The Role of Male Partner Involvement in Adherence to Iron-Folic Acid Supplementation Among Pregnant Women

Dr Hina Wasti   Dr. Sher Ali

ABSTRACT

Background: Iron-folic acid supplementation (IFAS) during pregnancy is a proven intervention to prevent maternal anemia and associated complications. Despite widespread distribution through antenatal care (ANC) services, adherence remains suboptimal in many low-resource settings. Emerging evidence suggests that male partner involvement may influence maternal health behaviors, yet this dimension remains underexplored in relation to IFAS adherence.

Objective: This study aimed to assess the role of male partner involvement in adherence to IFAS among pregnant women.

Materials and Methods: A community-based cross-sectional study was conducted among 215 pregnancy women attending ANC at randomly selected public health facilities between December 2024 and May 2025. Participants were selected using multistage sampling. Data were collected using a structured, interviewer-administered questionnaire assessing socio-demographics, obstetric history, IFAS knowledge, adherence behavior, and male involvement. Adherence was defined as taking ≥4 IFAS tablets per week in the previous month. Multivariable logistic regression was used to identify independent predictors of adherence. Statistical significance was set at $p < 0.05$.

Results: The overall adherence rate to IFAS was 57.7%. High male partner involvement was reported by 60% of women and was independently associated with higher adherence (AOR = 3.08; 95% CI: 1.68-5.66). Additional predictors included good maternal knowledge of IFAS (AOR = 2.12; 95% CI: 1.16-3.85), attending four or more ANC visits (AOR = 2.31; 95% CI: 1.27-4.22), and urban residence (AOR = 1.82, 95% CI: 1.02-3.27).

Conclusion: Male partner involvement significantly enhances IFAS adherence among pregnant women. Integrating male-focused education and support into routine ANC services offers a promising strategy to improve maternal nutrition and reduce pregnancy-related anemia in low-resource settings.

Keywords: Iron-folic acid supplementation, adherence, male partner involvement, antenatal care.

Correspondence
Ashok Kumar Tanwani
0300-8565035
Professor
aktanwani58@gmail.com
Hbs medical and dental college Islamabad

Introduction

Anemia during pregnancy, primarily caused by iron and folic acid deficiency, remains one of the most prevalent nutritional disorder globally. The World Health Organization (WHO) estimates that approximately 40% of pregnant women worldwide suffer from anemia, with the highest burden observed in low- and middle-income countries (LMICs) (1). Iron-deficiency anemia is associated with increased risks of maternal mortality, low birth weight, premature delivery, and impaired cognitive development in infants. To mitigate these risks, WHO recommends daily iron and folic acid supplementation (IFAS) throughout pregnancy as part of routine antenatal care (ANC) (2,3). Despite the proven effectiveness of IFAS, adherence to supplementation remains suboptimal in many settings. Studies from various regions of Asia and Africa consistently report poor adherence rates, ranging from 28% to 65% (4–6). Barriers to adherence include forgetfulness, side effects such as nausea, misconceptions about the supplement, poor access, and lack of knowledge about its importance (7). While these maternal-level factors are well-documented, they offer only a partial explanation of adherence behavior. The broader social and household environment, particularly the role of male partners, has been comparatively underexplored.

In recent years, the global health communities has increasingly recognized the importance of male involvement in reproductive and maternal health. The term "male involvement" encompasses a range of behaviors, including accompanying women to ANC visits, providing emotional, encouraging healthy practices, reminding women to take medications or supplements, and participating in health-related decision making. Evidence shows that male engagement has a positive impact on maternal health outcomes, including skilled birth attendance, early ANC booking, institutional delivery, and postnatal care utilization (8). However, its role in influencing adherence to iron-folic acid supplementation, a daily, sustained behavior requiring motivation, support, and reminder, has receiver far less attention. Recent studies has begun to fill this gap. In Ethiopia, a cross-sectional study in Adwa town reported that women who received partner support were more than twice as likely to adhere to IFAS (AOR = 2.23) compared to those who did not receive such support (9). Another study in Uganda found that the presence of an "adherence partner", often the male spouse, was strongly associated with higher compliance (AOR = 2.82), underdoing the potential of social support systems to enhance daily supplement use (10). Moreover, a behavior change trial conducted in Ethiopia and Kenya introduced the concept of "adherence partner", encouraging pregnant women to select someone, usually their husband, to remind them to

take IFAS (11). The strategy was found to be acceptable, culturally appropriate, and effective, with participants reporting that their partners not only reminded them to take supplements but also provided food, addressed side effects, and offered emotional encouragement.

Despite this growing evidence base, most IFAS programs and research continue to treat the women as the sole decision-maker and implementer of supplement adherence. Studies focus heavily on individual knowledge, counseling frequency, and number of ANC visits, while rarely measuring partner behavior, communicating patterns, or male awareness of IFAS importance. Additionally, cultural gender norms often dictate that men are the final decision-makers in household health matters, yet their perspectives on IFAS are largely unknown. This gap is particularly critical in patriarchal societies where male partners influence whether women attend ANC, take prescribed medications, or prioritize health over competing household duties. Without engaging men in IFAS education and promoting shared decision-making, adherence may remain poor, even when access barriers are removed.

Addressing this gap is just a matter of equity but also of effectiveness. Programs that recognize the household as a unit of health behavior, rather than focusing solely on individual women, are more likely to achieve sustainable results. Understanding how men perceive their roles, how often they participate in ANC, what knowledge they have about IFAS, and whether they support or discourage supplement use can provide critical insights for future interventions. Therefore, this study aims to examine the association between male partner involvement and adherence to iron-folic acid supplementation among pregnant women. It will assess specific behaviors such as whether male partners remind, accompany, encourage, or provide resources for their pregnant partners, and how these actions influence consistent IFAS intake. By shedding light on the relational context of IFAS adherence, this study seeks to inform gender-transformative interventions that actively engage men in maternal nutritional programs, ultimately aiming to reduce the high burden of iron-deficiency anemia in pregnancy.

Materials and Methods

A community-based, cross-sectionals study was conducted to assess the role of male partner's involvement in adherence to iron-folic acid supplementation (IFAS) among pregnancy women. The study was carried out in urban and rural areas of Hyderabad Region. The area is serves by a mix of primary healthcare units, including health posts, health centers, and referral facilities. Antenatal care (ANC) services are widely available across the district, and iron-folic acid supplementation is routinely provided as a part of maternal health protocols. Data collection was undertaken from December 2024 to May 2025. The required sample size was calculated using the single population proportion formula, assuming a 60% adherence rates among women with high male partner involvement. The computation was based on a 95%

confidence level, a 5% margin of error, and a design effect of 1.5 for account for the multistage nature of sampling process. An additional 10% of the sample size was added to adjust the potential non-responses. The final sample size was thus estimated to be 215. A multistage stratified random sampling method was employed to obtain a representative sample of pregnant women. In the first stage, health facilities were stratified into urban and rural categories. A predetermined number of health centers were randomly selected from each stratum using a lottery method. In the second stage, proportional allocation was applied to determine the number of participants to be selected from each facility, based on average ANC attendance over the previous three months. Within each facility, a systemic random sampling technique was used. The sampling interval was calculated by dividing the expected number of ANC attendees during the data collection period by the required number of participants.

Data Collection

Data were collected using a structured, interviewer-administered questionnaire adapted from validated instruments previously used in maternal nutrition and adherence studies. The questionnaire was initially developed in English and then translated into the local language by professional translators fluent in both languages. The questionnaire consisted of six main sections: (1) socioeconomic and economic characteristics; (2) obstetric and reproductive history; (3) knowledge of anemia and IFAS; (4) IFAS adherence behaviors; (5) male partner involvement; and (6) barriers and facilitators to adherence. Male partner involvement was assessed using a five-item index that captured the frequency and type of partner engagement, including whether the partner reminded the women to take supplements, accompanied her to ANC visits, provided financial or logistical support, participated in health-related decision-making, and offered emotional encouragement. Each affirmative response was scored as one point. A cumulative score of three or more was categorized as high involvement, while a score of fewer was considered low involvement. Rigorous quality assurance procedures were implemented throughout the data collection process. During fieldwork, each completed questionnaire was reviewed daily by field supervisor to identify and correct missing or inconsistent responses.

Data Analysis

The data was exported to SPSS v.26.0 for analysis. Descriptive statistics, including frequencies, means, and standard deviations, were calculated to describe the study population and summarize key study variables. Bivariate logistic regression analysis was performed to identify crude associations between IFAS adherence and each independent variable. Variables with a p-value <0.20 in the bivariate analysis were included in the multivariate logistic regression model to identify independent predictors of adherence while adjusting for potential confounding factors. Adjusted odd ratios (AORs) with 95% confidence intervals were reported, and statistical significant was determined at $p < 0.05$.

Ethical Consideration

Ethical approval for study was obtained from institutional review board. All eligible participants were informed about the study objectives, procedures, and their rights, including the right to withdraw at any point without consequence. Written informed consent was obtained from each participant before conducting interviews. To protect participant confidentiality, no personal identifiers were recorded, and all completed questionnaire were stored with access only to the principal investigator.

Results

A total of 215 pregnant women participated in the study. The participants had diverse backgrounds in terms of age, residence, education, and household income. The majority were aged between 25 and 34 years, with nearly 60% residing in urban areas and about half having completed secondary education or higher. A significant proportion were housewives, and roughly one-third lived in household earning less than 100,000 PKR per month. Additional, socio-economic characteristics are detailed in Table 1. In terms of obstetric history and service utilization, most women were multigravida and in their second trimester of pregnancy. Less than half initiated antenatal care during the first trimester, and fewer than half had attended four or more ANC visits at the time of the survey. Counselling on iron-folic acid supplementation during ANC was common, reported by over four-fifth of respondents. Further obstetric and health service-related findings are presented in Table 2.

Knowledge of iron-folic acid supplementation and anemia varied across the sample. While general awareness of anemia as higher, fewer women demonstrated detailed understanding of proper IFAS use, such as correct duration or potential side effects. Overall, slightly more than half of the women were categorized as having good knowledge based on a composite score. Full knowledge assessment outcomes are shown in Table 3. Adherence to iron-folic acid supplementation was achieved by approximately 58% of participants. Among non-adherent women, the most common reasons for missed doses included forgetfulness and side effects such as nausea. Less frequently, women reported running out of tablets or believing that supplementation was unnecessary (Table 4).

The analysis of male partner involvement revealed that about 60% of women received high levels of support. Financial and emotional support were more commonly reported than shared decision-making or physical accompaniment (Table 5). In bivariate logistic regression, several factors shows significant associations with adherence to IFAS. These included urban residence, higher educational attainment, frequent ANC visits, good knowledge of IFAS, and high male partner involvement. Among these, male involvement demonstrated the strongest crude association with adherence (Table 6). After adjusting for potential confounders in multivariate logistic regression, four variables remained statistically significant. Women with higher male partner involvement were more than three times as likely to adhere to IFAS compared to those with low involvement. Urban residence, good knowledge of IFAS, and having four or more ANC visits were also independently associated with higher adherence. The final model showed accepted fit (Hosmer-Lemeshow p = 0.67) (Table 7).

Table 1: Socio-Demographic Characteristics of Pregnant Women Attending ANC (n=215)

Variable	Category	Frequency (n)	Percentage (%)
Age	15-24 years	65	30.2
	25-34 years	110	51.2
	≥35 years	40	18.6
Residence	Urban	128	59.5
	Rural	87	40.5
Education Status	No education	43	20
	Primary	65	30.2
	Secondary and above	107	49.8
Monthly Income (PKR)	<50,000	72	33.5
	50,000 – 100,000	91	42/3
	>100,000	52	24.2
Partner's Education	No education	38	17.7
	Primary	69	32.1
	Secondary and above	108	50.2

Table 2: Obstetric and Health Services-Related Characteristics (n=215)

Variable	Category	Frequency (n)	Percentage (%)
Gravidity	1	74	34.4
	2-3	96	44.7
	≥4	45	20.9
Gestational Age	First trimester	28	13
	Second trimester	121	56.3
	Third trimester	66	30.7
Number of ANC Visits	<4 visits	123	57.2
	≥4 visits	92	42.8
First ANC Visit Timing	≤12 weeks	97	45.1
	>12 weeks	118	54.9

Counseling on IFAS	Yes	182	84.7
	No	33	15.3
Distance to Facility	<30 minutes	134	62.3
	≥30 minutes	81	37.7

Table 3: Knowledge About Iron-Folic Acid Supplementation and Anemia (n=215)

Knowledge Variable	Response	Frequency (n)	Percentage (%)
Heard of anemia	Yes	201	93.5
Knows IFAS prevents anemia	Yes	176	81.9
Knows correct duration of IFAS	Yes	148	68.8
Knows side effects of IFAS	Yes	139	64.7
Overall knowledge level	Good (≥80%)	127	59.1
	Poor (<80%)	88	40.9

Table 4: Adherence to Iron-Folic Acid Supplementation (n=215)

Adherence Variable	Category	Frequency (n)	Percentage (%)
Took >4 IFAS tablets/week in past 4 weeks	Yes (adherence)	124	57.7
	No (non-adherent)	91	42.3
Average weeks of IFAS use	Mean ± SD	6.8 ± 2.4	-
Most common reason for missing doses*	Forgetfulness	41	45.1*
	Side effects	23	25.3*
	Ran out of tablets	15	16.5*
	Didn't perceive need	12	13.1*

*Among non-adherent women (n=91)

Table 5: Male Partner Involvement in IFAS Adherence (n=215)

Involvement Indicators	Yes (n)	Percentage (%)	No (n)	Percentage (%)
Reminds to take IFAS	116	54	99	46
Accompanies to ANC	85	39.5	130	60.5
Provides financial/ logistic support	138	64.2	77	35.8
Encourages/ discusses health issues	120	55.8	95	44.2
Shared health decision-making	108	50.2	107	49.8
Overall male involvement				
High (≥3 supportive actions)	129	60		
Low (≤2 supportive actions)	86	40		

Table 6: Bivariate Logistic Regression Analysis of Factor Associated with IFAS Adherence (n=215)

Variable	Adherence (%)	COR (95% CI)	p-value
Urban residence	69.5	2.10 (1.21-3.62)	0.008
≥Secondary education	65.4	1.94 (1.14-3.28)	0.015
≥4 ANC visits	73.9	2.74 (1.56-4.83)	<0.001
Good knowledge	70.1	2.55 (1.48-4.38)	<0.001
High male involvement	74.4	3.67 (2.10-6.43)	<0.001

Table 7: Multivariate Logistic Regression of Predictors of IFAS Adherence (n=215)

Variable	AOR (95% CI)	p-value
Urban residence	1.82 (1.02-3.27)	0.042
≥4 ANC visits	2.31 (1.27-4.22)	0.006
Good knowledge	2.12 (1.16-3.85)	0.014
High male involvement	3.08 (1.68-5.66)	<0.001
Hosmer-Lemeshow p = 0.67		

Discussion

This study investigated the role of male partner involvement in adherence to iron-folic acid supplementation (IFAS) among pregnant women. The findings revealed that male involvement was a strong and independent predictor of IFAS adherence, even after adjusting confounding variables. This result highlights the growing recognition that partner

dynamics and social support structures are central to maternal health behavior, particularly in resource-limited setting. The adherence rate was observed in our study (57.5%) is comparable to that reported in other studies. Gebreamlak et al. found 60% adherence, and Nigussie et al. reported 51.4% adherence in various places (12,13). However, these figures still fall short of WHO's recommendation for universal IFAS adherence, which emphasizes daily intake for at least 90 days during pregnancy. The implication is that despite improvements in supply chain and counseling, significant behavioral and relational barriers persist.

Our study's central contribution is its robust demonstration of the importance of male partner involvement. Women who reported high partner involvement, measured via support, reminders, ANC attendance, and shared decision, were more than three times, as likely to adhere to IFAS. This finding is consistent studies from other regions. In a study, Sajith et al. found that women who had adherence partners had significantly better compliance (14). Likewise, Gebremichael et al. demonstrated that partner support doubled the odds of adherence (15). Mechanistically, male involvement acts across multiple domains. First, it improves routine behaviors. Forgetfulness is consistently cited as the primary reasons for non-adherence, and reminders by male partners can serve a similar function to digital alerts used in high-income settings. Second, male involvement facilitates logistic support, such as providing money for transport or helping to acquire replacement tablets during stock outs. Third, emotional support and shared decision, making create an enabling environment for sustainable behavior, reinforcing maternal agency and motivation. Crucially, this relational dimension also encounters gendered power imbalances. In patriarchal societies, health-seeking behavior is often contingent on male approval. When male partners actively support IFAS use, it legitimizes the practice and diffuses social barriers that may prevent women from prioritizing their own health.

Beyond male involvement, other significant predictors of adherence in our study, such as maternal knowledge, frequency of ANC visits, and urban residence, have been extensively documented in global literature. A meta-analysis by Saragih et al., involving 5,537 pregnant women across 18 studies, found that women with good knowledge of IFAS had 2.5 times higher odds of adherence (16). Knowledge increase understanding of the benefits of IFAS and reduces fear of side effects. In our study, nearly 60% of women had good knowledge, and they mere twice as likely to adhere, supporting the notion that knowledge is a key modifiable determinant. Similarly, attending four or more ANC visits was independently associated with adherence, echoing findings from Getachew et al. in refugree camps and Terefe et al. in Bench Maji Zone. Repeated ANC interactions offer opportunities for reinforced messaging, side effect management, and trust-building with health workers, critical to long-term adherence (17,18). A study by Rahman et al. estimated that women with ≥4 ANC visits were nearly 3.7 times more likely to adhere (19). Urban residence also predicted better adherence in our study. Urban women typically have shorter distances to health centers, better educational access, and fewer cultural barriers, consistent with findings by Chen et al. (20). In contrast, rural women may face stock outs, transportation difficulties, and sociocultural constrains that limit adherence. Despite relatively favorable adherence level in our study, common barriers still persisted. In line with previous studies, forgetfulness, fear of side effects, and misconceptions about supplement necessity were leading causes of non-adherence (21,22). These underline the importance of not only distributing supplements but also ensuring sustained interpersonal counselling and support. Interventions using SMS reminders, pill calendars, or community health worker follow-up have shown promise and may be further enhanced when coupled with male engagement.

The significance of male partner involvement in maternal micronutrient adherence is increasingly being recognized in global reproductive health. However, most programs continue to treat pregnancy and nutrition as female domains. This study provides compelling evidence that a shift is needed, one that integrates male involvement as a core component of antenatal care programming. Policies should aims to institutionalize male-inclusive counseling, promote couple-focused health education, and use mass media to normalize male support during pregnancy. However, caution is warranted. Male engagement should not reinforce control or gatekeeping over women's bodies. Rather, the approach should focus on supportive partnership, where both parties participate in health decisions. Strategies must also remain context-sensitive, accounting for rural vs. urban differences, literacy levels, and gender norms. This study's strength include its representative sample, multivariate modeling approach, and focus on a largely underexplored predictor male involvement. However, limitations exist. The cross-sectional design limits causal inference. Self-reported adherence is subject to recall and social desirability bias. Moreover, we relied solely on women's perceptions of male involvement without validating with partners themselves. Future research should triangulate reports from both partners and explore the use of digital or pill-count-based adherence verification methods.

Conclusion

This study demonstrated that male partner involvement is a significantly and independent predictor of adherence to iron-folic acid supplementation during pregnancy. Women whose partners provided emotional, logistical, and decision-making support were substantially more likely to adhere, highlighting the critical role of shared responsibilities in maternal health behaviors. In addition to male involvement, adherence was positively influenced by good maternal knowledge, frequent ANC attendance, and urban residence. These finding suggests that adherence is shaped by both individual and relational factors. To improve IFAS adherence and reduce maternal anemia, maternal health programs must move beyond women-only interventions

and incorporate male-focused education and engagement strategies within routine antenatal care.

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Ashok Kumar Tanwani
Professor
aktanwani58@gmail.com
Hbs medical and dental college Islamabad

Muhammad Ashraf
0333 5426260
Muhammadashraf91amc@gmail.com
Professor
Hbs medical and dental college Islamabad

Ayesha Sarwar
ayeshaali1019@gmail.com
Associate professor
Hbs medical and dental college Islamabad

Authors Contribution	
Ashok Kumar Tanwani Dr. Muhammad Ashraf	Conception of study design, acquisition, analysis, and interpretation of data
Dr. Ayesha Sarwar **Dr. Aqsa Noureen**	Drafting and methodology, data interpretation & Analysis and interpretation of data for work
Dr Humera Javed	Data Collection