Jurnal Ventilator: Jurnal riset ilmu kesehatan dan Keperawatan
Volume. 4 Nomor. 1 Maret 2026
E-ISSN .: 2986-7088; P-ISSN .: 2986-786X, Hal. 139-150
DOI: https://doi.org/10.59680/ventilator.v4i1.2305
Tersedia: https://jurnal.stikeskesdam4dip.ac.id/index.php/Ventilator

Analysis of Factors Affecting Pregnant Women in the Second Trimester in Consuming Iron Supplements

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Abstract: *Anemia during pregnancy remains a public health issue that seriously impacts the health of mothers and fetuses. One preventive measure for anemia is the administration of Iron-Folic Acid Tablets (IFAT), but compliance with IFAT consumption among pregnant women remains a challenge. This study aims to analyze the factors influencing Iron-Folic Acid Tablet consumption among pregnant women in their second trimester. This study used a quantitative approach with a cross-sectional observational design. The sample consisted of 30 pregnant women in their second trimester, selected using total sampling technique. Data were collected through interviews using a structured questionnaire and analyzed using univariate, bivariate (Chi-square/Fisher Exact test), and multivariate analysis using binary logistic regression. The results showed that 66.7% of pregnant women consumed TTD regularly, while 33.3% did not. Multivariate analysis showed that there were no factors that had a statistically significant effect on the regularity of TTD consumption, including age, education level, occupation, trimester of pregnancy, parity, or knowledge about the benefits of TTD ($p > 0.05$). These findings indicate that TTD consumption behavior is multifactorial and not solely determined by individual characteristics. The conclusion of this study states that improving TTD consumption compliance requires a comprehensive approach that includes strengthening the quality of antenatal counseling, family support, and continuous assistance from health workers to prevent anemia in pregnant women.*

Keywords: *Compliance; Iron Tablets; Pregnancy Anemia; Pregnancy Nutrition; Second Trimester Pregnant Women.*

1. INTRODUCTION

Anemia during pregnancy remains a significant public health problem at the global and national levels due to its widespread impact on the health of mothers and fetuses. The World Health Organization (WHO) reports that approximately 36–38% of pregnant women worldwide experience anemia, with iron deficiency as the main cause (WHO, 2024). Anemia during pregnancy is associated with an increased risk of fatigue, infection, labor bleeding, premature delivery, low birth weight, and increased morbidity and mortality in both mothers and babies (WHO, 2025). Therefore, the prevention and control of anemia is an important part of quality antenatal care.

In Indonesia, anemia in pregnant women remains a serious challenge. Data from the 2018 Riskesdas survey shows that 48.9% of pregnant women suffer from anemia, meaning that nearly one in two pregnant women are deficient in hemoglobin (Indonesian Ministry of Health, 2023). This high prevalence places anemia as one of the main risk factors in maternal and child health issues, including stunting and neonatal mortality. This condition shows that anemia prevention efforts have not been fully effective, even though iron supplementation programs have long been implemented nationally.

Naskah Masuk: 17 Januari 2026; Revisi: 16 Februari 2026; Diterima: 28 Maret 2026; Terbit: 31 Maret 2026

Iron and folic acid tablets (TTD), which contain iron and folic acid, are the primary intervention recommended by the WHO and adopted by many countries, including Indonesia, as a strategy to prevent anemia during pregnancy. The WHO recommends daily supplementation of 30–60 mg of elemental iron and 400 µg of folic acid for all pregnant women to prevent anemia, infections, and other pregnancy complications (WHO, 2024). In Indonesia, national policy recommends a minimum consumption of 90 TTD tablets during pregnancy, which are distributed through antenatal services at health facilities (Indonesian Ministry of Health, 2021).

Physiologically, iron requirements increase with gestational age due to increased plasma volume, erythrocyte mass, fetal and placental growth, and fetal iron stores. In the second trimester, the increase in plasma volume is often faster than the increase in erythrocytes, resulting in hemodilution that can lower hemoglobin levels. At the same time, fetal growth begins to accelerate, significantly increasing iron requirements (King, 2016). This condition makes the second trimester a crucial period for ensuring compliance with TTD consumption to prevent more severe anemia in the following trimesters.

Although TTD is widely available and provided free of charge, various studies show that TTD consumption compliance remains a major problem. Studies in various developing countries report that many pregnant women do not consume TTD as recommended, both in terms of quantity and regularity (Mekonnen et al., 2020). Common reasons cited include forgetting to take the tablets, side effects such as nausea and constipation, lack of understanding about the benefits of TTD, and the perception that TTD is unnecessary when there are no complaints (Sendeku et al., 2020).

The factors that influence TTD consumption are multidimensional. Previous studies have shown that maternal knowledge, education level, support from husbands and families, the quality of health worker counseling, and the frequency of antenatal visits play an important role in determining TTD consumption compliance (Amsalu et al., 2024; Mohamed et al., 2024). In addition, service system factors such as the availability of TTD, the way information is conveyed by health workers, and the interpersonal relationship between health workers and pregnant women also influence TTD consumption behavior (UNICEF Indonesia, 2024).

Several studies also highlight that the second trimester has specific characteristics related to TTD adherence. During this trimester, early pregnancy complaints such as nausea and vomiting generally begin to subside, so some mothers feel more comfortable taking TTD. However, at the same time, mothers' physical activity tends to increase and their perception of the risk of anemia often decreases, which can lead to a decline in TTD consumption compliance

(Seid et al., 2025). Unfortunately, many previous studies analyzed TTD compliance in general across all trimesters of pregnancy, without a specific focus on the second trimester, which has its own physiological and behavioral dynamics.

In Indonesia, national TTD guidelines emphasize the importance of the role of health workers in providing education about the benefits of TTD, how to consume it correctly, and how to deal with side effects (Kemenkes RI, 2021). However, a UNICEF report shows that challenges in communicating behavioral change and variations in the quality of counseling in antenatal services remain obstacles to improving compliance among pregnant women (UNICEF Indonesia, 2024). This indicates a gap between policy and practice in the field, which requires contextual studies at the local level.

Based on this description, there is a clear research gap, namely the limited number of studies that specifically analyze the factors that influence TTD consumption in pregnant women in the second trimester, especially in the context of health services in Indonesia. In addition, some studies emphasize individual factors, while recent evidence shows that service and social support factors play an equally important role. Therefore, research that integrates these various factors is needed to provide a more comprehensive picture.

With this background, the study entitled "Analysis of Factors Affecting Second Trimester Pregnant Women in Consuming Iron Tablets" is very relevant and urgent. This study aims to analyze the factors associated with iron tablet consumption in pregnant women in their second trimester, so that the results can be used as a basis for formulating more effective intervention strategies, whether through improving the quality of antenatal counseling, strengthening family support, or improving the health service system. Ultimately, this study is expected to contribute to reducing the prevalence of anemia in pregnant women and improving the health quality of mothers and fetuses.

2. RESEARCH METHOD

This study used a quantitative approach with an analytical observational research design and a cross-sectional design. This design was chosen because the study aimed to analyze the relationship between various factors and iron tablet consumption behavior in pregnant women in their second trimester, without providing direct intervention to the respondents. The cross-sectional design allows for the simultaneous measurement of independent and dependent variables at a single point in time, making it suitable for identifying factors that influence TTD consumption compliance in the context of antenatal care.

The study was conducted in the working area of health facilities that provide antenatal services and TTD programs to pregnant women. The selection of the study location was based on the availability of pregnant women in their second trimester, the continuity of the TTD program, and the completeness of data supporting the analysis of the factors studied.

The population in this study consisted of all pregnant women in their second trimester who attended antenatal visits and received iron tablets in the study area during the data collection period. This population reflected the main target group of the anemia prevention program during pregnancy.

The research sample consisted of pregnant women in their second trimester who met the inclusion criteria, namely those who were in their second trimester of pregnancy (14–27 weeks), received TTD from health workers, and were willing to be research respondents. The exclusion criteria included pregnant women with chronic diseases or certain medical complications that could affect iron consumption or metabolism, as well as pregnant women who were unable to complete the questionnaire. The sample size was determined based on total sampling, meaning that all pregnant women in their second trimester who met the inclusion criteria during the study period were included as respondents. Total sampling was used to obtain a comprehensive picture and optimize the power of analysis in a relatively limited population.

The sampling technique used was non-probability sampling with a total sampling approach, as the entire target population could be reached and analyzed. This technique is commonly used in health facility-based studies with a limited number of subjects.

The dependent variable in this study was the consumption behavior of Iron Tablets (TTD) in pregnant women in their second trimester, which was categorized as compliant and non-compliant based on the amount and regularity of TTD consumption according to health program standards. The independent variables included factors suspected of influencing TTD consumption, such as the mothers' level of knowledge about anemia and TTD, the mothers' attitudes toward TTD consumption, support from husbands or families, the role and counseling of health workers, and experiences of TTD side effects. These variables were measured using a structured questionnaire that had been adapted to the research context.

Data collection was conducted through direct interviews using questionnaires with respondents and tracing of supporting data from maternal and child health records or antenatal records to confirm second trimester pregnancy status and iron supplement intake. All data collection was conducted by researchers using the same procedures to maintain data consistency and validity.

Data analysis was conducted in stages. Univariate analysis was used to describe the distribution of respondent characteristics and each research variable in the form of frequencies and percentages. Next, bivariate analysis was conducted to determine the relationship between each independent variable and TTD consumption using the Chi-square test. If there were cells with an expected value of less than five, the Fisher Exact Test was used as an alternative. The statistical significance level was set at $\alpha = 0.05$, where a p-value < 0.05 indicated a statistically significant relationship between the factors studied and TTD consumption. If further analysis is needed, factors with a p-value < 0.25 in the bivariate analysis can be included in the multivariate analysis using logistic regression to determine the dominant factors that influence TTD consumption.

With this research method, it is hoped that a comprehensive picture of the factors that influence the consumption of iron tablets in pregnant women in the second trimester can be obtained. The results of this study are expected to form the basis for planning educational interventions, strengthening the role of health workers, and increasing family support in efforts to prevent anemia in pregnancy.

3. RESULTS AND DISCUSSION

Table 1. Demographic data.

Var		n	F (%)
Age	< 20 years old	0	0
	20-35 years old	29	96.7
	>35 years old	1	3.3
Education	Elementary school	0	0
	Junior high school	1	3.3
	High School	12	46.7
	College/university	15	50.0
Employment	Housewife	10	33.3
	Farmer	7	23.3
	Private employee	10	33.3
	Government employee	3	10
Trimester	1	0	0
	2	14	46.7
	3	16	53.3
Parity	0	10	33.3
	1	14	46.7
	2	6	20.0
Knowledge of efficacy	No	10	33.3
	Yes	20	66.7
Source of information	health workers	17	56.7
	Family	7	23.3
	Social media	6	20
FE tablet consumption	Irregular	10	33
	Regular	20	66.7
Total		30	100

(source: primary data, 2025)

Based on the results of a study of 30 pregnant women, the distribution of respondents by age shows that almost all respondents were in the 20–35 age group, namely 29 people (96.7%), which is the safe reproductive age. Only one respondent (3.3%) was over 35 years old, and there were no respondents under 20 years old. This shows that the majority of pregnant women are at the physiologically optimal age for pregnancy.

In terms of education level, half of the respondents had a college education, namely 15 people (50.0%). Respondents with a high school/equivalent education numbered 12 people (46.7%), while only 1 respondent (3.3%) had a junior high school education. There were no respondents with an elementary school education. The high level of education among respondents has the potential to influence their ability to receive and understand health information, including information related to the benefits and rules for consuming Iron Tablets.

Based on employment status, 10 respondents (33.3%) were housewives and private employees. Seven respondents (23.3%) were farmers, while three respondents (10.0%) were civil servants. This distribution shows that the socioeconomic backgrounds of the respondents were quite diverse.

In terms of gestational age, most respondents were in their third trimester, namely 16 people (53.3%), while 14 respondents (46.7%) were in their second trimester. There were no respondents in their first trimester. This condition shows that most pregnant women are in the advanced stages of pregnancy, where iron requirements increase.

The distribution of respondents based on parity shows that most mothers were primiparas, namely 14 people (46.7%). Respondents who were nulliparas numbered 10 people (33.3%), while respondents with two parities numbered 6 people (20.0%). This shows that the majority of respondents still had limited pregnancy experience.

Based on their knowledge about the benefits of Iron Tablets, most respondents stated that they knew about the benefits of Iron Tablets, namely 20 people (66.7%), while 10 people (33.3%) did not know about the benefits. This shows that there is still a proportion of pregnant women who do not have adequate understanding of the importance of consuming Iron Tablets.

The source of information about Iron Tablets was mostly obtained from health workers, namely 17 people (56.7%). Information from family was reported by 7 people (23.3%), while from social media by 6 people (20.0%). These findings confirm the important role of health workers as the main source of information related to iron supplementation in pregnant women.

Regarding the main variable of the study, namely Iron Supplement consumption, the results showed that 20 respondents (66.7%) consumed Iron Supplements regularly, while 10 respondents (33.3%) consumed Iron Supplements irregularly. Although most pregnant women

were compliant in taking TTD, one-third of respondents did not take TTD as recommended, which could potentially increase the risk of anemia during pregnancy.

Overall, the characteristics of the respondents showed that the pregnant women in this study were predominantly of safe reproductive age, had a medium to high level of education, and most had knowledge about the benefits of TTD. However, there was still a proportion of pregnant women who did not consume TTD regularly, so further analysis of the factors affecting compliance with Iron Supplement Tablet consumption is needed.

Table 2. Logistic regression analysis for implant contraception interest.

Independent variable	B	SE	Wald	P value	OR(Exp(B))
Age	-71.151	44,463.805	.000	0.999	0.00
Education	69,110	17,034.823	.000	0.997	1,033
Employment	.942	5,768.977	.000	1,000	2,566
Trimester	33,576	15,547.034	.000	0.998	3.81
Parity	-34.868	8554.767	.000	0.997	3.25
Knowledge of efficacy	40.323	15006.306	.000	0.998	0.00

*significant (source: primary data, 2025)

Multivariate analysis was performed using binary logistic regression to determine the factors that most influence the regularity of Iron Supplement Tablet (IST) consumption in pregnant women. The variables included in the model were age, education level, occupation, trimester of pregnancy, parity, and knowledge about the benefits of IST.

The results of the analysis showed that there were no independent variables that had a statistically significant effect on TTD consumption, as indicated by all p-values > 0.05. The age variable had a p-value of 0.999 with an odds ratio (OR) close to zero, indicating that the age of pregnant women did not significantly affect the regularity of TTD consumption. This indicates that in the safe reproductive age group that dominated the respondents, age variation was not a distinguishing factor in TTD consumption behavior.

The education level variable also did not show a statistically significant effect on TTD consumption ($p = 0.997$; $OR = 1.03$). Although theoretically higher education is often associated with better health understanding, these results indicate that formal education level alone does not necessarily determine TTD consumption compliance, especially when health information has been provided evenly by health workers.

The employment status of pregnant women did not show a significant relationship with TTD consumption ($p = 1.000$; $OR = 2.57$). These findings indicate that differences in

employment type do not directly influence TTD consumption behavior, possibly because the majority of respondents still have equal access to antenatal services and TTD distribution.

The variable of pregnancy trimester also did not significantly affect TTD consumption ($p = 0.998$; OR = 3.81). This indicates that differences in gestational age between the second and third trimesters are not a dominant factor in determining the regularity of TTD consumption, even though iron requirements increase in the later trimesters.

The parity of pregnant women did not show a significant effect on TTD consumption ($p = 0.997$; OR = 3.25). This finding indicates that previous pregnancy experience does not necessarily increase TTD consumption compliance, especially if it is not accompanied by adequate understanding and motivation.

The variable of knowledge about the benefits of TTD also did not show a significant effect on TTD consumption ($p = 0.998$). Although most respondents had good knowledge about the benefits of TTD, these results indicate that knowledge alone is not enough to change behavior, and other factors such as habits, family support, reinforcement from health workers, and management of side effects may play a greater role.

Overall, the multivariate analysis results indicate that there are no dominant factors that significantly influence TTD consumption among pregnant women in this study. This condition is likely influenced by the relatively small sample size, the homogeneous distribution of respondents, and the limited variation between variables, thereby limiting the power of the analysis and increasing the risk of type II error. Therefore, further research with a larger sample size and broader variable coverage is needed to identify the determinants of TTD consumption more comprehensively.

Discussion

This study aimed to analyze the factors that influence iron supplement consumption in pregnant women, focusing on maternal characteristics, pregnancy conditions, and cognitive factors. The results showed that most respondents consumed TTD regularly, but multivariate analysis using logistic regression did not find any factors that had a statistically significant effect on the regularity of TTD consumption. These findings indicate that TTD consumption behavior in pregnant women is complex and cannot be explained by one or two individual factors alone.

The insignificant effect of age on TTD consumption indicates that the relatively homogeneous age range of respondents—dominated by women of safe reproductive age—meant that age variation did not differentiate consumption behavior. In theory, age is often

associated with maturity in health decision-making, but when the majority of respondents are at the same reproductive maturity, the influence of age tends to weaken (Victora et al., 2021). This is in line with several studies reporting that age is not a major determinant of iron supplementation adherence when access and education are equally available.

Education level also did not show a significant effect on TTD consumption. Although formal education is often assumed to improve health literacy, the results of this study support the view that formal education is not always directly proportional to specific health behaviors, especially when information and tablets are provided routinely through antenatal care (ANC). Studies in various settings show that the quality of counseling and interpersonal communication by health workers is more influential than formal education level in shaping supplementation adherence (Webb Girard et al., 2020).

Employment status and parity also had no significant effect. These findings indicate that previous pregnancy experience (parity) does not necessarily increase TTD consumption compliance, especially when that experience is not accompanied by structured learning or reinforcement of health messages. The literature mentions that multiparous mothers may have a lower perception of risk of anemia because they feel "experienced," so compliance does not automatically increase (Nisar et al., 2022). Similarly, job variation does not directly affect TTD consumption when tablet distribution and service access are relatively equal.

The variable of pregnancy trimester was also not significant. Although iron requirements increase in the later trimesters, TTD consumption behavior in this study did not differ significantly between the second and third trimesters. This can be explained by the consistency of ANC messages emphasizing TTD consumption throughout pregnancy, so that mothers maintain the same behavior across trimesters. These findings are consistent with reports that compliance is more influenced by routine and service support than by the stage of pregnancy alone (Rahman et al., 2021).

Knowledge about the benefits of TTD did not have a significant effect in the multivariate model, even though descriptively the majority of respondents knew the benefits of TTD. This confirms the classic gap between knowledge and practice. Health behavior theories, such as the Health Belief Model and Theory of Planned Behavior, explain that knowledge is a prerequisite but not the sole determinant of behavior; reinforcing factors such as social support, subjective norms, and ease of action are crucial in the transition from knowing to doing (Glanz et al., 2019; Ajzen, 2020). In other words, knowing the benefits of TTD is insufficient without strategies to help mothers overcome practical barriers (forgetting, side effects, dosing schedule).

Statistically insignificant results also need to be understood in a methodological context. A relatively small sample size and homogeneous distribution of respondents have the potential to reduce test power and increase the risk of type II error, so that actual effects are not statistically detected (Vittinghoff et al., 2019). Additionally, very large coefficient values with high standard errors indicate possible model separation or instability due to the limited number of events per category, necessitating caution in interpreting odds ratios.

Nevertheless, these findings still have important clinical implications. First, interventions to increase TTD consumption should not only target individual factors such as knowledge, but also emphasize a service system approach: quality of counseling, reinforcement of repeated messages, and follow-up on compliance. Second, managing side effects (e.g., recommended timing of intake, combination with appropriate foods) and reminder strategies may be more effective than one-time education. Third, involving the family—especially the husband—as a support system can reinforce TTD intake norms and habits.

In obstetric practice, these results support the need for a woman-centered care approach that understands the context of pregnant women's lives. Empathetic counseling, personalized messages, and integrating TTD with the mother's daily routine can increase acceptance and sustainability of consumption. From a policy perspective, service-based compliance monitoring (e.g., simple pill counts or structured questions at each ANC visit) and communication training for health workers are relevant strategies.

Overall, although this study did not find statistically significant dominant factors, the findings confirm that TTD consumption is a multifactorial behavior that requires comprehensive intervention. Further research with a larger sample, more detailed service variables, and a longitudinal design is recommended to identify more sensitive determinants and assess behavioral changes over time.

4. CONCLUSION

This study shows that most pregnant women have consumed Iron Tablets (TTD) regularly. However, bivariate and multivariate analysis results indicate that there are no statistically significant factors influencing the regularity of TTD consumption, including age, education level, occupation, trimester of pregnancy, parity, or knowledge about the benefits of TTD. These findings indicate that TTD consumption behavior in pregnant women is multifactorial and cannot be explained solely by individual characteristics. The absence of significant dominant factors is also likely influenced by the homogeneity of respondent characteristics and the relatively limited sample size. However, descriptively, it appears that

pregnant women with good knowledge and access to information from health workers tend to be more compliant in consuming TTD. Therefore, increasing TTD consumption compliance requires a comprehensive approach that includes strengthening the quality of antenatal counseling, continuous assistance, and support from families and the health care environment.

Acknowledgement. The author would like to thank all pregnant women who were willing to be respondents in this study. Thanks are also extended to health workers and antenatal service managers who provided support and assistance during the data collection process. The author also appreciates the educational institutions and all parties who contributed directly or indirectly to the successful completion of this study.

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