Health Dynamics
eISSN: 3006-5518
Publisher: Knowledge Dynamics
DOI: https://doi.org/10.33846/hd31002

Original Research

Factors Associated with Adherence of Pregnant Women in Consuming Iron Supplementation Tablets

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Article history
Received: 27 April 2026
Revised: 29 October 2026
Accepted: 30 October 2026
Published Online: 31 October 2026

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How to cite this article: Utami PW, Setiaji B, Karyus A, Putri DUP, Budiati E. Factors Associated with Adherence of Pregnant Women in Consuming Iron Supplementation Tablets. *Health Dynamics*, 2026, 3(10), 417-423. https://doi.org/10.33846/hd31002

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ABSTRACT

Background: Anemia during pregnancy increases the risk of pregnancy complications and maternal and infant mortality. Iron supplementation tablets (*Tablet Tambah Darah*, TTD) are a key preventive strategy; however, adherence remains suboptimal, including in North Lampung Regency. This study aimed to determine the factors associated with adherence to TTD consumption among pregnant women in North Lampung Regency in 2025. **Methods:** This quantitative analytical study employed a cross-sectional design. A total of 298 third-trimester pregnant women in the working area of the North Lampung District Health Office were selected using proportional random sampling and interviewed using structured questionnaires. Data were analyzed using univariate analysis, bivariate analysis (Chi-square test), and multivariate logistic regression with the backward elimination method. **Results:** Most respondents (67.8%) adhered to TTD consumption. Age, education, knowledge, attitude, health worker support, and husband's support were significantly associated with adherence in the bivariate analysis ($p < 0.05$). In the multivariate analysis, knowledge (OR = 4.85), attitude (OR = 3.92), health worker support (OR = 5.76), and husband's support (OR = 4.33) remained significantly associated with adherence, with health worker support being the most dominant factor. **Conclusions:** Knowledge, attitude, health worker support, and husband's support are significantly associated with adherence to TTD consumption among pregnant women. Strengthening health education, enhancing the role of health workers, and involving family members are essential strategies for improving adherence and preventing anemia during pregnancy.

Keywords: Adherence; anemia; health worker support; iron supplementation tablets; pregnant women

1. INTRODUCTION

Anemia in pregnancy remains a major global public health problem due to its high prevalence and serious impact on maternal and fetal health. The World Health Organization (WHO) estimates that approximately 37% of pregnant women worldwide experience anemia, contributing significantly to maternal morbidity and mortality.(1) Anemia during pregnancy increases the risk of complications such as preterm birth, low birth weight, infections, and maternal and neonatal death.(2) Despite various prevention efforts, anemia continues to be a persistent challenge, particularly in developing countries where nutritional deficiencies and limited access to healthcare services are still common.(1,3)

In Indonesia, anemia among pregnant women remains a priority health issue. National data indicate that around

27.7% of pregnant women experience anemia.[4] The government has implemented several interventions, including the provision of iron supplementation tablets (*Tablet Tambah Darah*, TTD) as part of antenatal care services. Pregnant women are recommended to consume at least 90 iron tablets during pregnancy to prevent anemia and its complications.[5] However, adherence to this recommendation is still not optimal in many regions, which reduces the effectiveness of the program.[6]

North Lampung Regency is one of the areas in Lampung Province where adherence to iron supplementation among pregnant women remains relatively low. Although the coverage of iron tablet distribution has reached above 90%, the proportion of pregnant women who actually consume the tablets regularly is still lower.[7] This discrepancy indicates that availability alone is not sufficient, and behavioral factors play an important role in determining adherence. In addition, local health reports show that cases of anemia among pregnant women are still found in several primary healthcare centers, indicating ongoing public health concerns.[7,8]

Adherence to iron supplementation is influenced by various factors, including socio-demographic characteristics, knowledge, attitudes, and social support. Age and education level are associated with the ability to understand health information and adopt recommended behaviors.[9] Knowledge about anemia and the benefits of iron supplementation plays a crucial role in shaping adherence, as individuals with better knowledge are more likely to comply with health recommendations.[10,11] Similarly, attitudes toward iron tablet consumption, including perceptions of benefits and side effects, significantly influence adherence behavior.[12]

In addition to individual factors, external support systems also play a significant role. Support from health workers is essential in providing information, counseling, and motivation during antenatal care visits.[13] Effective communication from healthcare providers can help overcome barriers and improve adherence. Furthermore, husband or family support is an important reinforcing factor, as it can encourage pregnant women to maintain regular consumption of iron tablets.[14] Lack of support may lead to non-adherence and increase the risk of anemia.[15]

Previous studies have demonstrated that knowledge, attitude, and social support are significantly associated with adherence to iron supplementation among pregnant women. However, findings are not always consistent across different settings. Some studies identify knowledge as the most dominant factor,[10] while others emphasize the role of family support and healthcare services.[14,16] These inconsistencies suggest that contextual and sociocultural factors may influence adherence behavior, highlighting the need for further research in specific regions.

At the regional level, particularly in North Lampung Regency, studies examining factors associated with adherence to iron supplementation are still limited. Preliminary data indicate that barriers such as side effects, lack of awareness, limited access to information, and inadequate support systems contribute to low adherence.[7] Therefore, identifying the key determinants of adherence in this setting is essential for developing targeted interventions.

Improving adherence to iron supplementation is crucial not only for preventing anemia but also for improving maternal and child health outcomes. Strengthening health education, enhancing the role of healthcare providers, and involving family members are important strategies to increase adherence.[5,13] These efforts align with national and global health targets to reduce maternal mortality and improve the quality of maternal healthcare services.[1]

Based on these considerations, this study aimed to analyze the factors associated with adherence of pregnant women in consuming iron supplementation tablets (TTD) in North Lampung Regency. The findings of this study are expected to provide evidence-based recommendations for improving maternal health programs and reducing the burden of anemia among pregnant women.

2. METHODS

This study employed a quantitative analytic design with a cross-sectional approach to examine the factors associated with adherence of pregnant women in consuming iron supplementation tablets (TTD). The study was conducted in the working area of the North Lampung District Health Office, Indonesia, from December 2025 to January 2026.

2.1 Study Population and Sample

The population in this study consisted of all pregnant women in the working area of health centers in North Lampung Regency, with a total population of 845 pregnant women in the third trimester. The sample size

was 298 respondents who met the inclusion criteria. Sampling was carried out using a proportional random sampling technique to ensure representativeness across different health center areas.

2.2 Inclusion and Exclusion Criteria

Inclusion criteria included pregnant women in the third trimester, registered in the maternal health program, willing to participate, and provided informed consent. Exclusion criteria included pregnant women who were seriously ill, unavailable during data collection, or did not complete the questionnaire.

2.3 Variables and Measurement

The dependent variable in this study was adherence to consuming iron supplementation tablets (TTD), defined as compliance with the recommended intake of iron tablets during pregnancy. The independent variables included age, education, occupation, knowledge, attitude, health worker support, and husband's support. Data were collected using a structured questionnaire. Knowledge and attitude were measured using Likert-scale items and categorized into good/poor and positive/negative based on scoring criteria. Support from health workers and husbands was assessed based on respondents' perceptions and categorized into supportive and less supportive. Adherence was measured using self-reported data and categorized into adherent and non-adherent.

2.4 Instrument Validity and Reliability

The research instrument was tested for validity and reliability prior to data collection. Validity testing was conducted using product-moment correlation, and reliability testing was performed using Cronbach's alpha coefficient. The results indicated that all questionnaire items were valid and reliable for use in this study.

2.5 Data Collection Procedure

Data collection was carried out through direct interviews using questionnaires. Respondents were first given an explanation regarding the purpose of the study and procedures, followed by obtaining informed consent. Data collection was conducted with the assistance of trained enumerators. Confidentiality and anonymity of respondents were ensured throughout the study.

2.6 Data Analysis

Data were analyzed using IBM SPSS Statistics version 26 (IBM Corp., Armonk, NY, USA). Univariate analysis was performed to describe the frequency distribution of respondent characteristics and study variables. Bivariate analysis was conducted using the Chi-square test to examine the relationship between independent variables and adherence to iron supplementation (TTD). Variables with p-value <0.05 were considered statistically significant. Multivariate analysis was performed using logistic regression with the backward method to identify the most dominant factors associated with adherence. Odds ratios (OR) with 95% confidence intervals (CI) were calculated to estimate the strength of association.

2.7 Ethical Consideration

This study was conducted in accordance with ethical principles in research involving human subjects. Ethical approval was obtained from the Health Research Ethics Committee of Universitas Mitra Indonesia with Ethical Approval Number: S.25/046/FKES10/2026. All respondents provided informed consent prior to participation, and confidentiality of all information was strictly maintained.

3. RESULTS

3.1 Characteristics of Respondents

Based on Table 1, the majority of respondents were aged 20–35 years (66.4%), indicating that most participants were in the optimal reproductive age group. In terms of education, more than half of the respondents had a high level of education (62.4%). Additionally, most respondents were not working (58.4%). These characteristics suggest that the majority of respondents were within a productive age group with relatively adequate educational backgrounds.

Table 1. Distribution of respondent characteristics in North Lampung Regency, 2025 (n=298)

Variable	Category	Frequency	Percentage
Age	<20 years	32	10.7
	20–35 years	198	66.4
	>35 years	68	22.8
Education	Low	112	37.6
	High	186	62.4
Occupation	Not working	174	58.4
	Working	124	41.6

3.2 Distribution of Research Variables

Based on Table 2, most respondents had good knowledge (65.1%) and a positive attitude (67.8%) toward

iron supplementation. The majority of respondents also reported receiving high support from health workers (60.4%) and husbands (57.7%). Furthermore, most pregnant women were categorized as adherent in consuming TTD (67.8%), while 32.2% were non-adherent.

3.3 Bivariate Analysis

Based on Table 3, all independent variables showed a statistically significant relationship with adherence to TTD consumption ($p<0.05$). Pregnant women with good knowledge, positive attitudes, strong health worker support, and strong husband's support were more likely to be adherent. Additionally, age and education were also significantly associated with adherence, indicating that both socio-demographic and behavioral factors play important roles.

Table 2. Distribution of study variables (n=298)

Variable	Category	Frequency (n)	Percentage (%)
Knowledge	Poor	104	34.9
	Good	194	65.1
Attitude	Negative	96	32.2
	Positive	202	67.8
Health worker support	Low	118	39.6
	High	180	60.4
Husband's support	Low	126	42.3
	High	172	57.7
Adherence (TTD)	Non-adherent	96	32.2
	Adherent	202	67.8

Table 3. Relationship between independent variables and adherence to TTD consumption (n=298)

Variable	Category	Adherent n (%)	Non-adherent n (%)	*p*-value
Age	Risk	58 (58.0)	42 (42.0)	0.021
	Non-risk	144 (72.7)	54 (27.3)	
Education	Low	62 (55.4)	50 (44.6)	0.012
	High	140 (75.3)	46 (24.7)	
Knowledge	Poor	50 (48.1)	54 (51.9)	0.000
	Good	152 (78.4)	42 (21.6)	
Attitude	Negative	48 (50.0)	48 (50.0)	0.000
	Positive	154 (76.2)	48 (23.8)	
Health Worker Support	Low	60 (50.8)	58 (49.2)	0.000
	High	142 (78.9)	38 (21.1)	
Husband's Support	Low	58 (46.0)	68 (54.0)	0.000
	High	144 (83.7)	28 (16.3)	

3.4 Multivariate Analysis

Based on Table 4, knowledge, attitude, health worker support, and husband's support remained significantly associated with adherence after multivariate analysis ($p<0.05$). Health worker support was identified as the most dominant factor (OR=5.76), indicating that pregnant women who received strong support from health workers were 5.76 times more likely to be adherent compared to those with low support.

4. DISCUSSION

This study aimed to analyze the factors associated with adherence of pregnant women in consuming iron supplementation tablets (TTD) in North Lampung Regency in 2025. The findings revealed that knowledge, attitude, health worker support, and husband's support were significantly associated with adherence to TTD consumption. Among these variables, health worker support emerged as the most dominant factor influencing adherence. These results are consistent with health behavior theories, which emphasize that individual behavior is influenced by a combination of predisposing, enabling, and reinforcing factors.[19,20]

Table 4. Multivariate analysis of factors associated with adherence to TTD consumption

Variable	*p*-value	OR	95% CI
Knowledge	0.002	4.85	1.78–13.21
Attitude	0.004	3.92	1.54–9.98
Health worker support	0.001	5.76	2.10–15.80
Husband's support	0.003	4.33	1.65–11.32

The results showed that knowledge was significantly associated with adherence to iron supplementation. Pregnant women with good knowledge were more likely to comply with TTD consumption compared to those with poor knowledge. This finding is consistent with previous studies indicating that knowledge plays a crucial role in shaping health behavior by increasing awareness and understanding of the importance of preventive actions.[10,11,21]

Adequate knowledge enables pregnant women to understand the benefits of iron supplementation in preventing anemia, reducing the risk of complications such as preterm birth and low birth weight, and improving maternal and fetal health outcomes.[2,22,23] Conversely, lack of knowledge may lead to misconceptions, such as underestimating the importance of TTD or fear of side effects, which can negatively affect adherence.[24]

Attitude was also found to be significantly related to adherence. Pregnant women with a positive attitude toward iron supplementation were more likely to be adherent. This finding supports behavioral theories which suggest that attitude reflects an individual's predisposition to act based on beliefs and perceptions.[12,25] A positive attitude toward TTD consumption may include beliefs that iron tablets are beneficial, safe, and necessary during pregnancy. On the other hand, negative attitudes—such as fear of side effects like nausea or the perception that supplementation is unnecessary—can reduce adherence.[26] Previous studies have also demonstrated that attitude is a strong predictor of adherence to maternal health interventions.[27,28]

This study identified health worker support as the most dominant factor associated with adherence to TTD consumption. Pregnant women who received strong support from health workers were significantly more likely to adhere to iron supplementation. This finding is consistent with previous research highlighting the critical role of healthcare providers in influencing patient behavior.[13,29]

Health workers play an essential role in providing education, counseling, motivation, and monitoring during antenatal care. Effective communication between health workers and pregnant women can improve understanding, address concerns about side effects, and reinforce the importance of regular TTD consumption.[30,31] The dominance of this factor suggests that strengthening the role of health workers is key to improving adherence in maternal health programs.

Husband's support was also significantly associated with adherence. Pregnant women who received support from their husbands were more likely to comply with TTD consumption. This finding aligns with previous studies that emphasize the importance of family support in influencing maternal health behaviors.[14,32]

Husband's support can take various forms, including reminding pregnant women to take supplements, providing emotional encouragement, and facilitating access to healthcare services. In many cultural contexts, husbands play a key role in decision-making within the family, which can directly influence health-related behaviors.[33] Lack of support, on the other hand, may lead to decreased motivation and lower adherence.[34]

The findings of this study have important implications for public health practice. First, health education programs should focus on improving knowledge and shaping positive attitudes toward iron supplementation among pregnant women. Educational interventions should emphasize the benefits of TTD and address misconceptions related to side effects.[5,21] Second, the role of health workers should be strengthened through training in effective communication and counseling techniques. Providing continuous support, reminders, and follow-up during antenatal care visits can significantly improve adherence.[29,30] Furthermore, involving husbands and family members in maternal health programs is essential. Strategies such as family-based education and counseling can enhance social support and encourage adherence to TTD consumption.[32,33]

This study has several limitations. The cross-sectional design limits the ability to establish causal relationships between variables. In addition, the use of self-reported data may introduce bias, such as recall bias and social desirability bias. Future research is recommended to use longitudinal or experimental designs to better understand causal relationships between factors influencing adherence. Further studies should also explore additional variables such as cultural beliefs, access to healthcare services, and program implementation factors that may affect adherence. Expanding research to different regions would provide a more comprehensive understanding of adherence to iron supplementation among pregnant women.

5. CONCLUSION

This study concludes that knowledge, attitude, health worker support, and husband's support are significantly associated with adherence of pregnant women in consuming iron supplementation tablets (TTD) in North Lampung Regency. These factors play important roles in influencing adherence behavior, both from individual and external perspectives. Among these variables, health worker support emerged as the most dominant factor, indicating that pregnant women who receive adequate information, motivation, and assistance from health workers are more likely to adhere to TTD consumption.

These findings highlight the importance of strengthening both individual and social support factors in improving adherence to iron supplementation. Enhancing health education to improve knowledge and attitudes, increasing the role of health workers in counseling and monitoring, and involving husbands or family members as support systems are essential strategies to improve adherence among pregnant women. Future research is recommended to explore additional factors such as cultural beliefs, accessibility of healthcare services, and program implementation using longitudinal or experimental designs to better understand causal relationships and develop more effective interventions to prevent anemia during pregnancy.

Ethical Approval

Ethical approval was obtained from the Health Research Ethics Committee of Universitas Mitra Indonesia with Ethical Approval Number: S.25/046/FKES10/2026.

Acknowledgement

The authors would like to express their sincere gratitude to the North Lampung District Health Office and all community health centers involved for granting permission and support in conducting this study. Appreciation is also extended to all pregnant women who participated as respondents and contributed valuable data for this research. The authors also thank Universitas Mitra Indonesia for academic guidance and support throughout the study.

Competing Interests

All the authors declare that there are no conflicts of interest.

Funding Information

No funds were received for this study.

Underlying Data

Derived data supporting the findings of this study are available from the corresponding author on request.

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