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Adherence to iron and folic acid supplementation and associated factors among mothers receiving antenatal care in Lira district, Uganda

Usaama Ssewankambo[1], Rebecca Nakaziba[2*]

[1]Department of Midwifery, Faculty of Nursing & Midwifery, Lira University, P.O Box 1035 Lira, Uganda. [2]Department of Pharmacology & Therapeutics, Faculty of Medicine, Lira University, P.O Box 1035 Lira, Uganda.

[*]**Corresponding to:** Rebecca Nakaziba, Department of Pharmacology & Therapeutics, Faculty of Medicine, Lira University, P.O Box 1035 Lira, Uganda. E-mail: d2rebecca1@gmail.com.

Author contributions

SU was responsible for conceptualization, methods, data collection, and review of the manuscript; NR was responsible for supervision, manuscript drafting, and review of the manuscript. All authors reviewed and agreed on the final manuscript.

Competing interests

The authors declare no conflicts of interest.

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Abbreviations

IFAS, iron and folic acid supplementation; OR, odds ratio; CI, confidence interval; WHO, World Health Organisation; SSA, sub-Saharan Africa; LRRH, Lira Regional Referral Hospital; ANC, antenatal care; VAS, Visual Analogue Scale.

Citation

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Abstract

Background: Prenatal iron and folic acid supplementation is an economical strategy for reducing iron and folic acid deficiency anemia among expectant mothers in resource-limited countries like Uganda. This study aimed to assess the level of compliance with iron and folic acid supplementation (IFAS) and identify associated factors among mothers receiving prenatal services in Lira district, Uganda. **Methods:** A cross-sectional study was conducted at the antenatal clinic of Lira Regional Referral Hospital, involving 252 pregnant mothers. Adherence levels to IFAS were evaluated using a visual analogue scale, and associated factors were collected through an interviewer-administered questionnaire. The data were analyzed using SPSS software, and the results were presented in tables. **Results**: Only 46% of the mothers attending the antenatal clinic adhered to IFAS during the 30 days preceding the study. Participants who had good knowledge of IFAS before recruitment (odds ratio (OR) 1.49, 95% confidence interval (CI) 1.12–1.97), utilized reminder techniques (OR 1.05, 95% CI 1.02–1.09), and received support from their partners or relatives (OR 1.56, 95% CI 1.07–2.29) were more likely to have good adherence. The main reasons for missing IFAS were forgetfulness and fear of taking too many tablets. **Conclusions:** There was a low adherence rate to IFAS among mothers attending antenatal clinics in Lira district. Further investigations are recommended to identify barriers to adherence, and comprehensive health education programs should be provided to pregnant mothers.

Keywords: adherence; iron and folic acid supplements; pregnant mothers; Uganda

Background

Anemia is a significant global public health concern that has implications for both human health and socioeconomic development [1]. The World Health Organization (WHO) defines anemia as a condition in which the number of red blood cells or their capacity to carry oxygen is insufficient to meet the body's physiological needs [2]. WHO (2011) also proposes that a hemoglobin level less than 120 g/L and 110 g/L for non-pregnant and pregnant women aged 15 years and above respectively indicates anemia [2]. Globally, an estimated two billion individuals are affected by anemia and it is responsible for approximately one million deaths annually [3]. The majority of these deaths, about three-quarters, occur in Africa and Southeast Asia [3]. Furthermore, Nankinga (2019) emphasizes that a significant proportion of women of reproductive age, particularly in developing countries, are greatly affected by anemia [4]. In Africa, approximately 33% of women of reproductive age are affected by anemia [5]. According to the WHO in 2015, the estimated global prevalence of anemia among non-pregnant and pregnant women was 29% and 38%, respectively. In Africa, the estimated proportions were higher, with 37.8% of non-pregnant women and 46.3% of pregnant women being affected by anemia [6]. Among pregnant women, the prevalence of anemia in low-income countries is estimated to be 41%, compared to 21% in developed countries [6]. In Uganda, anemia in pregnancy is estimated to affect approximately 32% of pregnancies, with higher prevalence in the Northern region at 39.4% [7]. To prevent the morbidity associated with iron and folic acid deficiency anemia, the Ministry of Health in Uganda recommends the daily use of oral iron and folic acid supplementation during pregnancy and within six weeks after delivery. Achieving the effectiveness of this medication/intervention requires adherence rates of up to 80% [8].

Poor compliance with iron and folic acid supplementation (IFAS) during pregnancy is a serious public health issue in sub-Saharan Africa (SSA) when compared to developed countries, where adherence rates range from 77% in Denmar to 85% in Sweden [9, 10]. In some SSA countries, adherence rates can be as low as 22% [11–13]. However, the majority of women in SSA countries do not adhere to IFAS during pregnancy due to various factors, including lack of information, inadequate supply of supplements, poor utilization of antenatal care services, fear of side effects, forgetfulness and inadequate counseling on IFAS [14–16].

In Uganda, several studies have consistently reported a low level of adherence to IFAS among pregnant mothers, along with a high prevalence of anemia [17, 18]. This situation poses significant risks to both the mother and the fetus. Iron-deficient mothers often experience symptoms such as breathing difficulties, tiredness, and palpitations, and they face an increased risk of developing perinatal infections and pre-eclampsia. Meanwhile, the fetus may exhibit intrauterine growth retardation, low birth weight, and an elevated risk of mortality [19, 20]. Describing adherence to IFAS and understanding the associated factors among pregnant women is crucial for designing evidence-based interventions. Therefore, the objective of this study was to assess the adherence to IFAS and identify the factors associated with adherence among mothers receiving antenatal care in Lira district, Uganda.

Methods

Study design, setting and participants

This study utilized a cross-sectional, descriptive research design and employed a quantitative approach. The study was conducted among pregnant women in the second and third trimesters who were receiving antenatal care at the antenatal clinic of Lira Regional Referral Hospital (LRRH). LRRH is one of the 13 high-volume regional referral hospitals in Uganda and is located approximately 342 km north of Kampala in Lira city, northern Uganda. It is a public healthcare facility funded by the Uganda Ministry of Health and provides free general care, including both generalized and specialized services. LRRH is also a teaching hospital and is designated as one of the 15 internship hospitals in Uganda. The facility serves a large population of women of reproductive age from the Lira and Lango sub-regions. As part of the antenatal care services, LRRH provides 30 pills of IFAS at no cost to pregnant mothers during each antenatal visit. Additionally, pregnant mothers are given free IFAS tablets and antimalarials for the prevention of anemia and malaria, respectively. The estimated monthly Antenatal Clinic attendance in LRRH is approximately 640 pregnant women.

Sample size

The sample size for this study was determined using Kiesh and Leslie's (1969) formula, which is appropriate for estimating the sample size in a homogenous population. The confidence level in this study was 95%. The study adopted 22.9% as the national adherence as depicted from a study done by Ba and colleagues in 2019 to assess the prevalence of and socio-demographic-economic factors associated with adherence to iron supplementation among pregnant women in 22 countries of SSA, Uganda inclusive [21]. With a power of 80%, and the desired level of precision of 5%, the minimum sample size estimated for the study was 271 participants.

Sampling and study procedures

During the data collection phase, the study employed a non-probability consecutive sampling technique to select participants for the study. The consecutive sampling technique is a sampling technique in which every subject meeting the criteria of inclusion is selected until the required sample size is achieved [22]. This approach was chosen because it is considered to be a more rigorous method compared to convenience sampling, as it helps control sampling bias [23]. By using consecutive sampling, the study aimed to ensure that all eligible participants had an equal opportunity to be included in the study, thus enhancing the representativeness of the sample.

A total of 271 pregnant women were recruited from the antenatal clinic of LRRH. The study specifically approached pregnant women in the second and third trimesters who were receiving care at LRRH. Eligible participants were invited to take part in the study, and the purpose, procedures, and rationale of the research were explained to them. Those who agreed to participate and provided their informed consent were included in the study. The consecutive sampling technique was employed to select the participants in a systematic manner. Data collection was carried out in September 2021, following approval from the Lira University Research and Ethics Committee (No. LUREC-062-20). A well-structured interviewer-administered questionnaire was used to collect data from the eligible participants. Data was collected using a well-structured interviewer-administered questionnaire among qualified participants. Prior to the actual data collection, the questionnaires underwent a pretesting phase to ensure their validity and reliability. This involved administering the questionnaires to a small group of women who were not part of the study sample. The purpose of pretesting was to identify any potential issues or areas of improvement in the questionnaire design. The questionnaire was administered in English language but translated into the local language for some participants who did not understand English. The structure of the questionnaire was adapted from relevant literature, but modifications were made to align it with the specific objectives of this study. The questionnaire aimed to gather information on the participants' adherence levels to IFAS, as well as the factors associated with their adherence.

Section A of the questionnaire focused on collecting socio-demographic characteristics of the participants. This included details such as age, residence, education level and that of their partners, marital status, source of income, gestational age, monthly income level, parity, gravidity and HIV status. These factors were considered relevant for understanding the participants' backgrounds and potential influencing factors related to adherence to IFAS.

Section B required the woman's level of adherence to IFAS using a visual analog scale while Section C obtained data regarding knowledge and factors associated with adherence to IFAS.

Health-system-related factors like the number of antenatal visits the mother had before enrollment (antenatal care (ANC) visits), source of IFAS, taking other daily medications, use of reminder techniques, and support from partner and relatives were scrutinized. In addition, factors such as knowledge of anemia and IFAS, acceptability of IFAS, number of IFAS tablets supplied at the hospital/ pharmacy during the last ANC, and receiving health talks on the usefulness, duration of use, side effects, and management of side effects of IFAS were also probed.

Inclusion and exclusion

This study aimed to include all pregnant women in the second and third trimesters who were receiving antenatal care at the antenatal clinic of LRRH. To be eligible for participation, all participants had to have had an antenatal visit 30 days or more prior to recruitment and be eligible for receiving IFAS during their previous visit.

However, certain individuals were excluded from the study. Women with mental disorders were excluded as their condition may have hindered their ability to provide accurate responses or adhere to IFAS. Additionally, women who were deemed to be very sick at the time of data collection were also excluded, as their health status may have interfered with their participation and accurate reporting.

Data management

After the participants filled out the questionnaire, the data were checked for completeness to ensure that all required information was provided. The data were then coded and entered into a computer using the SPSS version 23 software. During the data cleaning process, inconsistent or invalid data were identified and excluded from the analysis.

The variables measured in this study included the respondent's knowledge of anemia and IFAS, as well as the levels of adherence to IFAS. Additionally, the family's monthly income level was used as a proxy for socioeconomic status. The income categories were defined as follows: a monthly income of less than 500,000 Uganda shillings was considered low socioeconomic status, an income of 500,000 Ugandan shillings and above but less than 1,000,000 Uganda shillings was classified as middle socioeconomic status, and a monthly income of 1,000,000 Uganda shillings or more was considered high socioeconomic status. These categories were used to assess the association between socioeconomic status and adherence to IFAS.

Knowledge of anemia as a reinforcing factor was evaluated in Section C of the questionnaire. Five questions were asked to assess one's level of understanding regarding anemia. Following that, an additional ten questions were posed to gauge the knowledge of respondents regarding IFAS. Responses were scored and summed up. Each correct answer received a score of one, while incorrect answers or "I don't know" were scored as zero. Knowledge scores were determined by calculating the number of correct responses for each respondent and expressing it as a percentage. The percentage scores were then categorized as follows to determine the knowledge levels of the respondents in relation to anemia and IFAS: 70–100% (high knowledge), 40–69% (moderate knowledge), 0%–39% (low knowledge).

The adherence to antenatal IFAS in the last 30 days was evaluated using the Visual Analogue Scale (VAS). The VAS is a self-report adherence measure where an individual is asked to consider a specified period, such as the previous month, and estimate along a continuum the percentage of medication doses (0% to 100%) that they had taken the medication as prescribed [24]. VAS is a simple, cost-effective, and reliable method for assessing medication adherence. It is also less susceptible to response biases compared to relying solely on self-reported recollection of missed doses [25]. Respondents were instructed to self-assess their adherence level on a scale of 0% to 100%, without being observed by the interviewer. Adherence was categorized as follows: good if the respondent scored 90% or higher, partial if the respondent scored less than 90% but equal to or higher than 50%, and poor if the respondent took less than 50% of their prescribed IFAS pills. For analysis purposes, the partially and poorly adherent groups were combined to form the non-adherent group, while the group with good adherence was classified as the adherent group [17].

Statistical methods. The collected data were analyzed using the SPSS data analysis program version 23. The dependent variable in the analysis was adherence to iron and folic acid supplements, while the independent variables were socio-demographic characteristics of the respondents (such as age, gravidity, marital status, total number of antenatal visits, education level, source of income, and gestational age) as well as health-system-related factors. These health-system-related factors encompassed the woman's knowledge of anemia and IFAS, number of tablets dispensed at the hospital pharmacy during the last ANC visit, being reminded to take her IFAS, reliable supply of IFAS, taking other medications, receiving counseling on IFAS among others. Descriptive statistics were employed to provide an overview of the participants, followed by bivariate and multivariate logistic regression analyses using a backward elimination method. The purpose of the regression analyses was to identify the factors that independently associated with good adherence. Factors were considered statistically significant if the p-value was less than 0.05, and the confidence interval (CI) was 95% with an odds ratio (OR) greater than 1.

Results

Socio-demographic characteristics of the participants

Among the 252 respondents of the survey, the majority fell into the age group of 20–24 years, accounting for 110 individuals (43.7%). Approximately 32% of the study participants (81 out of 252) were primigravidae, while 83% (210 out of 252) had completed post-primary education. Regarding socioeconomic status, more than half of the respondents (65.1%) were classified as having a low socioeconomic status (Table 1).

Adherence to IFAS in pregnancy.

Among the participants, 96.4% (243 out of 252) reported that they had missed taking their IFAS at some point during their current pregnancy (Figure 1). The most common reason for missing the medication was forgetting, reported by 145 out of 252 participants (Table 2).

Table 1 Demographic characteristics of study participants

Variable	Number (N = 252)	Percentage (%)
Age		
≤ 19 years	27	10.7
20–24years	110	43.7
25–29years	76	30.2
30–34years	28	11.1
≥ 35 years	11	4.4
Residence		
Rural	179	71.0
Urban	73	29.0
HIV status		
Negative	206	81.7
Positive	46	18.3

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Table 1 Demographic characteristics of study participants (*continued*)

Variable	Number (N = 252)	Percentage (%)
Religion		
Muslim	15	6.0
Catholic	119	47.2
Anglican	82	32.5
Others	36	14.3
Source of income		
Formal employment	31	12.3
Businesswoman	62	24.6
Peasant farmer	39	15.5
Housewife	113	44.8
Other	7	2.8
Level of education		
Primary	84	33.3
Secondary	93	36.9
Tertiary	49	19.4
No formal education	26	10.3
Partner's level of education		
Primary	34	13.5
Secondary	89	35.3
Tertiary	121	48.0
No formal education	8	3.2
Marital status		
Single	2	4.8
Married	228	90.5
Widowed	7	2.8
Divorced/separated	5	2.0
Current gestation age		
First trimester	44	17.5
Second trimester	102	40.5
Third trimester	106	42.1
Gravidity		
Primigravida	81	32.1
Multigravida	171	67.9
Parity		
None	83	32.9
1	48	19.0
2–4	102	40.5
5 and above children	19	7.5
Level of monthly income		
< UGX 500,000 (low status)	164	65.1
UGX 500,000–UGX1,000,000 (middle status)	79	31.3
≥ UGX1,000,000 (high status)	9	3.6

Table 2 Reasons why mothers missed IFAS

Reasons for missing IFAS		Frequency	Percent
Fear of side effects	Yes	30	11.9
	No	222	88.1
Feel IFAS is not important	Yes	13	5.2
	No	239	94.8
No IFAS	Yes	20	7.9
	No	232	92.1
Forgetting	Yes	145	57.5
	No	107	42.5
Too many tablets	Yes	43	17.1
	No	209	82.9

IFAS, iron and folic acid supplementation.

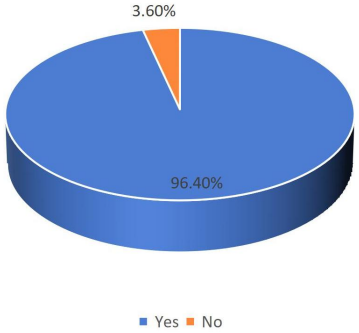


Figure 1 Percentage of mothers who ever missed taking IFAS. IFAS, iron and folic acid supplementation.

Using the VAS, it was found that 46.0% (116 out of 252) of the participants demonstrated good adherence, meaning they had taken 90% or more of the prescribed iron and folic acid supplements over a period of 30 days. Additionally, 26.6% (67 out of 252) had partial adherence, while 27.4% (69 out of 252) had poor adherence (Figure 2). To analyze adherence levels, the partially adherent and poorly adherent groups were combined, forming the non-adherent group, which accounted for 54.0% (136 out of 252) of the study participants (Figure 3).

Health system related factors

93% (235/252) of the study participants reported receiving thirty IFAS tablets during their previous antenatal visit. More than 72% of the participants had attended the antenatal clinic more than three times, and 98.8% had received the tablets free of charge at a government hospital or public health center. A Chi-square test was run to identify the factors that were significant and eligible for bivariate logistic regression analysis. Factors such as knowledge about anemia and IFAS, as well as reminding techniques, among others, were found to be significantly associated with adherence (Table 3).

Bivariate analysis

The significant variables identified in the Chi-square test were further analyzed using binary logistic regression in bivariate analysis to determine their association with adherence to IFAS. The findings revealed that participants who expressed satisfaction with the size, smell, color and packaging of IFAS, as well as those who received health talk counseling on the benefits of IFAS, were more likely to adhere to the medication (Table 4).

Multivariate analysis

To account for confounding factors, multivariate analysis was performed for all variables that exhibited statistical significance at the bivariate level. The results of the analysis indicated that participants who had a good knowledge of IFAS before recruitment (OR 1.49; 95% CI 1.12–1.97), utilized any technique to remind themselves to take their IFAS (OR 1.05; 95% CI 1.02–1.09), and received support from their partner or relatives in taking their IFAS (OR 1.56; 95% CI 1.07–2.29) were more likely to demonstrate good adherence to IFAS (Table 5). It should be noted that these associations were found to be statistically significant at $P < 0.05$ and a 95% CI.

Summary of study findings

The level of adherence to IFAS among women receiving antenatal care in Lira district was found to be low, with only 46.0% demonstrating good adherence. The primary reasons for mothers missing their IFAS intake were forgetting to take the tablets and fear of taking too many tablets. However, certain factors were identified to be associated with improved adherence. Participants who had good knowledge of IFAS before recruitment (OR 1.49; 95% CI 1.12–1.97), utilized any technique to remind themselves to take their IFAS (OR 1.05; 95% CI 1.02–1.09), and received support from their partner or relatives in taking their IFAS (OR 1.56; 95% CI 1.07–2.29) were more likely to exhibit good adherence to IFAS.

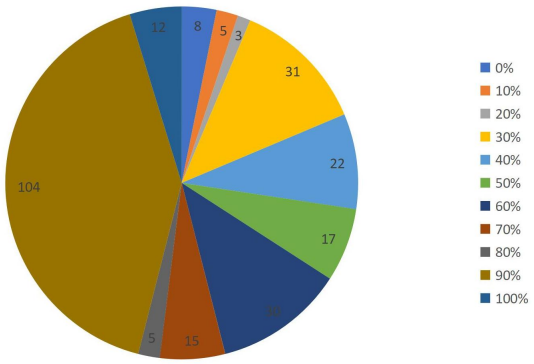


Figure 2 Level of adherence by the Visual Analogue Scale

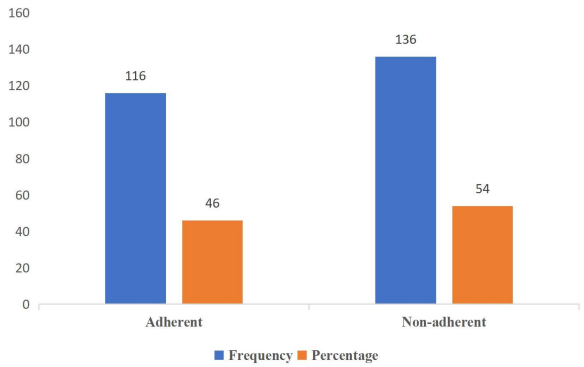


Figure 3 Showing the summary of Adherence from the VAS report analysis. VAS, Visual Analogue Scale.

Table 3 Factors affecting adherence

Variable	Adherence	Non-adherence	Total N (%)	*P*-value
Received IFAS at previous ANC				
Yes	116 (100)	135 (99.3)	251 (99.6)	0.355
No	0 (0.0)	1 (0.7)	1 (0.4)	
Number of IFAS pills received on previous ANC visit				
< 30 pills	4 (3.4)	13 (9.6)	17 (6.7)	0.054[a]
> 30 pills	112 (96.6)	123 (90.4)	235 (93.3)	
Satisfied with the size, color, smell, and packaging of IFAS				
Yes	97 (83.6)	92 (67.6)	189 (75.0)	0.004[a]
No	19 (16.4)	44 (32.4)	63 (25.0)	
Ever experienced the side effects of IFAS				
Yes	20 (17.2)	32 (23.5)	52 (20.6)	0.219
No	96 (82.8)	104 (76.5)	200 (79.4)	
Counseling				
Yes	105 (90.5)	88 (64.7)	193 (76.6)	0.000[a]
No	11 (9.5)	48 (35.3)	59 (23.4)	
Understanding IFAS counseling				
Yes	92 (79.3)	46 (33.8)	138 (54.8)	0.000[a]
No	24 (20.7)	90 (66.2)	114 (45.2)	
Knowledge about anemia				
High knowledge	78 (67.2)	32 (23.5)	110 (43.7)	0.000[a]
Low knowledge	38 (32.8)	104 (76.5)	142 (56.3)	

Table 3 Factors affecting adherence (*continued*)

Variable	Adherence	Non-adherence	Total N (%)	*P*-value
Knowledge about IFAS				
High knowledge	102 (87.9)	18 (13.2)	120(47.6)	0.000[a]
Low knowledge	12 (12.1)	118 (86.8)	132(52.4)	
Source of IFAS				
Government hospital/health centre	116 (100.0)	133 (97.8)	249 (98.8)	0.108
Private clinic/pharmacy	0 (0.0)	3 (2.2)	3 (1.2)	
Number of previous ANC visits				
< 3 visits	22 (19.0)	47 (34.6)	69 (27.4)	0.006[a]
≥ 3 visits	94 (81.0)	89 (65.4)	183 (72.6)	
Reminding techniques				
Yes	69 (59.5)	36 (26.5)	105 (41.7)	0.000[a]
No	47 (40.5)	100 (73.5)	147 (58.3)	
Support				
Yes	98 (84.5)	97 (71.3)	195 (77.4)	0.013[a]
No	18 (15.5)	39 (28.7)	57 (22.6)	
Gestation at start of IFAS				
First trimester	50 (43.1)	54 (39.7)	104 (41.3)	0.722
Second trimester	42 (36.2)	56 (41.2)	98 (38.9)	
Third trimester	24 (20.7)	26 (19.1)	50 (19.8)	
Taking other medications				
Yes	21 (18.1)	29 (21.3)	50 (19.8)	0.523
No	95 (81.9)	107 (78.7)	202 (80.2)	
Accessibility of IFAS				
< 30 minutes	60 (51.7)	59 (43.4)	119 (47.2)	
Between 30 and 60 minutes	31 (26.7)	33 (24.3)	64 (25.4)	0.154
More than 60 minutes	25 (21.6)	44 (32.4)	69 (27.4)	
Reasons for missing				
Side effects	11 (9.5)	19 (14.0)	30 (11.9)	0.273
Too many tablets	10 (8.6)	33 (24.3)	43 (17.1)	0.001
Forgetting	57 (49.1)	88 (64.7)	145 (57.5)	0.013
No drugs	6 (5.2)	14 (10.3)	20 (7.9)	0.134
Not important	0 (0.0)	13 (9.6)	13 (5.2)	0.001

a, significant level for the Chi-square test. IFAS, iron and folic acid supplementation; ANC, antenatal care.

Table 4 Factors associated with adherence to IFAS-bivariate analysis

Variable	Adherence N (%)	Non-adherence N (%)	OR	95% CI	*P*-value
No. of IFAS pills received on previous ANC visit					
< 30 pills	4 (3.4)	13 (9.6)	0.34	0.107–1.067	0.064
30 pills	112 (96.6)	123 (90.4)	1.0		
Satisfied with the size, color, smell, and packaging of IFAS					
Yes	97 (83.6)	92 (67.6)	2.44	1.328–4.489	0.004*
No	19 (16.4)	44 (32.4)	1.0		
Counseling					
Yes	105 (90.5)	88 (64.7)	5.207	2.550–10.630	0.000*
No	11 (9.5)	48 (35.3)	1.0		
Understanding IFAS counseling					
Yes	92 (79.3)	46 (33.8)	7.500	4.230–13.298	0.000*
No	24 (20.7)	90 (66.2)	1.0		
Knowledge about anemia					
High knowledge	78 (67.2)	32 (23.5)	6.671	3.832–11.613	0.000*
Low knowledge	38 (32.8)	104 (76.5)	1.0		
Knowledge about IFAS					
High knowledge	102 (87.9)	18 (13.2)	47.762	22.629–100.810	0.000*
Low knowledge	12 (12.1)	118 (86.8)	1.0		
No. of previous ANC visits					
< 3 visits	22 (19.0)	47 (34.6)	0.443	0.247–0.794	0.006*
≥ 3 visits	94 (81.0)	89 (65.4)	1.0		
Reminding techniques					
Yes	69 (59.5)	36 (26.5)	4.078	2.397–6.939	0.000*
No	47 (40.5)	100 (73.5)	1.0		
Support					
Yes	98 (84.5)	97 (71.3)	2.198	1.172–4.090	0.014*
No	18 (15.5)	39 (28.7)	1.0		

*, significant at bivariate analysis. IFAS, iron and folic acid supplementation; OR, odds ratio; CI, confidence interval; ANC, antenatal care.

Table 5 Factors associated with adherence to IFAS-multivariate analysis

Variable	Unadjusted OR	Adjusted OR	95% CI	*P*-value
Satisfied with the size, color, smell and packaging of IFAS				
Yes	2.44	0.501	0.193–1.302	0.156
No	1.0	1.0		
Counseling				
Yes	5.207	0.719	0.262–1.972	0.521
No	1.0	1.0		
Understanding IFAS counseling				
Yes	7.500	1.495	0.467–4.783	0.498
No	1.0	1.0		
Knowledge about anemia				
High knowledge	6.671	0.640	0.233–1.761	0.388
Low knowledge	1.0	1.0		
Knowledge about IFAS				
High knowledge	47.762	1.490	1.120–1.970	0.000¶
Low knowledge	1.0	1.0		
Number of previous ANC visits				
$<$ 3 visits	0.443	0.717	0.255–2.018	0.529
$\geq$ 3 visits	1.0			
Reminding techniques				
Yes	4.078	1.050	1.020–1.090	0.003¶
No	1.0	1.0		
Support				
Yes	2.198	1.560	1.070–2.290	0.029¶
No	1.0	1.0		

¶, significant at multivariate analysis. IFAS, iron and folic acid supplementation; OR, odds ratio; CI, confidence interval; ANC, antenatal care.

Discussion

Despite the known high prevalence of anemia in pregnancy in low-resource settings and the established effectiveness of antenatal iron and folic acid supplementation, the study findings revealed a disappointing adherence rate of only 46% among the participants (Figure 2, Figure 3). Similar low adherence rates to iron and folic acid supplements have been observed in other studies, such as 12% at Mulago National Hospital and 40.9% in Tigray, Ethiopia [17, 26]. In contrast, higher adherence rates to iron and folic acid supplements have been reported in Sri Lanka at 80.1% and in Tikur, Ethiopia at 63.6% [27, 28]. The adherence to IFAS in this study was very low compared to that reported in other countries. The differences in levels of adherence can be explained by the differing definition of adherence in the studies.

The major reason for non-adherence in the current study was forgetfulness. In fact over 90 % of the respondents had ever missed taking their IFAS (Figure 1). Forgetfulness was also cited as the reason for non-adherence in studies from Sri Lanka and Ethiopia [26, 27]. Forgetfulness might be addressed by introducing strategies such as taking the tablets at a consistent time each day and placing them in a location that is readily accessible.

In the present study, it was observed that mothers with a high level of knowledge about IFAS were more likely to adhere to the IFAS program compared to those with low knowledge levels (Table 3). This finding is consistent with studies conducted in Ethiopia and Tanzania [13, 29]. Counseling sessions that provided information about the benefits, management of side effects, and consequences of not taking IFAS were found to be significant factors associated with good adherence to the IFAS program (Table 3). According to Assefa, Abebe and Sisay, pregnant mothers who receive health education will have the opportunity to appreciate the purpose, dosage, duration, and possible side effects of the supplement [30]. Providing mothers with information about the importance of IFAS through health talks was independently associated with improved adherence. Previous studies have consistently highlighted the importance of providing information to mothers in enhancing the effectiveness of IFAS programs [31]. Patients who have a clear understanding of their medication are more likely to adhere to the prescribed regimen [32]. Health talks during pregnancy serve as a valuable avenue for effectively conveying messages to mothers and promoting adherence to IFAS.

In this study, the use of daily reminders was found to be independently associated with adherence to IFAS. Pregnant mothers who utilized any reminding technique to take their IFAS had higher odds (OR 1.05; 95% CI 1.02–1.09) of adhering to the supplement compared to those who did not use any technique (Table 4). This finding is consistent with a study conducted in the United States of America, which aimed to systematically review the impact of reminders on overall healthcare outcomes [33]. The review demonstrated that reminders were effective in improving patient medication compliance.

The current study found that pregnant mothers who received support from their partners in taking IFAS had higher odds (OR 1.56; 95% CI 1.07–2.29) of adherence compared to those who lacked such support (Table 5). This finding aligns with a study conducted in Tanzania [13]. This can be justified by the partner's role in reminding the mother to take the IFAS and offering support when discomforts due to side effects occur.

Conclusions

In Lira district, the adherence to IFAS among pregnant women attending antenatal care remains low, with only 46% demonstrating good adherence. This low adherence is primarily attributed to forgetfulness and the fear of taking multiple tablets. However, certain factors were found to be independently associated with adherence to IFAS. These factors include having knowledge about IFAS, utilizing reminder techniques, and receiving support from partners or relatives. By providing easily understandable health education counseling that highlights the benefits and side effects of the supplements, pregnant mothers can gain a better understanding of the importance of adherence. Practical reminder techniques, such as setting alarms or taking the pills at a specific time, can also be beneficial. Additionally, the support of partners or relatives can play a crucial role in ensuring adherence to IFAS.

To gain more objective insights and make informed conclusions, further studies should be conducted. These studies can assess adherence by measuring serum concentrations of radiologically labeled IFAS and focus on exploring the underlying factors that contribute to the observed associations.

Overall, improving adherence to iron and folic acid supplements requires a multifaceted approach that includes comprehensive health

education, practical reminders, and social support from partners or relatives. By implementing these strategies, the adherence rates among pregnant women in Lira district can be improved, ultimately leading to better health outcomes for both mothers and infants.

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