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Factors influencing adherence to iron and folic acid among primigravidae seeking antenatal care in Mbarara district, Southwestern Uganda. A cross-sectional study.

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Abstract

Background

This study aimed at determining the factors influencing adherence to iron and folic acid among primigravidae seeking antenatal care in Mbarara district, Southwestern Uganda.

Methods

This was a cross-sectional study done within Mbarara district among primigravidae seeking antenatal care. Proportionate probability sampling and simple random sampling techniques were used to select 172 primigravidae 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 primigravidae.

Results

The proportion of primigravidae attending antenatal care in Mbarara district whose adherence to iron and folic acid supplements 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).

Conclusions

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

Recommendation

Intensive and daily counselling about the importance of iron and folic acid supplements during pregnancy should be done by antenatal care providers, especially to primigravidae who are 30 years of age or older.

Keywords: *Primigravidas, Adherence, Iron and folic acid supplements, Mbarara district.*
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Background

Primigravidas 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

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growing fetus, and increased urinary losses of folic acid by Primigravidas during pregnancy (Balcha et al., 2023; Oiye et al., 2020). Because the fetal neural tube closes by the 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 are the main cost-effective strategy for prevention and control of iron deficiency anemia among primigravidae (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).

Globally, above 25%, that is around 2 billion people, are highly affected by anaemia (WHO,2012). Haemoglobin concentration is often lower in expecting mothers than in non-expecting mothers, which indicates children and expecting mothers are the most-at-risk subpopulations (Balcha et al., 2023; Saragih et al., 2022). 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. (WHO, 2015). There is a growing concern over the increasing burden of poor adherence to iron and folic acid supplements among primigravidae in Mbarara district, and the reasons for this are yet to be known. This study aimed at determining the factors influencing adherence to iron and folic acid among primigravidae seeking antenatal care in Mbarara district, Southwestern Uganda.

Methods

Study design, setting, and study population

This was a cross-sectional study done from May/2025 to June/2025 among primigravidae seeking antenatal care in Mbarara district, south-western Uganda. Mbarara district is located in South-Western Uganda, approximately 269km southwest of Kampala, Uganda's capital city. Health facilities that provide antenatal care in Mbarara district include: Bwizibwera Health Centre IV, Rubindi HC III, Rubaya HC III, and Bubare Health Center III, among others.

Sample size determination

The sample size was determined using the Kish and Leslie formula, denoted as

Where n represented the estimated minimum sample size required,

=1.96 represented the standard normal value corresponding to a 95% confidence interval. **p** represented the estimated proportion of primigravidae adhering to iron and folic acid supplementations. According to a study conducted in Mulago National Referral Hospital, the estimated proportion of primigravidae adhering to iron and folic acid supplements was 11.6% (0.116) (Kiwanuka et al., 2017), **which** represented the margin of error of 5%. 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 primigravidae.

Sampling technique and procedures

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 primigravidae 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 the 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.2.4

Data collection technique and tools.

Eligible primigravidae 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

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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.

Inclusion criteria

The study included selected primigravidae seeking ANC services for the second time or 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.

Exclusion criteria

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

Data collection procedure

Permission to collect data from health facilities was obtained from the Mbarara District Health Officer. The study team then approached heads of health facilities offering antenatal care services in Mbarara district, introduced themselves, gave information regarding the study, and obtained administrative approvals. The researcher approached heads of antenatal care units at particular health facilities that linked us with primigravidae. Informed Consent from Primigravidas was obtained, and data were collected using pretested questionnaires.

Bias

A Primigravida's antenatal card was used to confirm the mother's gravidity and to prove that the Primigravida received iron and folic acid pills on the previous visit. Research assistants were trained and data collection tools pretested, ensuring that they were valid and reliable.

Study variables

Dependent variable

The dependent variable was the adherence level to iron and folic acid supplementation among first-time expectant mothers. This was the adherence level that was determined by considering the number of tablets taken and missed within 30 days before the study. The adherence level was put on a Likert scale as excellent, good, average, poor, and very poor, and later dichotomized as Adherence or No Adherence.

Independent variables

Independent variables were the individual factors and health facility factors associated with adherence to IFAS among first-time expectant 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 is classified on a Likert scale as: Very low knowledge, Low knowledge, Moderate knowledge, Good knowledge, and Very good knowledge.

Data processing and analysis

Data was entered into Excel, cleaned and checked for completeness, and exported to Stata Version 17 for analysis. Data was analyzed using Stata Version 17 at 3 levels: Univariate, Bivariate, and Multivariate analysis.

At the univariate level, descriptive statistics were used to analyze categorical and numerical variables.

For categorical variables, Proportions and frequencies were determined.

For normally distributed numerical variables, the means and standard deviations were analyzed and presented. For non-normally distributed numerical variables, median and interquartile range were determined and presented.

At bivariate analysis, simple binary logistic regression was done to determine factors influencing adherence to iron and folic acid supplements among primigravidae.

In multivariate analysis, all variables that were found with p values less than 0.2 were considered to determine factors independently associated with adherence to iron and folic acid supplements among primigravidae.

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Ethical approval and consent to participate in the study

Ethical clearance was obtained from the Research Ethics Committee (REC) of Bishop Stuart University (BSU-REC-2025-498) on 19/06/2025. Administrative clearance was obtained from the District Health Officer of Mbarara district on 23/06/2025. Participants were asked to voluntarily sign the consent form after being educated by the investigator/research assistant about the study.

Study profile

A total of 172 Primigravidas were enrolled in this study between May and June 2025. Eligible primigravidae 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 1;

Table 1: Number of study participants as per health facility

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**

Results

Participants flow

Of the 176 eligible primigravidae,172 participated in the study, giving a response rate of 97.73%. 4 participants declined to participate in the study due to their spouses' discouragement; their husbands did not approve of their participation in the study. 172 Primigravidas were finally analyzed.

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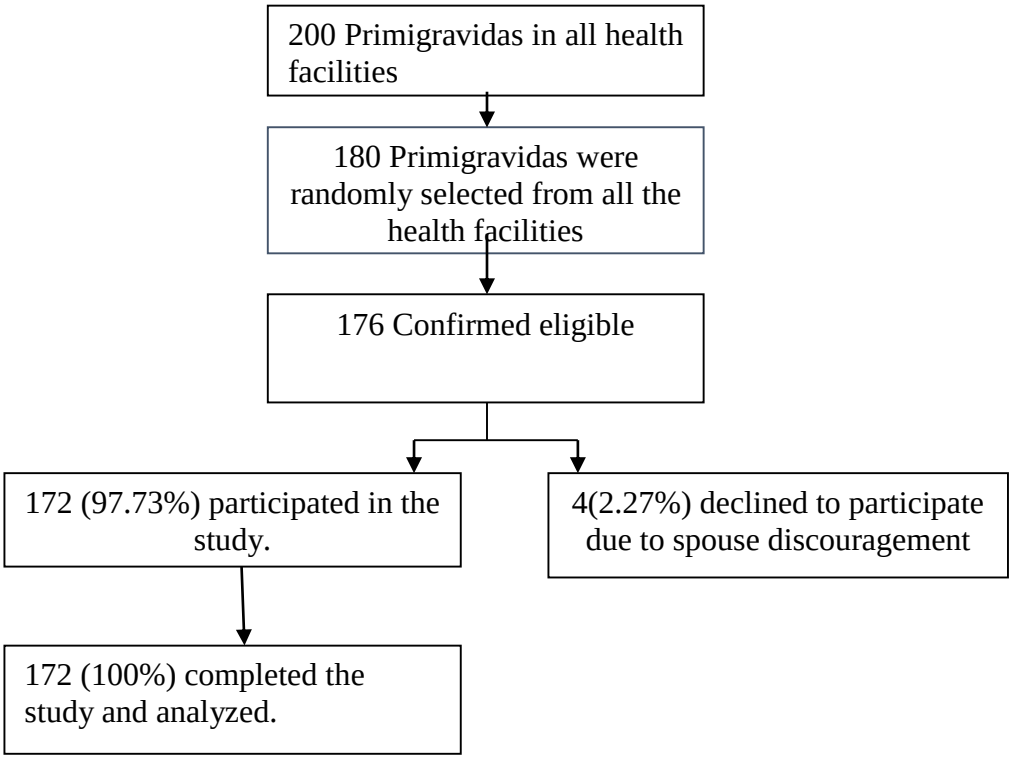
Fig 1: Participants flow.



Characteristics of study participants.

Socio-demographic characteristics of study participants.

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

Characteristics of study participants (Primigravidas)

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Table 2: 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

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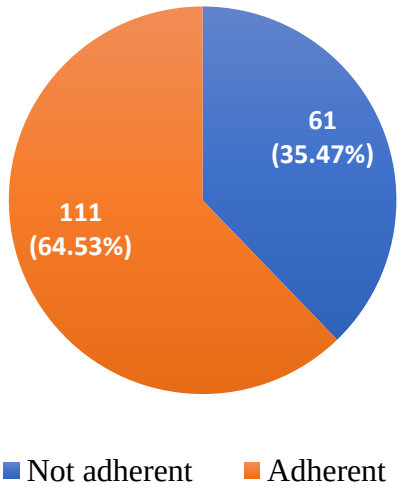
Proportion of Primigravidas with adherence to iron and folic acid supplements among Primigravidas attending ANC in Mbarara district



The proportion of primigravidae 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).

Table 3: Socio-demographic and health system factors influencing adherence to IFAS among primigravidae 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)	Ref		Ref	
Has a reminder to take IFAS						
No	45 (69.23)	54 (50.47)	Ref		Ref	
Yes	20 (30.77)	53 (49.53)	2.56 (1.32-4.97)	0.005	2.81 (1.33-5.92)	0.007 **

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Taking other medications other than IFAS						
No	45(69.23)	90 (84.11)	Ref		Ref	
Yes	20(30.77)	17 (15.89)	0.32 (0.15-0.70)	0.022	0.43 (0.17-1.13)	0.078
Counseled on the importance of IFAS						
No	42 (64.62)	35 (32.71)	Ref		Ref	
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).

Discussion

Primigravida adherence to IFAS

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 before 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 the importance of IFAS during pregnancy, as well as the provision of ANC daily at the health facilities.

A 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; 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). 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 the 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

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of 91% (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 primigravidae had attained at least secondary education, the majority were government employees, and hence these were likely to know the importance of adhering to IFAS, and also considered anyone who took at least 4 tablets per week to have adhered to IFAS.

The current study has found that the prevalence of stunting and wasting is 20.98% and 4.7% respectively.

Socio-demographic factors influencing Primigravida adherence to iron and folic acid supplements

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

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.

Support from a husband, family members, or peers regarding adherence to iron and folic acid supplements

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 who 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). Spouses, family members, and peers often help to remind Primigravidas to take IFAS, hence minimizing 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).

Health system determinants of adherence to iron and folic acid supplements among primigravidae seeking ANC in Mbarara district

Counselling about the importance of iron and folic acid supplements during pregnancy

In this study, the only health system factor associated with Primigravida adherence to IFAS was counselling about the importance of IFAS during pregnancy. Primigravidas who had received counselling from health workers regarding the importance during pregnancy were 4.5 times more likely to adhere to IFAS compared to Primigravidas who did not receive any counselling regarding the 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).

Some studies have identified the number of antenatal care visits attended by a Primigravida as an independent factor that increases adherence to IFAS, since Primigravidas get many sessions of counselling about the 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).

Generalizability of the study findings.

The findings of this study are consistent with findings of previous studies done by other researchers (Gebremichael and Welesamuel, 2020; Lyoba et al., 2020; Seck and Jackson, 2008; Sendeku et al., 2020). These findings may therefore be generalized to Primigravidas with similar demographics. However, the study's focus on Primigravidas coming for their second ANC visit and above might limit the generalizability of these findings to all Primigravidas attending ANC.

Conclusions

The level of adherence to IFAS among Primigravidas attending ANC in Mbarara district is relatively high (6 in every 10 Primigravidas).

Primigravidas who are less than 30 years old, with a reminder to take IFAS and counselling from health workers

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about the importance of IFAS during pregnancy, are more likely to adhere to IFAS.

Limitations of the study.

The level of adherence to iron and folic acid supplements among primigravida was assessed based on participants' self-reports. This could have overestimated the adherence to IFAS.

Recommendations.

The study recommends that intensive and daily counselling about the importance of IFAS during pregnancy be done by Antenatal care providers, especially to primigravidae who are 30 years of age or older.

The findings recommend a qualitative study to be conducted to have an in-depth understanding of why some primigravidae do not take IFAS as prescribed.

Abbreviations

PG	Primigravida
PGs	Primigravidas
IFAS	Iron and Folic Acid Supplements
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

Acknowledgements

Special appreciation to primigravidae who participated in the study.

Conflict of interest.

The authors declare that they have no conflict of interest.

Funding

The study received no funding

Availability of data and materials

The datasets used and/or analyzed during the study will be made available from the corresponding author on reasonable request.

Authors' contributions

AH conceived and designed the study, performed the analysis, and interpreted the data. AJ and MD supervised the design conception, analysis, and interpretation of data, and made critical comments at each step of the research. AH drafted the manuscript. All authors read, reviewed, and approved the final Manuscript.

Privacy protection

The study participants were interviewed in a private consultation room.

Confidentiality.

Participants' names were not used on questionnaires, and information obtained was kept on gadgets with strong passwords.

Competing interests

The authors declare that they have no competing interests.

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