tel: +256

485-433468 E-mail: rec@bsu.ac.ug

INFORMED CONSENT FORM (TRANSLATED VERSION)

Omutwe gw'omushomo: **Enshonga ezirikuretera abakazi abarikukyebeza enda yokubanza omu disiturikiti ya Mbarara okumira gye nari obutamira gye obujuma bw'okugaruramu eshagama.**

Omukyondozi mukuru: Ankunda Hector **(**0786 496 096)**-**BISHOP STUART UNIVERSITY

OKWANJURA

Ebi oshemereire kumanya aha mushomo gwokukyondooza oku:

- Nooshabwa kwejumbira omu mushomo gw'okukyondooza ogu.
- Ekyihandiiko ky'okwikyiriza ekyi nikyishoboorora omushomo gw'okukyondooza, hamwe n'omurimo gwawe omu mushomo.

- Nooshabwa kukyishoma okakyetegyereza kandi okatwara obwire bwoona obworikwenda.
- Ori nyekundeire. Oine obugabe obutejumbiramu kandi wayejumbiramu, nobasa kurugamu eshaaha yoona. Tihariho ekyiheneso kyoona ekyirakuheebwe washaramu kuruga omu mushomo ogu.

Bikye ahabwihiriro bw'omushomo ogu:

Nitushaba kugambaho niiwe ahamushomo gwokukyondooza ogugyendereire kumanya enshonga ezirikuretera abakazi abarikukyebeza enda yokubanza omu disiturikiti ya Mbarara bamira kurungyi nari batamira kurungyi obujuma bw'okugaruramu eshagama. Ekyigyendererwa nekyokugyira ngu tukore ahabizubu ebirikutuma mutabasa kumira gye omubaazi nikwo tukakyendeza ekyizibu kyokugyira eshagama nkye omu bakazi b'enda yokubanza.

Ekyigyendererwa ky'okukyondooza oku:

Ekyigyendererwa ky'okukyondooza oku ni okumanya enshonga ezirikuretera abakazi abarikukyebeza enda yokubanza omu disiturikiti ya Mbarara bamira kurungyi nari batamira kurungyi obujuma bw'okugaruramu eshagama.

Omukyondoozi nomwegyi wa masitazi aheitendekyero erya Bishop Stuart yunivasite kandi okukyondooza oku ni kyimwe ahabyetago by'abarikwenda kutunga diguri ya masitazi omu byamagara g'abantu boona.

Amakuru aguturayihe omukukyondoza oku nigaza'kutuhwera omukukora aha nshonga ezakubasa kutuma abakazi benda yokubanza batamira gye obujuma bwokugaruramu eshagama nikwo tukakyendeza enamba yabakazi b'enda abarikufa ahabw'eshagama nkye.

Entwaza yomushomo:

Washaramu kwejumbira omu kukyondoza oku, nituza kukubuza kandi tuhandike bikye ebirikukukwataho nka emyaka, emishomo yaawe, ahokutura, entasya yaawe, ebi orikumanya ahashagama nkye omumubiri waba oyine enda.

Ekyi nikyiza kutwara nkedakyika mwakumyasatu.

Akabi / obutagwibwa gye:

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

Amagoba:

Nkomuringo gw'okukusima ahabw'okutugarukamu, nituza kukuhereza akahembo komuti gwasabuni hamwe na toyireti pepa ibiri

Ebihembo byokwetaba omukukyondooza oku:

Nkomuringo gw'okukusima ahabw'okutugarukamu, nituza kukuhereza akahembo kashiringyi enkumitano

Okukuuma nkekyihama ebyarundanwa na okukuma kyibuuzibwa nkekyihama omukurundana amakuru aga:

Nituza kugambaho niiwe omumwanya ogwehereire kugyira ngu abandi bantu batabaasa kuhurira ebibuuzo ebiturabe nitukubuza ninga ebiwagarukamu. Tituragambire abantu abandi ahabwenkyi twaba nitugambaho niiwe.

Okwenda kukuma ebihama byawe, nituza kubika amakuru gawe omumwanya ogukyingirwe negufuru.

Obugabe bw'okwanga hamwe nokuruga omu'mushomo:

Okwetaba kwawe omumushomo ogu nokwekundira. Eshaaha yoona wareeba ngu tokyenda kwetaba omumushomo, nobugabe bwawe okurugamu. Noyija kugumizamu notunga

obureberezi obuhikyire obwobire oshemereire kuba notunga hatariho kyifubiro kyona ninga okuferwa amagoba.

Nooha ou nakubuuza ninga kuhikyiraho naaba nyine ekyibuuzo naari oburemeezi?

Nobaasa kuterera omukyondoozi:

1. Dr. Ankunda Hector, Omukyondoozi mukuru w'omushomo (0786 496 096)

Omukono (ninga ekyinkuumu) kyaawe nikyimanyisa kyi aha kyihandiiko ekyi?

Omukono gwawe aha kyihandiiko ekyi nikyimanyisa ngu:

- Wamanyisibwa ahamigasho, entwaza, amagooba hamwe nebihikyirizi by'omushomo ogu
- Waheebwa omugisha kubuuza ebibuuzo kandi wagarukwamu otakatireho omukono gwaawe
- Wayekundira kusharamu kwetaba omu mushomo ogu

_____ _____ _____

_____ _____ _____

Eizina ry'omuntu owayetabamu | Omukono/Ekyinkumu kyomwetabi | Ebiiro

_____ _____ _____

_____ _____ _____

Eiziina ryomuntu orikushaba | Omukono | Ebiro

Orusa

_____ _____ _____

_

Eiziina ryomurinzi	Omukono	Ebiro

Appendix 2: <u>QUESTIONNAIRE FOR PRIMIGRAVIDAS</u>

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

Section A: SOCIO-DEMOGRAPHIC INFORMATION OF A PRIMIGRAVIDA

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. Gestational age at registration (booking ANC visit)
    0. First trimester ☐
    1. 2nd trimester ☐
    2. 3rd trimester ☐
8. Current ANC Visit number
    0. ANC 1 ☐
    1. ANC 2 ☐
    2. ANC 3 ☐
    3. ANC 4+ ☐
9. Who often reminds you to take your iron and folic acid tablets?
    0. None ☐
    1. Peer ☐
    2. My husband/other family member ☐

Section B. KNOWLEGDE ABOUT IFAS AND ANAEMIA IN PREGNANCY

10. Have you ever heard about iron and folic acid supplementations during pregnancy?

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

11. How often should one take iron and folic acid tablets during pregnancy?

0. Don't know or 'other answer' ☐
1. Once daily ☐

12. Can you mention the importance of taking iron and folic acid tablets during pregnancy?

0. Don't know ☐
1. Either; to prevent anaemia and its signs, to prevent maternal death, to prevent excessive bleeding at childbirth, to prevent preterm infants, prevent low birth weight infants ☐
2. Others; Specify…….. ☐

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

0. No ☐
1. Yes ☐

14. What do you do when you experience side effects of iron and folic acid tablets?

0. Don't know ☐
1. Either; Swallow with food, persevere with the side effects, go back to health facility to complain, take while going to bed ☐
2. Others, Specify……. ☐

15. What are the signs and symptoms of iron deficiency anaemia in pregnancy?

0. Don't know ☐

1. Either; feels weak, looks pale, palpitations, headaches, dizziness, tiredness and easily fatigued ☐
2. Others, Specify……. ☐

16. 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, ☐
2. Others, Specify……. ☐

Section C. HEALTH FACILITY FACTORS

17. Other than iron and folic acid tablets, are you on any other medications?
    0. No ☐
    1. Yes ☐
18. Did you get enough information from antenatal care providers explaining why you must take iron and folic acid tablets during pregnancy?
    0. No ☐
    1. Yes ☐
19. How many iron and folic acid tablets were provided on your last antenatal care visit?
    0. <15 tablets ☐
    1. = or >15tablets ☐
20. Do you have a private space where you can ask anything you want to know about your pregnancy during antenatal visit?
    0. No ☐
    1. Yes ☐
21. Do you experience any side effects after taking iron and folic acid tablets?
    0. Yes ☐

1. No ☐

22. If Yes to qn 21 above, which side effect(s) do you often experience?

0. Nausea ☐
1. Heart burn ☐
2. Stomach cramps ☐
3. Others, specify……☐

Section D. ADHERENCE LEVEL

23. Number of iron and folic acid tablets missed over previous one month.

0. 0-2 tablets ☐
1. 3-4 tablets ☐
2. 5-6 tablets ☐
3. 7-10 tablets ☐
4. 10+ tablets ☐

24. What are some of the reasons that make you forget or skip taking iron and folic acid tablets?

0. None ☐
1. Forgetting to take the tablets ☐
2. Side effects ☐
3. Pill burden ☐
4. Feeling very well ☐
5. Others, Specify……☐

Appendix 3: <u>EBIBUUZO BYABAKYARA ABIINE ENDA YOKUBANZA(QUESTIONNAIRE-TRANSLATED VERSION)</u>

Engyenderwaho: Omukyondozi natikinga ekyiwagarukamu.

Ekyicweka A: Ebirikukwata ahamukazi oyine enda yokubanza

1.Emyaka

0.10-19 emyaka ☐

1.20-24 emyaka ☐

2. 25-29 emyaka ☐

3.30-34 emyaka ☐

4.35 emyaka nokweyongyerayo ☐

2.Oshwirwe ota

0.Nshwirwe, nintura nomusheija ☐

1.Omusheija akafa ☐

2.Nkataana nomusheija ☐

3.Tinshwirwe ☐

3.Emishomo ayahiguru munonga

0.Tinshomire ☐

1.Purayimare ☐

2.Siniya ☐

3. Nkarenga ahasiniya ☐

4.Omurumo

0.Ninyekozesa emirimo eya mporampora ☐

1.Ndyomusubuzi ☐

2.Ninkorera omushara ☐

3.Ninkozesa emikono ☐

5.Obuturo

0.Omukyaro ☐

1. Omutawuni ninga omusenta ☐

6.Entasya omushiringyi za Uganda ibara kwezi

0.<50,000 ☐

1.50,000-100,000 ☐

☐

2.100,000-200,000

3.>200,000

7.Obukuru bwenda ahakukyebeza enda omurundi gwokubanza

0.0-3 emyezi ☐

1.3-6 emyezi ☐

2.6-9 emyezi ☐

8.Nomurundi gwakangahi okukyebeza enda egyi?

0.gwokubanja ☐

1.gwakabiri ☐

2.gwakashatu ☐

3.gwakana nokugaruja aheiguru ☐

9.Noha orikukyira kukwizusya okumira obujuma bwawe?

0.Tariho ☐

1.Bagyenzi bangye ☐

2.Omusheija wangye narishi abinkutura nabo ☐

Ekyicweka B. EKYORIKUMANYA AHABUJUMA OBURUKUGARUZAMU ESHAGAMA WABA OYINE ENDA

10.Orahurireho ahabujuma oburikugaruzamu eshagama waba oyine enda?

0.Ngaha ☐

1.Ego ☐ Waba wagyira 'Ngaha' gyenda aha namba 16

11.Omukazi wenda ashemerire kuba namira obujuma bwokugarizamu eshagama emirundi engahi?

0. Tindikumanya, ningashi okugarukamu okundi ☐

1.Rimwe buri izoba ☐

12.Nomanya omugasho gwokumira obujuma bwokugarizamu eshagama waba oyine enda?

0.Ngaha ☐

1.Okwerinda okuhwamu eshagama, kwerinda okwitwa eshagama nkye waba oyine enda, kwerinda okujwa munonga ahakuzara, kwerinda okuzara abaana batayikyire, ☐ Kwerinda okuzara abaana bakuremera kiro nkye.

2.Okugarukamu okututagambaho……☐

13.Nokyimanya ngu nobasa kufuna obutaberwagye waba nomira obujuma bwokugarizamu eshagama waba oyine enda?

0.Ngaha ☐

1.Ego ☐

14.Nokorakyi wafuna obutaberwa gye waba nomira obujuma oburikugaruzamu eshagama waba oyine enda?

0.Tindikumanya ☐

1.Nobasa kumira obujuma hamwe nebyokurya,,Nobasa okwemera obutaberwagye, Nobasa kugaruka omwigariro omanyise abashaho, Nobasa kumira waba noja ☐ kubyama

2.Okugarukamu okukutaana nokwaharuguru…….☐

15.Nibumanyishokyi bweshagama kukyendera omukazi yaba ayine enda?

0.Tindikumanya ☐

1.Nabura amaani, Naperuka, omutima nigwehuba, Nategwa omutwe, Nagyira akazengyerera, Naruharuha ☐

2. Okugarukamu okukutaana nokwaharuguru ……. ☐

16.Nibyokurya kyi ebikongyera eshagama omumubiri?

0. Tindikumanya ☐

1.Ekyine, Enyama, Emboga zikwiragura, Emboga zenzuma ☐

2. Okugarukamu okukutaana nokwaharuguru ……. ☐

Ekyicweka C. EBIKUKWATA AHIRWARIRO HAMWE NABASHAHO

17.Hine endijo emibazi eyokumira oyihireho obujuma oburikugaruzamu eshagama?

0.Ngaha ☐

1.Ego ☐

18.Okafuna okumanyisibwa kurukumara kuruga omubashaho ahabikwatirine nokumira obujuma bukugarizamu eshagama waba oyine enda?

0.Ngaha ☐

1.Ego ☐

19.Bakakuhereza obujuma bungahi obwohereruka kukyebeza enda?

0.<15 enjuma ☐

1.= or >15 enjuma ☐

20.Mwine omwanya gwehereire ahorikubasa kubuza ahabikwatirine nenda yawe?

0.Ngaha ☐

1.Ego ☐

21.Hine okorikuhurira kubi wamara kumira obujuma oburikugaruzamu eshagama?

0.Ngaha ☐

1.Ego ☐

22.Korabe wagyira Ego aharuguru, Obujuma nibukuteganisa buta?

0.Esheshemi ☐

1.Ekyaata ☐

2.Amacumu omunda ☐

3.Okugarukamu okurikutaana…… ☐

Ekyicweka D. EMIRA YOBUJUMA OBUKUGARUZAMU ESHAGAMA

23.Enamba yobujuma obwotamizire omukwezi okuhwire

0.0-2 Obujuma ☐

1.3-4 Obujuma ☐

2.5-6 Obujuma ☐

3.7-10 Obujuma ☐

4.10+ Obujuma ☐

24.Ninshonga kyi eziri kukuretera wayebwa kumira obujuma bwawe oburikugaruzamu eshagama?

0. Tihariho Nshonga yona ☐

1. Okwebwa okubumira ☐

2. Okuhurira kubi naheza kubumira ☐

3. Obujuma okuba bwingyi ☐

4. Okuhurira Ndigye ☐

5. Okugarukamu okurikutaana ……☐

Appendix 4. INTERVIEW SCHEDULE FOR HEALTH WORKERS/ANC PROVIDERS

TOPIC OF THE STUDY:

Factors influencing adherence to iron and folic acid supplementations among primigravidas attending antenatal care in Mbarara district, south western-Uganda.

Name of principal investigator: Dr. Ankunda Hector, MPH student, BSU-0786 496 096

Name of health facility……

Level (Tick): **1. HC IV** **2. HC 111**

Ownership (Tick): **1. Gov't** **2. PNFP**

Cadre of key informant (ANC provider) …….

Questions.

1. How many days in a week does your health facility offer antenatal care services to Primigravidas?

   ……..

2. Briefly explain how ANC staff at your health facility offer antenatal care services to primigravidas and their respective cadres.

   ……

   ……

   ……

……

……

3. Can you comment on the stock levels of iron and folic acid tablets in your health facility over the previous one month and how often you experience stock-outs and the measures being taken to avoid such stock-outs.

……

……

……

……

……

……

4. What would you comment about health education provided to primigravidas about iron and folic acid supplements during antenatal care visits? Kindly comment about time taken for each session and how many times it is done for primigravidas in a week and if all ANC providers offer such health education.

……

……

……

……

……

……

5. What would you think are the advantages of taking iron and folic acid supplements during pregnancy?

    a) To prevent iron deficiency anaemia and its complications

    b) To prevent maternal deaths

c) To prevent excessive bleeding at childbirth

d) To prevent preterm deliveries

e) Others;

specify……

……

……

……

…….

6. In your health facility, how many pills of iron and folic acid supplements do you often dispense to mothers?

a) 30 and above

b) <30 pills

7. Does your health facility give iron and folic acid supplements to all Primigravidas throughout pregnancy?

a) Yes

b) No.

If no, what are some of the reasons?

.....

.....

.....

.....

8. Does your health facility have any outreaches that offer antenatal care services?

a) Yes

b) No:

Why……

…….

9. Explain some of the challenges and barriers you encounter as health workers while trying to provide antenatal care services to primigravidas in your health facility?

……

……

……

……

……

……

10. Do you think primigravidas who attend to ANC services in your health facility actually take dispensed iron and folic acid supplementations on a daily basis throughout a month?

a) Yes

b) No

11. If yes to question 10 above, skip to question 12.

If no to question 10 above, what would you think are some of the reasons why such primigravidas do not take iron and folic acid supplementations as prescribed?

……

……

……

……

……

……

……

12. What would you think should be done to ensure primigravidas take iron and folic acid supplementations daily and throughout pregnancy?

……

……

……

……

……

……

Thank you for your time to contribute to the study. God bless you abundantly.

Appendix 5: COVID-19 AND EBOLA RISK MITIGATION PLAN:

Protocol Title: Factors Influencing Adherence to IFAS Among Primigravidas Seeking Antenatal Care in Mbarara District, South-Western Uganda

Principal Investigator: Ankunda Hector.

<u>During community engagements (Before, during and after data collection)</u>

While at meeting sites, hand washing points with detergent soaps will be availed and all the members advised to wash hands as regularly as possible.

Disposable face masks will be availed to members to help in controlling the spread of Covid-19. Any members that will show signs of Covid-19 or Ebola will be advised to seek immediate medical intervention from Mbarara Regional Referral Hospital emergency department.

During data collection.

All study staff will be availed with disposable facemasks and hand sanitizers to ensure good hand hygiene during data collection and interaction with study participants.

At community meetings during dissemination of research findings, each member will be given a face mask and advised to use it properly and consistently.

Any member who will exhibit signs of Covid-19 or Ebola will be advised to seek immediate help from Mbarara Regional Referral Hospital emergency department.

Appendix 6: REC APPROVAL

BISHOP STUART UNIVERSITY

P.O.BOX 9, MBARARA

Tel: 0772 512551

Website: www.bsu.ac.ug

E-mail: rec@bsu.ac.ug/info@bsu.ac.ug

RESEARCH ETHICS COMMITTEE

10/07/2025

To: ANKUNDA HECTOR

0786 496 096/0752 587 584

Type: Initial Review

Re: BSU-REC-2025-498: FACTORS AFFECTING ADHERENCE TO IRON AND FOLIC ACID AMONG PRIMIGRAVIDAS SEEKING ANTENATAL CARE IN MBARARA DISTRICT, SOUTH-WESTERN UGANDA

I am pleased to inform you that at the **38** convened meeting on **19/06/2025**, the Bishop Stuart University (BSU) REC meeting voted to approve the above referenced application.
Approval of the research is for the period of **10/07/2025** to **10/07/2026.**

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 **10/07/2026** 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 Bishop Stuart University (BSU) REC:

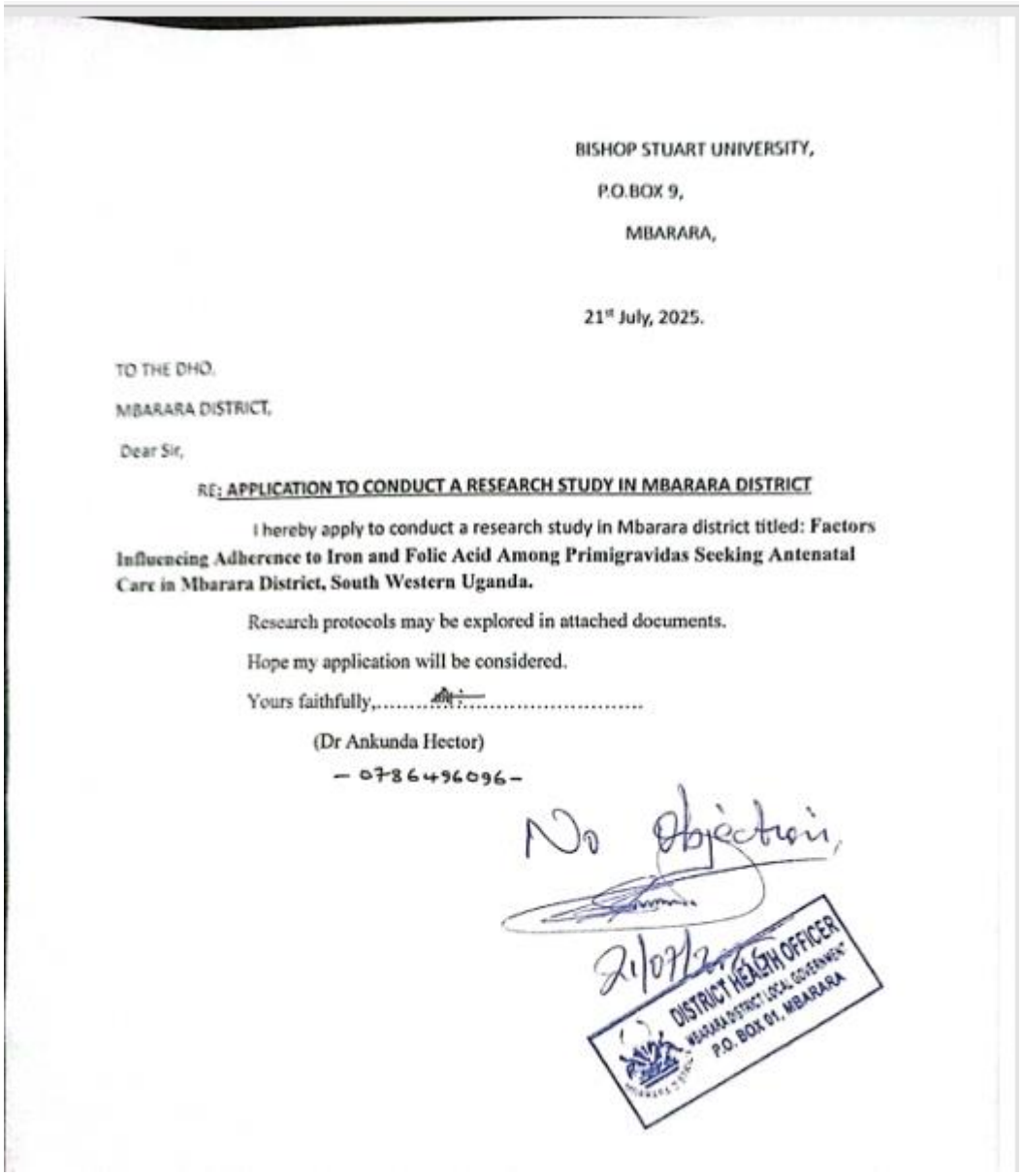
No.	Document Title	Language	Version Number	Version Date
1	Questionnaire-2, Translated version	Runyankore	2	2025-07-09
2	Questionnaire-2, English version	English	2	2025-07-09
3	Letter from faculty	English	2	2025-07-09
4	Protocol	English	2	2025-07-09
5	Protocol	English	2	2025-07-09
6	Translated consent	Runyankore	2	2025-07-09
7	Informed consent form for the recruitment of research participants	English	2	2025-07-09
8	COVID-19 & EBOLA risk management plan	English	2	2025-07-09
9	Community Engagement plan	English	2	2025-07-09
10	Letter from faculty	English	Bishop Stuart University	2025-03-03

Yours Sincerely



Godfrey Rukundo
For: Bishop Stuart University (BSU) REC

Appendix 7: ADMINISTRATIVE CLEARANCE



BISHOP STUART UNIVERSITY,

P.O.BOX 9,

MBARARA,

21st July, 2025.

TO THE DHO.

MBARARA DISTRICT.

Dear Sir,

RE: APPLICATION TO CONDUCT A RESEARCH STUDY IN MBARARA DISTRICT

I hereby apply to conduct a research study in Mbarara district titled: **Factors Influencing Adherence to Iron and Folic Acid Among Primigravidas Seeking Antenatal Care in Mbarara District, South Western Uganda.**

Research protocols may be explored in attached documents.

Hope my application will be considered.

Yours faithfully,.....

(Dr Ankunda Hector)

– 0786496096 –

No Objection,

21/07/2

DISTRICT HEALTH OFFICER
MBARARA DISTRICT LOCAL GOVERNMENT
P.O. BOX 61, MBARARA

Appendix 8: MAP OF UGANDA SHOWING MBARARA DISTRICT



Mbarara District, south western Uganda