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Adherence To Iron and Folic Acid Supplementation and Associated Factors Among Antenatal Care Attendees At General Hospital North Bank, Makurdi, Nigeria.

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ABSTRACT
Introduction: *Iron and folic acid supplementation (IFAS) is an indispensable component of antenatal care because it aids prevent maternal anaemia, reduces the risk of adverse pregnancy outcomes and supports fetal development. However, its effectiveness depends largely on pregnant women's understanding and consistent use of the supplements.*
Objective: *This study assessed knowledge, adherence, and factors associated with iron and folic acid supplementation among antenatal care attendees at General Hospital North Bank, Makurdi, Benue State, Nigeria.*
Methods: *A descriptive cross-sectional survey design was employed among 240 pregnant women attending antenatal care. Respondents were recruited using a consecutive sampling technique. Data were collected through a structured interviewer-administered questionnaire covering sociodemographic characteristics, knowledge of IFAS, adherence practices, and factors influencing supplementation. The instrument demonstrated a Cronbach's alpha reliability coefficient of 0.81. Data were analysed using descriptive statistics, including frequencies, percentages and means with statistical analysis performed using SPSS version 25.*
Results: *The findings indicated generally good knowledge of IFAS among respondents. Participants recognised its importance during pregnancy (mean = 3.0), its role in preventing anaemia (mean = 3.2), and its contribution to fetal development and the prevention of birth defects (mean = 3.3). However, understanding of the recommended dosage and duration was comparatively lower (mean = 2.7). Adherence was generally favourable, particularly regarding daily intake as prescribed (mean = 3.4), continued use even in the absence of illness (mean = 3.3), and completion of the recommended supplementation period (mean = 3.2). Factors associated with adherence included dislike of tablet taste or smell (mean = 3.2), perceived effectiveness of supplementation (mean = 3.3), encouragement from healthcare workers (mean = 3.0), family support (mean = 2.7), and supplement availability (mean = 2.9). Forgetfulness (mean = 2.5) and reported side effects (mean = 2.0) were not prominent barriers.*
Conclusion: *Antenatal care attendees demonstrated favourable knowledge and reported adherence to iron and folic acid supplementation. Nevertheless, additional education on appropriate dosage, duration, and possible side effects, together with improved counselling and reliable supplement availability, is necessary to strengthen adherence.*
Keywords: *Antenatal care, adherence, iron and folic acid supplementation, maternal anaemia, pregnant women, knowledge, associated factors.*

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I. INTRODUCTION

Pregnancy is a physiological period characterised by considerable changes in a woman's body, particularly in nutritional requirements. As pregnancy progresses, the need for essential nutrients increases to support maternal health, fetal growth, placental development and the preparation of the mother's body for childbirth and breastfeeding. Iron and folic acid are particularly important micronutrients during this period because of their assistances to blood formation, cellular development, oxygen transportation and fetal growth (Jouanne et al., 2021; Pascual & Langaker, 2023).

Iron is an essential mineral required for haemoglobin production, which enables red blood cells to transport oxygen throughout the body. During pregnancy, maternal blood volume increases, resulting in a greater demand for iron. When the body's iron requirements are not adequately met, iron deficiency may develop and subsequently results to anaemia. Maternal anaemia is associated with weakness, fatigue, reduced physical capacity, and an increased risk of complications during pregnancy and childbirth (James, 2021). Folic acid, the synthetic form of folate, is another important nutrient required for cell division, DNA synthesis and normal fetal development. Adequate folic acid intake before conception and during early pregnancy is particularly important in reducing the risk of neural tube defects, including spina bifida and anencephaly (Kancherla, 2023).

The World Health Organization recommends daily oral supplementation with 30–60 mg of elemental iron and 400 µg of folic acid during pregnancy to prevent maternal anaemia and improve pregnancy outcomes (WHO, 2024). The recommended supplementation should commence as early as possible during pregnancy and continue throughout the pregnancy period (World Health Organization [WHO], 2020, 2024). The importance of iron and folic acid supplementation extends beyond the prevention of maternal anaemia. Adequate supplementation supports maternal nutritional status and contributes to favourable fetal and neonatal outcomes. Studies has associated appropriate supplementation with reductions in iron deficiency, low birth weight, and other adverse pregnancy outcomes (Mengistu et al., 2023). Furthermore, adequate folic acid intake during early pregnancy helps reduce the occurrence of neural tube defects.

Despite the established benefits of iron and folic acid supplementation, adherence among pregnant women remains a public health concern, particularly in low- and middle-income countries like Nigeria. Evidence indicates that the use of supplements is influenced by several factors, including maternal education, knowledge of supplementation, household income, antenatal care attendance, availability of supplements, family support, and experiences of side effects (Fite et al., 2021; Nisar et al., 2020).

Adherence refers to the extent to which an individual follows the recommended treatment or supplementation instructions provided by healthcare specialists. In the context of pregnancy, adherence to IFAS involves taking the prescribed supplements at the recommended frequency, following the appropriate dosage instructions, and continuing their use for the advised duration. Failure to maintain regular supplementation may reduce the potential benefits of the intervention.

Recent studies have identified different challenges affecting adherence to iron and folic acid supplementation. These include forgetfulness, inadequate counselling, misconceptions about the benefits of supplements, gastrointestinal discomfort, and inconsistent availability of tablets at healthcare facilities. Saeed et al. (2024) reported that antenatal care attendance and knowledge of anaemia were associated with adherence among pregnant women in Eastern Sudan. Similarly, Salifu et al. (2024) identified maternal knowledge and household-related factors as important considerations in supplementation practices.

In Nigeria, maternal anaemia remains an important public health concern. Variations in access to antenatal services, educational opportunities, nutritional practices and household socioeconomic circumstances influence the extent to which pregnant women receive and consistently use recommended supplements. Consequently, assessing adherence at individual healthcare facilities is important for identifying local challenges and developing appropriate interventions.

General Hospital North Bank, Makurdi, provides antenatal services to pregnant women from North Bank and neighbouring communities. Although iron and folic acid supplementation forms part of routine maternal healthcare, the knowledge and practices of pregnant women, as well as the factors influencing their adherence, require continuous assessment.

Understanding these factors can assist healthcare professionals in identifying gaps in maternal health education, improving counselling practices, and strengthening the distribution of supplements. Therefore, this study assessed knowledge, adherence, and factors associated with iron and folic acid supplementation among antenatal care attendees at General Hospital North Bank, Makurdi, Benue State, Nigeria.

II. METHODOLOGY

2*.1 Research Design*

A descriptive cross-sectional survey design was adopted to assess knowledge, adherence, and factors associated with iron and folic acid supplementation among pregnant women attending antenatal care at General Hospital North Bank, Makurdi. This design enabled the collection of information from respondents at a particular period to describe their knowledge, supplementation practices, and experiences.

2.2 Study Area

The study was conducted at General Hospital North Bank, Makurdi, Benue State, Nigeria. The hospital is a secondary healthcare facility situated within Makurdi Local Government Area. It provides various healthcare services, including obstetric and gynaecological care, paediatric services, medical and surgical services, and antenatal care.

The facility serves residents of North Bank and surrounding communities. Its antenatal clinic provides an appropriate setting for examining the knowledge and adherence practices of pregnant women receiving iron and folic acid supplementation.

2.3 Study Population

The study population comprised pregnant women attending antenatal care at General Hospital North Bank, Makurdi, during the study period. The estimated population of pregnant women attending the facility was 600.

2.4 Sample Size Determination

The sample size was determined using the Taro Yamane formula at a 5% margin of error.
The formula is expressed as:
:

$$\boldsymbol{n} = \frac{\mathrm{N}}{\mathbf{1}+\boldsymbol{N}\,(\boldsymbol{e})\mathbf{2}}$$

Where:
$\boldsymbol{n}$ = Sample size
$\boldsymbol{N}$ = Total population size
e = Margin of error (commonly 0.05 for a 95% confidence level)

$$\text{Therefore, } \boldsymbol{n} = \frac{600}{\mathbf{1}+\mathbf{600}\,(\mathbf{0.05})\mathbf{2}}$$

$$\boldsymbol{n} = \frac{600}{\mathbf{2.5}}$$

n = 240
Therefore, 240 pregnant women were included in the study.

2.5 Sampling Technique

A consecutive sampling technique was employed to recruit eligible pregnant women attending the antenatal clinic. Women who met the inclusion criteria were approached during clinic days and recruited consecutively until the required sample size of 240 respondents was obtained.
Eligible participants were pregnant women who attended antenatal care at the facility, had received iron and folic acid supplements for at least one month, and voluntarily consented to participate. Pregnant women who were severely ill at the time of data collection were excluded.

2.6 Instrument for Data Collection

Data were collected using a structured interviewer-administered questionnaire developed in line with the objectives of the study.
The questionnaire consisted of four sections:

- **Section A:** Sociodemographic characteristics of respondents, including age, marital status, educational attainment, employment status, and antenatal care attendance.
- **Section B:** Knowledge of iron and folic acid supplementation, including awareness of its importance, role in preventing anaemia, contribution to fetal development, recommended dosage, duration, and possible side effects.
- **Section C:** Adherence to iron and folic acid supplementation, including regular intake, missed doses, completion of the recommended duration, and compliance with healthcare workers' instructions.
- **Section D:** Factors associated with adherence, including forgetfulness, side effects, tablet taste and smell, family support, healthcare worker encouragement, supplement availability, and perceived effectiveness.

The questionnaire was reviewed by experts in maternal health, public health nursing, and the research supervisor to establish its face and content validity.

2.7 Reliability of the Instrument

A pilot study involving 20 pregnant women at a nearby healthcare facility was conducted to assess the reliability of the questionnaire. The pilot participants were not included in the main study. The instrument produced a Cronbach's alpha coefficient of 0.81, indicating acceptable internal consistency.

2.8 Method of Data Collection

Following ethical approval, the researcher and trained research assistants administered the questionnaires to eligible participants during antenatal clinic sessions. Data collection lasted four weeks. The purpose of the study was explained to participants before questionnaire administration. Informed consent was obtained, and respondents were assured that their participation was voluntary. The study adopted a four-point Likert scale for measuring respondents' ideas on the research items. The response options were weighted as follows:

Response option	Score
Strongly Agree	4
Agree	3
Disagree	2
Strongly Disagree	1

The criterion mean was calculated as: $= \frac{4+3+2+1}{4} = 2.5$

Therefore, a criterion mean of 2.50 was used as the benchmark for decision-making. Any item with a mean score of 2.50 and above was considered as agreement, while any item with a mean score below 2.50 was considered as disagreement.

2.9 Method of Data Analysis

Completed questionnaires were checked for completeness, coded, and analysed using Statistical Package for Social Sciences (SPSS), version 25. Descriptive statistics, including frequencies, percentages and means were used to summarise the respondents' sociodemographic characteristics and responses to the research questions. The results were presented in tables and interpreted according to the study objectives.

2.10 Ethical Considerations

Ethical clearance was obtained from the Research and Ethics Committee of the Department of Nursing Sciences, College of Health Sciences, Rev. Fr. Moses Orshio Adasu University, Makurdi.

The principles of informed consent, voluntary participation, confidentiality, anonymity, and the right to withdraw from the study were observed. Participants were informed about the purpose of the research before providing consent. Information obtained was treated confidentially and used strictly for academic and research purposes.

III. RESULTS

A total of 240 pregnant women participated in the study. Their sociodemographic characteristics are presented in Table 1.

Table 1 Socio-demographic Information of respondents (N=240)

Variables	Frequency	Percentage (%)
Age		
Less than 20 years	12	5
20 – 24 years	38	16
25 – 29 years	44	18
30 - 34 years	82	34
35 years and above	64	27
Marital Status		
Single	0	0
Married	240	100
Divorced	0	0
Widowed	0	0
Educational Level		
No Formal Education	0	0
Primary	14	6
Secondary	183	76
Tertiary	43	18
Employment Status		
Employed	42	18
Self-employed	53	22
Unemployed	145	60

Number of ANC Visits in this Pregnancy		
First	57	24
2 – 3 Times	95	40
More than 3 Times	88	37

*Source: Field survey.*2026

Table 1 shows that the largest age group comprised respondents aged 30–34 years, representing 82 (34.0%) of the participants. This was followed by women aged 35 years and above, accounting for 64 (27.0%). Respondents aged 25–29 years constituted 44 (18.0%), those aged 20–24 years accounted for 38 (16.0%), while 12 (5.0%) were below 20 years. Regarding marital status, all 240 respondents (100.0%) were married. With respect to educational attainment, secondary education was the most common level, reported by 183 (76.0%) respondents, followed by tertiary education with 43 (18.0%) and primary education with 14 (6.0%).

In terms of employment, 145 (60.0%) respondents were unemployed, 53 (22.0%) were self-employed, and 42 (18.0%) were employed. Regarding antenatal care attendance, 95 (39.6%) had attended between two and three times, 88 (36.7%) had attended more than three times, while 57 (23.8%) were attending for the first time during the current pregnancy.

Table 2 Knowledge of Iron and Folic Acid Supplementation

Statement	SA	A	D	SD	X	Remark
I know that iron and folic acid are important for pregnant women.	57	143	26	14	3.0	Agree
I am aware that iron and folic acid prevent anemia in pregnancy.	81	137	18	4	3.2	Agree
Iron and folic acid help in fetal development and reducing birth defects.	82	158	0	0	3.3	Agree
I know the correct dosage and duration of taking iron and folic acid during pregnancy.	51	95	66	28	2.7	Agree
Health workers have educated me on the benefits of iron and folic acid supplements.	71	119	38	12	3.0	Agree
I know the side effects associated with iron and folic acid supplements.	69	107	41	23	2.9	Agree

Source: Field survey 2026

Table 2 indicates that respondents demonstrated favourable knowledge of iron and folic acid supplementation. Knowledge of the role of supplementation in fetal development and reducing birth defects recorded the highest mean score (3.3). Awareness of its importance in preventing anaemia followed with a mean score of 3.2. General awareness of the importance of iron and folic acid during pregnancy and education received from healthcare workers each recorded a mean of 3.0. Knowledge of possible side effects recorded a mean of 2.9, while understanding of the correct dosage and duration of supplementation recorded the lowest mean score of 2.7.

Table 3 Level of Adherence to Iron and Folic Acid Supplementation

Statement	SA	A	D	SD	X	Remark
I take iron and folic acid tablets daily as prescribed.	92	148	0	0	3.4	Agree
I rarely miss my iron and folic acid doses	72	118	40	10	3.1	Agree
I have completed or intend to complete the recommended duration of supplementation.	80	136	20	4	3.2	Agree
I take the supplements even when I do not feel sick.	90	137	13	0	3.3	Agree
I follow the timing instructions given by health workers when taking the supplements.	70	147	23	0	3.2	Agree

Source: Field survey 2026

Table 3 reveals that respondents generally reported favourable adherence to iron and folic acid supplementation. Daily intake of the supplements according to prescription recorded the highest mean score of 3.4. Taking the supplements even when not experiencing symptoms of illness recorded a mean score of 3.3. Similarly, completing or intending to complete the recommended supplementation period and following the timing instructions provided by healthcare workers each recorded a mean score of 3.2.

Table 4. Factors Affecting Adherence to Iron and Folic Acid Supplementation

Statement	SA	A	D	SD	X	Remark
I forget to take the supplements regularly.	42	64	106	28	2.5	Agree
I experience side effects like nausea or constipation when I take them.	10	40	118	72	2.0	Disagree
I dislike the taste or smell of the tablets.	70	147	23	0	3.2	Agree
My family supports and reminds me to take the supplements.	51	95	66	28	2.7	Agree
The health workers encourage and monitor my supplement intake.	71	119	38	12	3.0	Agree
I sometimes run out of the supplements before my next ANC visit.	69	107	41	23	2.9	Agree
I believe the supplements are effective in improving my health and my baby's health.	82	158	0	0	3.3	Agree

Source: Field survey 2026

Table 4 shows that several personal, family-related, and healthcare-related factors were associated with respondents' supplementation practices. Belief in the effectiveness of iron and folic acid supplements in improving maternal and fetal health recorded the highest mean score of 3.3. Dislike of the taste or smell of the tablets recorded a mean score of 3.2. Encouragement and monitoring by healthcare workers recorded a mean of 3.0, while occasional unavailability of supplements before the next antenatal visit recorded a mean of 2.9. Family support and reminders recorded a mean score of 2.7. Forgetfulness recorded a mean score of 2.5, while reported side effects such as nausea and constipation recorded the lowest mean score of 2.0.

IV. DISCUSSION

4.1 Sociodemographic Characteristics of Respondents

The findings revealed that most respondents were aged 30–34 years (34%), and all were married (100%). Most had secondary education (76%), while 60% were unemployed. Regarding antenatal care attendance, 40% had attended ANC two to three times, while 37% had attended more than three times.

The predominance of respondents aged 30–34 years is comparable with the findings of Adekunle et al. (2025) in Ogbomoso, Nigeria, who reported a mean age of 28.78 ± 5.57 years. Similarly, Akomolafe, Hansen, and Rochani (2025) found that maternal age was associated with adherence to the recommended duration of IFA supplementation among pregnant women in Karu, Nasarawa State.

The fact that all respondents were married may provide opportunities for emotional, financial, and practical support during pregnancy. However, marriage alone does not guarantee adherence to IFA supplementation. Regarding education, the high proportion of respondents with secondary education suggests that many may have the ability to understand health information about IFA supplementation. Nevertheless, Adekunle et al. (2025) reported that although awareness of IFA supplementation was high among pregnant women in Ogbomoso, daily adherence was not universal.

The high unemployment rate (60%) may create financial challenges that affect access to supplements and other healthcare services. This observation is consistent with Mare, Aychiluhm et al. (2024), whose study across 35 sub-Saharan African countries identified employment status and household wealth among the factors associated with non-adherence to antenatal iron supplementation.

Furthermore, regular ANC attendance provides opportunities for health education, supplement distribution, and monitoring of adherence. This agrees with Akomolafe et al. (2025), who reported that women attending four or more ANC visits were more likely to adhere to the recommended duration of IFA supplementation. Similarly, Adekunle et al. (2025) found a significant association between ANC attendance and IFA adherence.

4.2 Knowledge of Iron and Folic Acid Supplementation

The study revealed that respondents generally demonstrated favourable knowledge of iron and folic acid supplementation. Most participants recognised the importance of the supplements during pregnancy, their role in preventing maternal anaemia, and their contribution to fetal development and the prevention of birth defects. Knowledge of the benefits of iron and folic acid is essential because pregnant women who understand the purpose of supplementation may be more willing to continue taking the tablets even when they do not experience immediate symptoms. Iron supports haemoglobin production, while folic acid contributes to normal cellular development and helps prevent neural tube defects.

The findings are consistent with the importance of maternal nutritional education emphasised in the WHO recommendations on antenatal care and iron and folic acid supplementation (WHO, 2024). However, knowledge of the recommended dosage and duration of supplementation recorded a comparatively lower mean score of 2.7. Similarly, knowledge of possible side effects recorded a mean of 2.9. These findings suggest that awareness of the general benefits of supplementation may be better established than knowledge of specific instructions for its use.

This observation is important because knowledge of the benefits alone may not be sufficient to ensure appropriate supplementation practices. Pregnant women also need clear information about the recommended dosage, timing, duration, and appropriate responses to possible side effects. The findings can be compared with those of Roche et al. (2021), who highlighted the importance of addressing knowledge-related barriers and strengthening counselling strategies to improve supplementation practices among women in low- and middle-income countries.

Therefore, regular antenatal health education should go beyond explaining the benefits of iron and folic acid. It should also provide practical instructions on how to take the supplements, how long to continue them, and when to consult healthcare professionals about difficulties experienced during use.

4.3 Level of Adherence to Iron and Folic Acid Supplementation

The study found that respondents generally reported favourable adherence to iron and folic acid supplementation. Daily intake according to prescription recorded the highest mean score of 3.4, while taking supplements even in the absence of illness recorded a mean of 3.3. The findings further showed that respondents generally intended to complete the recommended supplementation period and follow the timing instructions provided by healthcare workers. These responses indicate that participants recognised the importance of regular supplementation as part of antenatal care.

The favourable adherence pattern may be associated with the respondents' awareness of the benefits of supplementation and their contact with healthcare professionals during antenatal visits. Continuous interaction with healthcare workers provides opportunities for counselling, clarification of misconceptions, and reinforcement of recommended maternal health practices.

Nevertheless, the findings differ from those reported by Mengistu et al. (2023), who observed that only 44.3% of pregnant women in their study complied with the recommended iron and folic acid supplementation regimen. Differences in study populations, healthcare settings, participant characteristics, and adherence measurement methods may contribute to the variation between the findings. Similarly, Salifu et al. (2024) reported a relatively low adherence level of 35.5% among pregnant women in a pastoral population in Ghana. Their study identified household socioeconomic circumstances and maternal knowledge as important factors associated with supplementation practices. The favourable responses observed in the present study suggest that pregnant women attending General Hospital North Bank may have developed positive supplementation practices.

4.4 Factors Associated with Adherence to Iron and Folic Acid Supplementation

The study identified several factors associated with adherence to iron and folic acid supplementation, including perceived effectiveness, tablet taste and smell, family support, healthcare worker encouragement, and supplement availability. Belief in the effectiveness of supplementation recorded the highest mean score of 3.3. This suggests that respondents generally understood that iron and folic acid supplements contribute to maternal and fetal health. Positive perceptions of treatment effectiveness may encourage pregnant women to continue supplementation even when they do not immediately notice physical changes.

Dislike of the taste or smell of the tablets also recorded a relatively high mean score of 3.2. This finding suggests that the physical characteristics of supplements may influence their acceptability. Where women find tablets unpleasant to consume, they may experience reduced willingness to take them consistently. Healthcare workers should therefore encourage women to discuss difficulties associated with the supplements rather than discontinue them without professional guidance.

Family support recorded a mean score of 2.7, indicating that family members may contribute to supplementation practices through encouragement and reminders. Supportive household relationships can help pregnant women maintain positive health behaviours and attend scheduled antenatal appointments. The role of

healthcare workers was also evident, with encouragement and monitoring recording a mean score of 3.0. This finding reinforces the importance of effective communication between healthcare providers and pregnant women. Counselling during antenatal visits should include explanations of the benefits of supplementation, instructions on correct use, and opportunities for women to discuss any challenges.

The occasional unavailability of supplements before the next antenatal visit recorded a mean score of 2.9. This finding suggests that access to supplements may remain a practical concern for some participants. Even when pregnant women understand the benefits of supplementation and are willing to comply, interruptions in the supply of tablets may affect continuity of use. The results are consistent with Saeed et al. (2024), who identified antenatal care attendance and knowledge of anaemia as factors associated with better adherence among pregnant women in Eastern Sudan. Their findings further emphasise the importance of health education and consistent engagement with antenatal services. Yismaw et al. (2022) also reported an association between educational attainment and adherence to iron and folic acid supplementation, suggesting that educational opportunities may influence women's ability to understand and follow supplementation instructions.

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