Editon Consortium Journal of Research in Medical and Health Sciences [ISSN: 2789 - 4878]

Issue no: 1 | **Vol no:** 5 | **May** 2025: 1-12

Determinants of the Level of Adherence to Iron and Folic Acid Supplements among Antenatal Mothers Attending Ruiru Level 4 Hospital, Kiambu County, Kenya

Tabitha Wambui [(1)]
John Kariuki [(2)]
Esther Mate [(3)]
Isaac Nthiga [(4)]

(1.2.3) Mount Kenya University, Kenya; (4) Kabarak University, Kenya
Main author email: **tabithakinuthia84@gmail.com**

Article History
Received: 2025-03-27
Accepted: 2025-04-28
Published: 2025-05-28

Cite this article in APA
Wambui, T., Kariuki, J., Mate, E. & Nthiga, I. (2025). Determinants of the level of adherence to iron and folic acid supplements among antenatal mothers attending Ruiru Level 4 Hospital, Kiambu County, Kenya. *Editon consortium journal of research in medical and health sciences, 5*(1), 1-12. https://doi.org/10.51317/ecjrmhs.v5i1.588

Abstract
This article examines the determinants of adherence to iron and folic acid supplementation (IFAS) among antenatal mothers attending Ruiru Level Four Hospital in Kiambu County, Kenya. Despite global and national recommendations for daily IFAS during pregnancy, adherence rates remain low in many settings, contributing to maternal anaemia and poor pregnancy outcomes. A cross-sectional analytical study was conducted among 241 antenatal mothers systematically selected from the hospital's antenatal clinic. Data were collected using semi-structured, researcher-administered questionnaires. Adherence was assessed using the Morisky Medication Adherence Scale (MMAS-8), which classifies scores as low (<6), moderate (6–7), and high (=8) adherence. The mean MMAS adherence score was 5.95 ± 1.34, indicating moderate adherence. Most participants (55%) had moderate adherence, 39 per cent had low adherence, and 6 per cent had high adherence. The mean age of respondents was 25.74 ± 4.99 years, and the average number of pregnancies was 1.72 ± 0.79. Statistically significant predictors of adherence included level of education (p = 0.005), knowledge of IFAS (p = 0.036), number of antenatal care visits (p = 0.023), and receiving counselling on IFAS (p = 0.011). Age, marital status, and income were not significant predictors. Improving adherence to IFAS requires strengthening maternal education, enhancing counselling during antenatal visits, and promoting regular ANC attendance. These strategies can improve adherence, reduce maternal anaemia, and enhance pregnancy outcomes.

Key words: Adherence, antenatal care, folic acid, iron, supplementation.

INTRODUCTION

Iron and folic acid supplementation (IFAS) is a critical intervention for preventing iron deficiency anaemia and ensuring maternal and foetal health during pregnancy. However, despite global recommendations, adherence to IFAS remains low in many regions, including Kenya. Low adherence to IFAS undermines the potential health benefits, contributing to the persistence of maternal anaemia and associated complications such as preterm births, low birth weights, and even maternal mortality. In Kenya, where anaemia in pregnancy is a major public health issue, addressing the problem of IFAS adherence is crucial to improving maternal health outcomes.

Adherence refers to the extent to which pregnant women follow the prescribed iron and folic acid supplementation regimen as advised by healthcare providers. Iron and folic acid supplementation (IFAS) involves the daily intake of iron and folic acid tablets to prevent or treat deficiencies that could lead to anaemia and other pregnancy-related complications. These key interventions are aimed at reducing the risks of maternal anaemia, ensuring foetal development, and preventing other associated health issues during pregnancy.

Anaemia during pregnancy is a significant global health issue, affecting approximately 41.8 per cent to 43.8 per cent of pregnant women worldwide. Africa bears the highest burden, with the prevalence reaching 61.3 per cent (Kamau et al., 2018). In Kenya, the prevalence of anaemia among pregnant women is reported to be 55.1 per cent, according to the Kenya Demographic and Health Survey 2022 (KNBS, 2023). This high prevalence contributes to poor maternal and foetal health outcomes, including maternal mortality (10%) and perinatal deaths (20%) (Mulambah et al., 2014). During pregnancy, the body's demand for iron increases due to the expanded blood volume and the growing foetus, making dietary intake of iron and folic acid insufficient to meet these heightened needs. This leads to iron deficiency anaemia, a prevalent condition affecting pregnant women worldwide (Boti et al., 2018). Addressing the issue of anaemia through interventions like IFAS is essential for improving pregnancy outcomes in the country.

The World Health Organisation (WHO) recommends that all pregnant women receive daily iron and folic acid supplementation to reduce the risk of anaemia. In response to this global guidance, the Kenyan government has implemented several strategies, including the distribution of IFAS tablets and the inclusion of IFAS in national essential drug lists. The Ministry of Health aimed to achieve 80 per cent coverage of IFAS by 2017, though this target has yet to be fully realised (World Health Organisation, 2018). Despite these efforts, adherence to IFAS remains suboptimal, limiting the effectiveness of these interventions in reducing maternal anaemia and improving pregnancy outcomes.

Low adherence to IFAS continues to be a barrier to improving maternal health outcomes. Studies conducted in other regions, such as western Uganda, have shown that only 22.37 percent of pregnant women adhered to their prescribed IFAS regimen (Nimwesiga et al., 2021), and a similar study in Thika Hospital, Kiambu County, Kenya, reported an adherence rate of 24.5 percent (Kamau et al., 2018). However, research specifically exploring the factors influencing IFAS adherence within Kiambu County is limited. Factors such as maternal education, knowledge of IFAS, frequency of antenatal care visits, and counselling on IFAS could significantly influence adherence rates. Understanding these local determinants is crucial for improving adherence to IFAS in the region.

This study aims to examine the determinants of adherence to IFAS among antenatal mothers attending the antenatal clinic at Ruiru Level Four Hospital in Kiambu County, Kenya. The research will focus on key factors that may influence adherence, such as maternal education, knowledge of IFAS, antenatal care visit frequency, and counselling. By identifying the barriers to adherence, the study will provide recommendations for improving IFAS uptake, ultimately contributing to a reduction in maternal anaemia and improved pregnancy outcomes in the region.

LITERATURE REVIEW

Rate of Adherence to Iron and Folic Acid Supplementation

Globally, adherence to iron and folic acid supplementation (IFAS) during pregnancy remains suboptimal, especially in low- and middle-income countries. Pregnant women in many parts of the world fail to meet the recommended intake of IFAS, contributing to high rates of maternal anaemia and

adverse birth outcomes (Fite et al., 2021). In sub-Saharan Africa, the challenge is more pronounced due to systemic barriers and health inequalities. A meta-analysis by Kamau et al. (2018) reported wide variation in adherence rates across the region, ranging from as low as 10.6 per cent in Kenya to as high as 79 per cent in Mozambique, highlighting the inconsistency and need for targeted public health strategies.

Socio-Demographic and Economic Characteristics

Socio-demographic and economic factors significantly influence IFAS adherence. Age is one such factor; women aged 20–29 tend to have higher adherence levels compared to teenagers or older mothers (Tarekegn et al., 2019; Appiah et al., 2020). Marital status also plays a role, with studies consistently showing higher adherence among married women, possibly due to increased emotional and financial support (Appiah et al., 2020; Wemakor, 2019). Education level is a well-established determinant, with higher education being positively associated with knowledge and compliance with supplementation guidelines (Kamau et al., 2018; Sendeku et al., 2020). Employment status has also been linked to adherence, with employed women demonstrating greater access to health services and a better understanding of IFAS benefits (Lyoba et al., 2020; Appiah et al., 2020). These patterns are reflected in Kenya, where disparities in education and employment among pregnant women contribute to low adherence rates.

Maternal Factors

Maternal knowledge and obstetric history are key predictors of adherence to IFAS. A lack of knowledge about anaemia and the benefits of IFAS is common across sub-Saharan Africa and particularly prevalent in Kenya, where awareness campaigns often fail to reach all segments of the population (Appiah et al., 2020; Lyoba et al., 2020). Kamau et al. (2018) and Digssie Gebremariam et al. (2019) emphasise that pregnant women with a greater understanding of anaemia and its consequences are more likely to comply with supplementation. Obstetric factors such as parity, timing of antenatal care (ANC) initiation, and the frequency of ANC visits also influence adherence. Primigravidas (first-time mothers) tend to adhere more strictly than multigravidas, possibly due to greater caution and adherence to medical advice (Nimwesiga et al., 2021). Early initiation of ANC in the first trimester is associated with improved adherence, as is attending at least four ANC visits, which increases the chances of receiving continuous counselling and supply of supplements (Nasir et al., 2020; Gebremariam et al., 2019).

Health Facility Factors

The structure and functioning of health facilities directly impact IFAS adherence. Adequate counselling and follow-up by healthcare providers are essential in improving supplement uptake (Kamau et al., 2018). Many women fail to adhere due to insufficient information on the benefits of IFAS and fear of side effects, which could be mitigated through better communication at health facilities (Lyoba et al., 2020). In Kenya, supply chain challenges and stock-outs remain a persistent problem, especially in rural or resource-constrained settings. Even when women are willing to adhere, the lack of consistent access to supplements reduces overall compliance (Lyoba et al., 2020).

Relationship between Various Factors and Adherence

The interplay between socio-demographic, maternal, and health facility factors shapes the overall adherence landscape. Women with higher educational levels, who initiate ANC early, and who have better knowledge of anaemia and IFAS tend to adhere more consistently (Nasir *et al.*, 2020; Fite et al., 2021). These relationships are well-documented in both regional and Kenyan studies. Counselling by healthcare providers further enhances adherence, especially when delivered early and consistently during ANC visits (Kamau et al., 2018). Improving one or more of these determinants could significantly enhance IFAS uptake, particularly in settings like Kenya, where adherence remains critically low.

Theoretical Framework

This study adopts the Health Belief Model (HBM), developed by Rosenstock and Hochbaum in 1974, to explain the behavioural dynamics influencing adherence to IFAS. The HBM posits that individual health actions are shaped by perceived susceptibility, severity, benefits, and barriers. In the context of IFAS adherence, perceived severity of anaemia, perceived benefits of taking supplements, and perceived barriers such as side effects or unavailability, all play roles in shaping whether a pregnant woman adheres to supplementation.

The model is applicable across settings, but especially relevant in Kenya, where awareness, access, and trust in health systems vary widely.

METHODOLOGY

This study adopted a cross-sectional analytical design, appropriate for identifying associations between variables within a limited timeframe. While this design is effective for estimating prevalence and exploring relationships, it does not permit causal inference. The study was conducted at Ruiru Level Four Hospital (RL4H), the primary public health facility in Ruiru Sub-County, one of twelve sub-counties in Kiambu County, Kenya. The location was purposively selected due to its central role in maternal service delivery and because Ruiru Sub-County recorded the highest incidence of anemia among pregnant women in Kiambu County in 2019 (Odhiambo & Sartorius, 2020).

The sample size was determined using Cochran's formula (1963), as cited by Fisher et al. (1998), yielding a target of 253 antenatal mothers. Hospital records estimated that approximately 720 antenatal clients would visit the facility during the data collection period. Systematic sampling was used to select participants. A sampling interval (k) of 3 was calculated by dividing the population (720) by the sample size (253). Every third eligible antenatal mother was selected until the target sample was reached. Inclusion was limited to women attending their second or subsequent antenatal care (ANC) visit to ensure that they had already received iron and folic acid supplementation (IFAS) and were thus eligible for an assessment of adherence. A total of 241 women participated in the study, resulting in a 95.3 per cent response rate.

Data were collected using a semi-structured, interviewer-administered questionnaire designed to capture socio-demographic characteristics, knowledge of IFAS, maternal factors, and health service-related influences. The tool was piloted on 24 antenatal mothers at Igegania Level Four Hospital to ensure clarity and reliability.

Adherence to IFAS was measured using the Morisky Medication Adherence Scale (MMAS-8), a validated eight-item instrument commonly used in adherence studies. The scale includes questions addressing both intentional and unintentional non-adherence, with binary responses ("Yes"/"No") scored to yield a total between 0 and 8. A score of 8 indicated high adherence, 6–7 moderate adherence, and below 6 low adherence (Cuevas & Pe, 2015).

Descriptive statistics summarised participant characteristics and adherence levels. Inferential statistics, including chi-square tests and logistic regression, were employed to explore associations between IFAS adherence and variables such as socio-demographic, maternal, and health service-related factors. A p-value < 0.05 was considered statistically significant at a 95 per cent confidence level.

Ethical approval was obtained from the Mount Kenya University Research and Ethics Committee, and a research permit was granted by the National Commission for Science, Technology and Innovation (NACOSTI). Additional approvals were obtained from the Mount Kenya University Graduate School and Ruiru Level Four Hospital. All participants provided written informed consent, and confidentiality was maintained throughout the study.

RESULTS AND DISCUSSION

The Level of Adherence to IFAS by Study Participants

The average adherence score, as measured by the Morisky Medication-Taking Adherence Scale (MMAS), was 5.95 ± 1.34, with scores ranging from 2 to 8. According to the MMAS interpretation guidelines (Cuevas & Pe, 2015), a score below 6 indicates low adherence, scores between 6 and 7 indicate moderate adherence, and a score of 8 indicates high adherence. A total of 241 participants were assessed. Of these, 133 (55 per cent) demonstrated moderate adherence, 94 (39 per cent) had low adherence, and 14 (6 per cent) achieved high adherence (Figure 1).

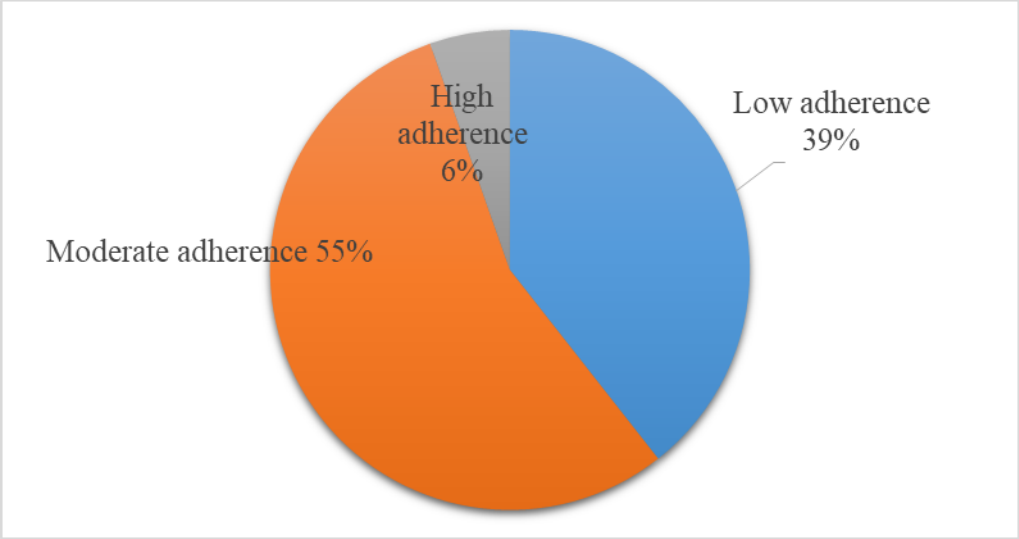

Figure 1: Level of Adherence to IFA Supplementation

The Socio-Demographic and Economic Characteristics of Antenatal Mothers at ANC at RL4H

The mean age of the study participants was 25.74 ± 4.99 years. Nearly half (45.6%) of the respondents were in the age bracket of 20–24 years, followed by those aged 25–29 years (29.9 %). A smaller proportion fell within the age groups 30–34 years (15.4%), 35–40 years (5.4%), and 15–19 years (3.7 %). Regarding marital status, the majority of the respondents were married (80.5%), while 17.4 per cent had never married. A small proportion were either separated or divorced (1.7%), and 0.4 per cent were widowed.

In terms of education, most of the participants had attained secondary education (58.5%), followed by college-level education (21.2%). Others had completed primary education (14.5%), university education (5.4%), and a very small percentage had attended pre-primary or nursery school (0.4%). Concerning occupation, 34.6 per cent of the women reported being unemployed, while 33.8 per cent were engaged in business activities. Additionally, 20.8 per cent were salaried workers, 6.3 per cent were housewives, and 4.6 per cent were casual labourers. In terms of average monthly income, the highest proportion of participants (48.6%) earned between Ksh. 11,000 and 20,000. Meanwhile, 20.8 per cent reported earning between Ksh. 6,000 and 10,000, and 17.0 per cent earned below Ksh. 6,000. Only 13.7 per cent earned above Ksh. 20,000 (Table 1).

These socio-demographic and economic characteristics provide important context for interpreting the adherence levels to IFAS, as they may influence health-seeking behaviour, access to services, and understanding of health information.

Table 1: Socio-Demographic and Economic Characteristics of Antenatal Mothers

Characteristics	Categories	N (241)
Age group	15 - 19	9 (3.7%)
	20 - 24	110(45.6%)
	25 - 29	72(29.9 %)
	30 - 34	37(15.4 %)
	35 - 40	13(5.4 %)
Marital status		
	Separated/Divorced	4(1.7%)

	Never married	42(17.4%)
	Widowed	1(0.4%)
	Married	194(80.5%)
Education level		
	Nursery/kindergarten	1(0.4%)
	Primary	35(14.5%)
	Secondary	141(58.5 %)
	College	51(21.2%)
	University	13(5.4 %)
Occupation		
	Casual labour	11(4.6 %)
	Labour (salaried)	50(20.8 %)
	Business	81(33.8%)
	Unemployed	83(34.6 %)
	Housewife	15(6.3 %)
Average monthly income		
	less than 6,000	36(17.0 %)
	6,000 - 10,000	44(20.8 %)
	11,000 - 20,000	103(48.6 %)
	21,000 - 50,000	29(13.7 %)

Maternal and Health Facility Factors Affecting the Level of Adherence to IFAS

The current study revealed that the mean knowledge score of IFAS among the study respondents was 72.13 ± 14.8, ranging from 21 per cent to 98 per cent. To better understand this distribution, the respondents were categorised into three levels of knowledge based on their scores: low knowledge (<50%), moderate knowledge (50–74%), and high knowledge (≥75%), as guided by Hammouh et al. (2023). The findings showed that most antenatal mothers (56%) exhibited high knowledge of IFAS. This was followed by 35 per cent who demonstrated moderate knowledge and 9 per cent who had low knowledge (Figure 2).

This level of awareness is promising, as knowledge is an essential foundation for adherence, influencing attitudes, decision-making, and ultimately, uptake of supplementation during pregnancy.

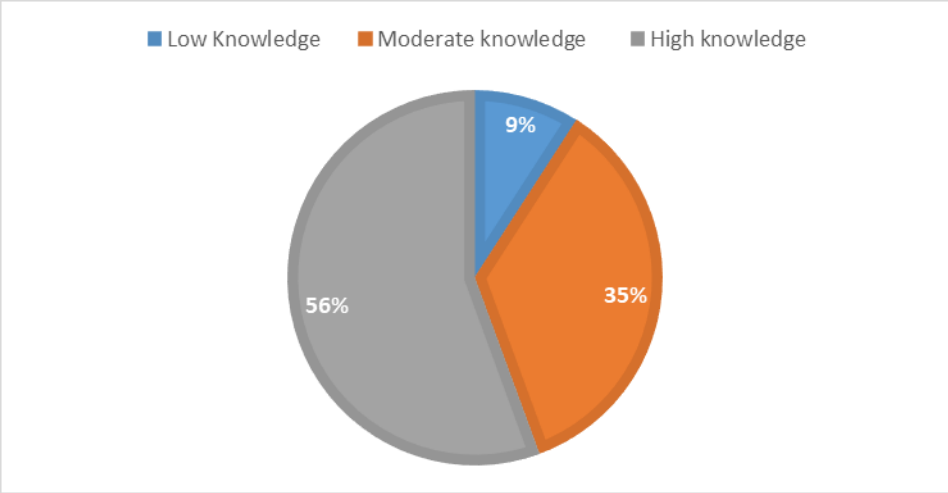

Figure 2: Level of Knowledge on IFAS

A closer examination of specific aspects of knowledge revealed that 86.3 per cent of the participants knew where to obtain iron and folic acid supplements, and 88 per cent were familiar with their general benefits. However, awareness of the importance of these nutrients for foetal growth was lower, at 68 per cent, and only 46.5 per cent had come across information about folic acid's role in preventing certain birth defects. This suggests that although the broader purpose of IFAS is well recognised, understanding of its critical roles in early pregnancy development remains limited.

Regarding anaemia-related knowledge, 79.7 per cent of respondents had heard of the condition, and 78.4 per cent understood that IFAS could prevent it. Additionally, 82.6 per cent could identify its signs and symptoms, 76.8 per cent recognised its effects on pregnant women, and 73.9 per cent were aware of the consequences for the baby (Table 2). These insights highlight that knowledge about the risks and symptoms of anaemia is relatively widespread among pregnant women.

Together, these findings underscore the importance of reinforcing specific health messages during antenatal visits, particularly those related to early pregnancy outcomes and congenital defects. Strengthening this knowledge may further support the uptake of IFAS among pregnant women.

Table 2: Aspects of Knowledge on IFAS

S/No	Aspect of knowledge	PERCENTAGE N = 241
1.	Knew where iron and folic acid supplements could be obtained from	208 (86.3%)
2.	Knew the benefits of IFAS	212(88%)
3.	Knew iron and folic acid are necessary for foetal growth during Pregnancy	164(68%)
4.	Those who had heard or read that taking vitamin folic acid can prevent some birth defects?	112(46.5%)
5.	The reason why some health experts recommend taking folic acid	146(60.6%)
6.	Heard about anaemia?	192(79.7%)

7.	Knew that IFAS prevent anaemia	189(78.4%)
8.	The signs/symptoms of anaemia?	199(82.6%)
9.	Knew anaemia have consequences to pregnant mother?	185(76.8%)
10.	Knew anaemia have consequences to the baby?	178(73.9)

The findings revealed that 46.9 per cent of the respondents were primigravida, with the average number of pregnancies being 1.72 ± 0.79. This suggests that a significant portion of the sample were first-time mothers, which is important for targeting educational interventions, especially for new mothers who may require more guidance on pregnancy care. The timing of the first antenatal care (ANC) visit showed that most mothers (63.4%) believed it should occur between the 4th and 6th months, while the actual timing indicated that 61.8 per cent initiated their first ANC in the second trimester, and 34 per cent in the first trimester. This highlights a gap between knowledge and practice, as timely initiation of ANC during the first trimester is crucial for early detection and management of pregnancy-related health risks. Health promotion campaigns should continue to emphasise the importance of early ANC visits, particularly within the first trimester, to optimise maternal and foetal health outcomes.

Regarding the number of ANC visits, the study revealed that while most participants (67.7%) recommended attending 4–8 ANC visits, the average number of visits attended was higher (3.48 ± 1.51), indicating good adherence to the recommended frequency. This is a positive finding, as regular ANC visits contribute to better monitoring of maternal and foetal health. However, a significant proportion (16.1%) still suggested fewer visits (2–3), and 10.8 per cent recommended more than eight visits. These variations suggest a need for clear and consistent messaging about the optimal number of ANC visits, particularly targeting those who may underestimate the importance of regular check-ups during pregnancy.

Health Facility Factors Influencing IFAS Uptake

The study found that a majority of respondents (84.2%) always received iron and folic acid supplements (IFAS) from health facilities, indicating good access to supplementation. This is crucial, as IFAS is essential in preventing anaemia and promoting fetal development during pregnancy. Additionally, a significant proportion (69.3%) received counselling on IFAS, which suggests that antenatal clinics are playing an important role in educating mothers on the importance of supplementation. However, the fact that only 22.8 per cent were informed about the side effects of IFAS, and even fewer (2.9%) received guidance on managing these side effects, indicates an area where further education is needed. Ensuring that health facilities provide comprehensive counselling, including information on potential side effects and their management, could help increase adherence to IFAS and reduce concerns that may lead to non-compliance. While the majority (68.8%) were informed about the health benefits of IFAS, more targeted education on the specific benefits and food sources of iron and folic acid (65.6%) could further improve the uptake and effectiveness of supplementation. Additionally, a more robust approach to counselling on managing side effects could be crucial in improving compliance, especially for women who may experience discomfort from the supplements.

Relationship between Factors Affecting IFAS Adherence and Level of Adherence

The chi-square analysis revealed no significant association between age group, marital status, occupation, or monthly income and adherence to iron and folic acid supplementation (IFAS), indicating that these characteristics may not directly influence a pregnant woman's commitment to IFAS guidelines. However, a statistically significant relationship was found between the level of education and IFAS adherence ($\chi^2 = 25.306$, df = 8, $p = 0.001$). This suggests that education equips women with a better understanding of health messages and the benefits of supplementation.

Binary logistic regression further confirmed that education was a strong predictor of adherence. Women with primary education were 2.8 times more likely to adhere compared to those with nursery-level education (AOR = 2.811; p = 0.029). The likelihood increased for those with secondary (AOR = 5.41; p = 0.017), college (AOR = 3.32; p = 0.045), and university education (AOR = 3.79; p = 0.046). These findings imply that increasing education opportunities for women, or delivering health messages in more accessible formats, could significantly enhance adherence to IFAS and thereby reduce risks of anaemia and related complications in pregnancy.

A negative but statistically significant correlation was found between the knowledge score and adherence (r = – 0.165, p = 0.010), suggesting that while knowledge plays a role, other behavioural or contextual factors may moderate its impact. Nonetheless, binary logistic regression showed that with each unit increase in knowledge, the likelihood of adherence improved by 23 per cent (AOR = 1.230; p = 0.034). These findings indicate that knowledge remains a key influence and should be strengthened through continuous health education. More specifically, women who knew why folic acid is recommended for expectant mothers were 2.5 times more likely to adhere to IFAS (AOR = 2.498; p = 0.006), while those who understood the consequences of anaemia to babies were 22 per cent more likely to adhere (AOR = 1.22; p = 0.044). These results imply that focused education on the *reasons* behind IFAS can drive behaviour change better than general information. Health promotion strategies should, therefore, highlight the specific dangers of anaemia and the protective role of IFAS.

There was no significant relationship between the number of pregnancies a woman had and her level of adherence to IFAS (r = 0.030, p = 0.642), indicating that experience with previous pregnancies does not necessarily improve IFAS practices. This implies the need for consistent messaging regardless of whether a woman is in her first or fifth pregnancy.

Women who began ANC visits in the second trimester were twice as likely to adhere to IFAS compared to those starting in the third trimester (AOR = 2.088; p = 0.038), while those who began in the first trimester showed higher adherence odds (AOR = 1.967; p = 0.052), though not statistically significant. This suggests that early contact with antenatal care increases chances for effective counselling and supplement uptake. The implication is that programs should emphasise the importance of early ANC initiation to improve IFAS adherence and related maternal outcomes.

A significant positive correlation was found between the number of ANC visits and adherence (r = 0.130, p = 0.044), supported by logistic regression (AOR = 1.51; p = 0.023). This confirms that frequent contact with healthcare providers reinforces consistent use of IFAS. It underscores the need for interventions that encourage regular ANC attendance and follow-ups as a strategy to boost supplementation adherence.

Women who consistently received IFAS tablets from health facilities, were counselled on IFAS, and were informed about the correct dosage showed significantly higher levels of adherence ($p < 0.05$). These findings highlight the central role of health facility practices in promoting supplementation behaviour. Moreover, women who were specifically counselled on the side effects of IFAS were nearly twice as likely to adhere (AOR = 1.945; p = 0.008), suggesting that addressing potential fears or misconceptions related to side effects can reduce dropout and non-compliance.

These results have strong policy implications: they call for improved consistency in supplement supply, staff training on effective IFAS counselling, and patient-centred communication approaches that pre-emptively address side effect concerns. While other health facility characteristics did not significantly predict adherence, the quality and depth of interaction at the point of care were clearly crucial.

Determinants of Level of Adherence to IFAS

To determine the key predictors of IFAS adherence while accounting for confounding factors, a multiple logistic regression analysis was conducted. The dependent variable was the level of adherence to IFAS. The independent variables included socio-demographic factors (education level, age, marital status, occupation, and income), maternal factors (knowledge of IFAS, ANC visits, and timing of ANC initiation), and health facility-related factors (availability of IFAS, counselling, and information on dosage and side effects).

The results indicated that education level (p = 0.005, AOR: 1.52, 95% CI: 0.627–2.651), knowledge of IFAS (p = 0.036, AOR: 1.70, 95% CI: 0.75–2.703), ANC visits (p = 0.023, AOR: 1.62, 95% CI: 0.707–3.555), and counselling on IFAS (p = 0.011, AOR: 1.77, 95% CI: 0.725–2.824) were significant predictors of adherence. Pregnant women with higher education levels and better knowledge of IFAS were more likely to adhere to supplementation. Additionally, more frequent ANC visits and receiving counselling on IFAS positively influenced adherence levels.

Importantly, specific knowledge components also emerged as key determinants. Women who knew the reason for folic acid supplementation were 2.5 times more likely to adhere to IFAS (p = 0.006, AOR: 2.498, 95% CI: 1.293–4.826), while those who understood the effect of anaemia on the baby also had increased odds of adherence (AOR: 1.220; 95% CI: 2.371–4.013; p = 0.044). These findings suggest that not just general knowledge, but also targeted understanding of IFAS benefits significantly enhances adherence.

On the other hand, some factors, including maternal age (p = 0.264, AOR: 0.94), marital status (p = 0.249, AOR: 1.06), and income level (p = 0.294, AOR: 0.93), were not statistically significant predictors of adherence when controlling for other variables. Although these factors did not show a meaningful association with adherence in the final model, they were included as potential confounders to ensure the robustness of the analysis.

The findings suggest several practical implications for improving IFAS adherence among pregnant women. Education programs that enhance women's knowledge of the purpose, duration, side effects, and proper usage of IFAS could be effective in increasing adherence rates. Notably, women who knew why folic acid is recommended were significantly more likely to adhere, indicating that targeted health messages about the role of folic acid in preventing birth defects could yield substantial improvements in compliance.

Additionally, increasing the frequency of ANC visits and offering counselling during these visits on the importance and proper usage of IFAS can further promote adherence. Specific knowledge, such as awareness of anaemia's consequences on the baby, should also be emphasised in counselling sessions to drive behaviour change. Given that education level and knowledge of IFAS emerged as strong predictors, targeted interventions focusing on women with lower education levels or limited IFAS understanding may help close adherence gaps. Health policy makers should also prioritise ensuring the availability of IFAS and comprehensive counselling in ANC settings to support informed and consistent supplementation among pregnant women.

Although socio-demographic factors like age, marital status, and income level were not statistically significant in the multivariate analysis, they should still be considered in the design of inclusive interventions to ensure equitable access and messaging across all socio-economic groups.

Summary of Key Determinants

Overall, this study identified key factors significantly associated with adherence to iron and folic acid supplementation (IFAS) among pregnant women. Multivariable regression analysis revealed that maternal education level, knowledge of IFAS benefits, frequency of antenatal care (ANC) attendance, and receipt of IFAS-related counselling were the most robust predictors of adherence. Specifically, higher educational attainment and adequate knowledge regarding the role of folic acid in fetal development and the consequences of anaemia were positively associated with adherence. Although variables such as age, marital status, and household income did not demonstrate statistically significant associations in the adjusted model, they may still exert indirect influence and are relevant in contextualising maternal health behaviours. These findings highlight the critical role of health education and structured counselling during ANC visits in promoting optimal uptake of IFAS and advancing maternal and neonatal health outcomes.

Discussion

This study assessed factors influencing adherence to iron and folic acid supplementation (IFAS) among pregnant women in Kiambu County. The findings revealed an adherence rate of 56 per cent, similar to results in Nyeri County (Bahati et al., 2021)and parts of Ethiopia (Fite et al., 2021). However, it contrasts with higher adherence reported in Mozambique (Nwaru et al., 2015) and Senegal (Ba et al., 2019) and lower rates in Uganda (Nimwesiga et al., 2021). These discrepancies may be

due to differences in health system efficiency, ANC coverage, and IFAS stock availability.

High IFAS knowledge was a strong predictor of adherence, aligning with previous studies (Boti et al., 2018; Nasir et al., 2020). Educated women likely better understand the importance of supplementation and are more responsive to counselling. Similarly, a positive attitude towards IFAS was linked to adherence, echoing findings from Mekonnen et al. (2021). Behavioural theories suggest that belief in the benefits of supplementation enhances compliance.

Access to early and frequent antenatal care (ANC) visits significantly influenced adherence, consistent with findings in Rwanda (Munyaneza et al., 2016) and Nepal (Paudyal et al., 2022). Frequent ANC visits offer more opportunities for health education, consistent follow-up, and reinforcement of IFAS use. Counselling during ANC was also critical; women who received IFAS-specific counselling were more likely to adhere, as seen in previous studies (Digssie Gebremariam et al., 2019; Nimwesiga et al., 2021). In contrast, this study found that age and marital status were not significantly associated with adherence, differing from findings in Ethiopia and Uganda (Nimwesiga et al., 2021). These differences may stem from varying sociocultural expectations, household decision-making structures, and health-seeking behaviours in different populations.

The health facility environment, including waiting time, staff attitude, and IFAS availability, impacted adherence. Facilities with shorter wait times and respectful care encouraged better compliance. This aligns with the WHO's framework on respectful maternity care and the need for client-centred service delivery (World Health Organisation, 2016).

CONCLUSION AND RECOMMENDATION

Conclusion: The study concluded that most antenatal mothers at RL4H moderately adhered to Iron and Folic Acid Supplementation (IFAS), but many had limited knowledge about its benefits. Key factors influencing adherence included education level, ANC visit timing, and health facility support, particularly counselling on IFAS and its side effects. The findings highlight the need for enhanced education on IFAS and improved ANC services to support better adherence among pregnant women.

Recommendations: The study recommends enhancing the delivery of information on the importance of Iron and Folic Acid Supplementation (IFAS), emphasising its benefits and potential side effects. It is also crucial to improve the coverage and quality of antenatal care services, ensuring they are more comprehensive and accessible to all pregnant women.

REFERENCES

Ba, D. M., Ssentongo, P., Kjerulff, K. H., Na, M., Liu, G., Gao, X., & Du, P. (2019). Adherence to iron supplementation in 22 Sub-Saharan African countries and associated factors among pregnant women: A large population-based study. *Current Developments in Nutrition*, *3*(12), nzz120. https://doi.org/10.1093/cdn/nzz120

Bahati, F., Kairu-Wanyoike, S., & Nzioki, J. M. (2021). Adherence to iron and folic acid supplementation during pregnancy among postnatal mothers seeking maternal and child healthcare at Kakamega level 5 hospital in Kenya: A cross-sectional study. *Wellcome Open Research*, *6*, 1–32. https://doi.org/10.12688/wellcomeopenres.16699.2

Boti, N., Bekele, T., Godana, W., Getahun, E., Gebremeskel, F., Tsegaye, B., & Oumer, B. (2018). Adherence to iron-folate supplementation and associated factors among pastoralist's pregnant women in Burji Districts, Segen area people's zone, Southern Ethiopia: Community-based cross-sectional study. *International Journal of Reproductive Medicine*, *2018*, 1–8. https://doi.org/10.1155/2018/2365362

Cuevas, C. De, & Pe, W. (2015). *Psychometric properties of the eight-item Morisky Medication Adherence Scale (MMAS-8) in a psychiatric nate*. https://doi.org/10.1016/j.ijchp.2014.11.003

Digssie Gebremariam, A., Abebaw Tiruneh, S., Abebe Abate, B., Tadege Engidaw, M., & Tesfa Asnakew, D. (2019). Adherence to iron with folic acid supplementation and its associated factors among pregnant women attending antenatal care follow up at Debre Tabor General Hospital, Ethiopia, 2017. *PLoS ONE*, *14*(1), 1–10. https://doi.org/10.1371/journal.pone.0210086

Fisher, R. A., Bell, M. A., & Dunn, L. (1998). No Title. In *Sampling techniques*. John Wiley & Sons.

Fite, M. B., Roba, K. T., Oljira, L., Tura, A. K., & Yadeta, T. A. (2021). Compliance with Iron and Folic Acid Supplementation (IFAS) and associated factors among pregnant women in Sub-Saharan Africa: A systematic review and meta-analysis. *PLoS ONE*, *16*(4), 1–17. https://doi.org/10.1371/journal.pone.0249789

Hammouh, F., Abdullah, M., Al-Bakheit, A., Al-Awwad, N. J., Dabbour, I., & Al-Jawaldeh, A. (2023). Nutrition Knowledge, Attitudes, and Practices (KAPs) among Jordanian Elderly—A cross-sectional study. *Nutrients*, *15*(9), 1–10. https://doi.org/10.3390/nu15092220

Kamau, M. W., Mirie, W., & Kimani, S. (2018). Compliance with iron and folic acid supplementation (IFAS) and associated factors among pregnant women: Results from a cross-sectional study in Kiambu County, Kenya. *BMC Public Health*, *18*(1), 1–10. https://doi.org/10.1186/s12889-018-5437-2

KNBS. (2023). Demographic and Health Survey 2022. *Demographic and Health Survey 2022*, 1–23.

Lyoba, W. B., Mwakatoga, J. D., Festo, C., Mrema, J., & Elisaria, E. (2020). Adherence to iron-folic acid supplementation and associated factors among pregnant women in Kasulu Communities in North-Western Tanzania. *International Journal of Reproductive Medicine*, *2020*, 1–11. https://doi.org/10.1155/2020/3127245

Mekonnen, A., Alemnew, W., Abebe, Z., & Demissie, G. D. (2021). Adherence to iron with folic acid supplementation among pregnant women attending antenatal care in public health centres in Simada district, northwest Ethiopia: Using health belief model perspective. *Patient Preference and Adherence*, *15*, 843–851. https://doi.org/10.2147/PPA.S299294

Mulambalah, C. S., Siamba, D. N., Ogutu, Philip, A., Siteti, D. I., & Wekesa, A. W. (2014). Anaemia in pregnancy: Prevalence and possible risk factors in Kakamega county, Kenya. *Science Journal of Public Health*, *2*(3), 216-222. 10.11648/j.sjph.20140203.23

Munyaneza, F., Mujawase, F., Banamwana, L., Sayinzoga, F., Thomson, D. R., Ntaganira, J., Hedt-gauthier, B. L., Link, C., & Manzi, A. (2016). Assessing predictors of delayed antenatal care visits in Rwanda: A secondary analysis of the Rwanda Demographic and Health Survey 2010. *BMC Pregnancy and Childbirth*, *14*(290), 1–8.

Nasir, B. B., Fentie, A. M., & Adisu, M. K. (2020). Adherence to iron and folic acid supplementation and prevalence of anemia among pregnant women attending antenatal care clinic at Tikur Anbessa Specialized Hospital, Ethiopia. *PLoS ONE*, *15*(5), 1–11. https://doi.org/10.1371/journal.pone.0232625

Nimwesiga, C., Murezi, M., & Taremwa, I. M. (2021). Adherence to iron and folic acid supplementation and its associated factors among pregnant women attending antenatal care at Bwindi Community Hospital, Western Uganda. *International Journal of Reproductive Medicine*, *2021*, 1–10. https://doi.org/10.1155/2021/6632463

Nwaru, B. I., Salomé, G., Abacassamo, F., Augusto, O., Cliff, J., Sousa, C., Regushevskaya, E., Parkkali, S., & Hemminki, E. (2015). Adherence in a pragmatic randomised controlled trial on prophylactic iron supplementation during pregnancy in Maputo, Mozambique. *Public Health Nutrition*, *18*(6), 1127–1134. https://doi.org/10.1017/S1368980014001359

Odhiambo, J. N., & Sartorius, B. (2020). Mapping of anaemia prevalence among pregnant women in Kenya (2016–2019). *BMC Pregnancy and Childbirth*, *20*(1), 1–11. https://doi.org/10.1186/s12884-020-03380-2

Paudyal, N., Parajuli, K. R., Garcia Larsen, V., Adhikari, R. K., Devkota, M. D., Rijal, S., Chitekwe, S., & Torlesse, H. (2022). A review of the maternal iron and folic acid supplementation programme in Nepal: Achievements and challenges. *Maternal and Child Nutrition*, *18*(S1), 1–11. https://doi.org/10.1111/mcn.13173

World Health Organisation. (2016). Standards for improving the quality of maternal and newborn care in health facilities. *Who*, 73. https://doi.org/978 92 4 151121 6

World Health Organisation. (2018). *Developing and Validating an Iron and Folic Acid Supplementation Indicator for Tracking Progress Towards Global Nutrition Monitoring Framework Targets* (Issue June).