
The Relationship Between Pregnant Women's Level of Knowledge Regarding Iron (Fe) Tablet Consumption and the Incidence of Anemia

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Abstract

Anemia among pregnant women remains a public health problem in Indonesia because it increases the risk of pregnancy complications as well as maternal and infant mortality. Low adherence to iron (Fe) tablet consumption is often associated with a low level of knowledge. This study aimed to determine the relationship between pregnant women's level of knowledge regarding iron (Fe) tablet consumption and the incidence of anemia in the working area of Tanjung Agung Public Health Center, Ogan Komering Ulu Regency, in 2025. This study employed an analytical design with a cross-sectional approach involving 65 respondents selected using accidental sampling. Data were collected through interviews using a knowledge-level questionnaire and hemoglobin measurement using an Hb stick, then analyzed using the Chi-Square (χ^2) test at a 95% confidence level. The results showed that 35 pregnant women (53.8%) experienced anemia, while 30 women (46.2%) were not anemic, with a p-value of 0.031, indicating a statistically significant relationship between pregnant women's level of knowledge and the incidence of anemia. In conclusion, better knowledge among pregnant women regarding iron (Fe) tablet consumption is associated with a lower risk of anemia. It is recommended that health workers enhance nutrition education and conduct routine monitoring of adherence to iron tablet consumption at every antenatal care visit

Keywords: Anemia, Pregnant Women, Knowledge, Iron (Fe) Tablets

INTRODUCTION

Anemia remains a major global public health problem, particularly among pregnant women. The World Health Organization (WHO) reported that approximately 38% of pregnant women worldwide suffer from anemia due to iron and folic acid deficiency (WHO, 2015). Anemia during pregnancy can lead to serious risks for both mother and fetus, including preterm birth, low birth weight, and maternal mortality (WHO, 2018). In Indonesia, the prevalence of anemia among pregnant women increased from 37.1% in 2013 to 48.9% in 2018 based on the National Basic Health Research (Riskesmas) report (Ministry of Health of the Republic of Indonesia, 2018). This increasing trend indicates that the effectiveness of iron supplementation programs for women of reproductive age and pregnant women, as regulated in Minister of Health Regulation No. 88 of 2014, remains suboptimal (Ministry of Health of the Republic of Indonesia, 2014).

The distribution of anemia in Indonesia is uneven due to regional disparities in the utilization of antenatal care (ANC) services and nutrition education (Laksono, Rukmini, & Wulandari, 2020). The Indonesian Health Profile report shows that the coverage of consuming at least 90 iron (Fe) tablets during pregnancy has not yet reached the national target (Ministry of Health of the Republic of Indonesia, 2019). Analysis of the 2017 Indonesian Demographic and Health Survey (IDHS) revealed that anemia is more prevalent among pregnant women with low knowledge levels, low socioeconomic status, and poor adherence to iron tablet consumption (BPS, BKKBN, & Ministry of Health of the Republic of Indonesia, 2017). A study by Guspaneza, Martha, and Health Promotion (2019) demonstrated that educational level, frequency of ANC visits, and support from health workers influence the incidence of anemia among pregnant women in Indonesia. These findings indicate that promotive and preventive efforts remain insufficient.

Pregnant women's knowledge regarding the importance of iron tablet consumption is a key factor influencing adherence to iron supplementation (Shofiana, Widari, & Sumarmi, 2018). Research by Awalamaroh, Rahayu, and Yuliana (2018) showed that women with higher levels of knowledge tend to have better anemia status because they are more compliant with iron tablet consumption as

recommended. Selvaraj, Arumugasamy, and Sarkar (2017) found that in Tamil Nadu, knowledge and motivation play major roles in shaping iron tablet consumption patterns among pregnant women and adolescent girls. Similarly, a study by Yunita, Supiyah, and Isdana (2018) demonstrated that knowledge, age, and educational level were significantly associated with adherence to iron tablet consumption at Tirtajaya Public Health Center.

Adherence to iron tablet consumption among pregnant women is crucial for preventing iron deficiency anemia. Studies in Ethiopia have shown that adherence is influenced by education, regular ANC visits, and perceptions of the benefits of supplementation (Agegnehu, Atenafu, Dagne, & Dagne, 2019; Gebremichael & Welesamuel, 2020). Similar findings were reported by Kamau, Mirie, and Kimani (2018) in Kenya, where low adherence was attributed to side effects, boredom, and inadequate information from health workers. Birhanu, Birarra, and Mekonnen (2018) further emphasized that repeated education and direct monitoring by health workers significantly increase iron tablet consumption.

Several studies in Indonesia have reinforced that knowledge and regular ANC visits are positively associated with adherence to iron tablet consumption. A study by Nurmasari and Sumarmi (2019) in Probolinggo found that pregnant women with routine ANC visits and good knowledge were less likely to experience anemia. Sri Hartatik (2013) highlighted that socioeconomic factors and family support also influence adherence to iron tablet consumption. Research by Triyani and Purbowati (2016) in Jakarta emphasized the important role of midwives and health counseling in improving pregnant women's motivation to consume iron tablets as recommended. Ruwayda (2016) stated that strengthening the implementation of antenatal care service standards by midwives at public health centers is essential to ensure effective delivery of iron tablet education.

Economic and social status are also strongly associated with adherence to iron tablet consumption. Yuliansyah, Trismiana, and Keswara (2015) found that low income is a major contributor to anemia among pregnant women due to limited dietary iron intake. A study by Rosmala et al. (2018) in Palu showed that iron tablet consumption levels and anemia incidence are influenced by pregnant women's socioeconomic background. Manas et al. (2013) in India added that educational level and household income determine the extent to which pregnant women comply with iron tablet recommendations. Similar results were reported by Yuliarti and Daryanti (2018), who found that parity and income were associated with adherence to iron tablet consumption at Godean II Public Health Center.

International studies demonstrate consistent patterns regarding the influence of knowledge and socioeconomic factors on adherence to iron supplementation. Studies by Tarekegn et al. (2019) and Kassa et al. (2019) in Ethiopia identified maternal education and frequency of ANC visits as primary predictors of adherence to iron tablet consumption. Nasir, Fentie, and Adisu (2020) reported that anemia remains prevalent among pregnant women who do not routinely consume supplements due to lack of awareness of their benefits. Abebaw et al. (2020) and Pathirathna et al. (2020) also concluded that behavioral factors and family support play important roles in sustaining iron supplementation during pregnancy.

These conditions indicate the importance of educational approaches in improving pregnant women's knowledge regarding the benefits of iron tablets. Juanda (2020), in a systematic review, stated that knowledge and positive attitudes toward iron supplementation are dominant factors influencing adherence. A study by Siabani et al. (2018) in Iran supported this conclusion by showing that community-based educational interventions effectively reduce anemia prevalence. Similar approaches were proposed by Dunneram and Jeewon (2015), who emphasized the importance of multilevel strategies and community responsibility in nutrition programs for women of reproductive age. This aligns with the findings of Widji Utomo, Nurdiati, and Padmawati (2015), who reported that low iron intake and poor adherence to iron tablet consumption directly increase the risk of anemia. In addition to knowledge and economic factors, age, parity, and support from health workers have also been shown to influence iron tablet consumption. Destiana, Harokan, and Zaman (2025) reported that

anemia among adolescent girls is largely caused by low nutritional awareness and limited knowledge of iron supplementation. Puspitasari et al. (2025) further emphasized that inadequate education and negative perceptions of iron tablets are major contributors to anemia among adolescent girls. A study by Sari, Harokan, and Zaman (2025) demonstrated that continuous education and maternal motivation significantly improve adherence to iron tablet consumption at Muara Enim Public Health Center. These findings highlight the need for integrated health interventions involving health workers, families, and communities.

Based on these findings, it can be concluded that pregnant women's knowledge regarding the importance of iron tablet consumption plays a strategic role in preventing anemia. Low levels of knowledge, poor adherence, and insufficient educational support from health workers remain major barriers to reducing anemia prevalence in Indonesia. Therefore, this study aims to analyze the relationship between pregnant women's level of knowledge regarding iron tablet consumption and the incidence of anemia.

RESEARCH METHODS

This study employed an analytical design with a cross-sectional approach, which aims to determine the relationship between independent and dependent variables collected at the same point in time. The independent variable in this study was pregnant women's level of knowledge regarding iron (Fe) tablet consumption, while the dependent variable was the incidence of anemia among pregnant women. Each respondent was observed only once without any treatment or intervention; therefore, the data obtained reflect the actual condition of the respondents at the time of the study. This design was chosen because it is considered time- and cost-efficient and appropriate for simultaneously assessing the relationship between two variables within the studied population.

The study was conducted in the working area of Tanjung Agung Public Health Center, Ogan Komering Ulu Regency, which is one of the areas with relatively high coverage of maternal health services. This location was selected due to the availability of complete pregnancy-related data, ease of access for the researcher, and strong support from health workers in implementing the research activities. The study was carried out from January to February 2025, covering all stages of the research process, including the collection of primary and secondary data as well as data processing and analysis. The selected period was aligned with the antenatal care service schedule at the public health center to ensure a smooth data collection process.

The population of this study consisted of all pregnant women recorded in the pregnancy register book within the working area of Tanjung Agung Public Health Center from January to February 2025, totaling 73 individuals with gestational ages ranging from 28 to 40 weeks. From this population, 65 respondents were selected as the study sample using accidental sampling. This sampling technique involves selecting respondents encountered by the researcher at the study location who meet the inclusion criteria. Accidental sampling was chosen because it suited the dynamic field conditions and was able to represent the characteristics of pregnant women attending antenatal care services at the public health center.

The research procedure was carried out in three main stages: preparation, implementation, and evaluation. The preparation stage included obtaining permission from the public health center, arranging the research schedule, and conducting a pilot test of the questionnaire to ensure clarity of the questions. The implementation stage involved direct interviews with respondents using a structured questionnaire to assess knowledge levels, as well as hemoglobin measurements using an Hb stick to determine anemia status. The evaluation stage consisted of checking data completeness, cleaning data from input errors, and compiling data tabulations prior to statistical analysis.

The research instruments consisted of two main measurement tools: a knowledge questionnaire and a hemoglobin measurement device (Hb stick). The questionnaire was used to assess pregnant

women’s level of knowledge regarding adherence to iron tablet consumption based on Notoatmodjo’s theory (2018), which includes aspects of benefits, consumption methods, side effects, and the importance of iron supplementation. Knowledge scores were categorized into three levels: good if the score was >76%, moderate if 56–76%, and poor if <56%. The incidence of anemia was determined based on hemoglobin examination results using an Hb stick, where Hb levels <10 g/dL were categorized as anemia and ≥10 g/dL as non-anemia. These instruments were used to obtain accurate, measurable, and objective data.

The data collected consisted of primary and secondary data. Primary data were obtained directly from interviews with respondents and hemoglobin examination results, while secondary data were collected from pregnancy register records, antenatal care service reports, and administrative data from the public health center. Prior to analysis, the data underwent editing, coding, entry, cleaning, checking, and processing to ensure validity and reliability. After the validation process, the data were entered into statistical software for analysis according to the research objectives.

Data analysis was conducted using univariate and bivariate analyses. Univariate analysis was used to describe the characteristics of each variable, such as age, education level, parity, knowledge level, and anemia status, using frequency distributions presented as percentages. Bivariate analysis was performed to examine the relationship between pregnant women’s level of knowledge regarding iron tablet consumption and the incidence of anemia using the Chi-Square (χ^2) test with a 95% confidence level. The results were considered statistically significant if the p-value was <0.05, indicating a significant relationship between the two variables, whereas a p-value >0.05 indicated no significant relationship.

This study was conducted in accordance with research ethics principles, including informed consent, anonymity, and confidentiality of respondents’ data. Before completing the questionnaire, the researcher explained the objectives, benefits, and procedures of the study to respondents both verbally and in writing. Each respondent was provided with an informed consent form to indicate voluntary participation without coercion. Data confidentiality was ensured by assigning numerical codes to each questionnaire without including personal identifiers. This study also obtained official permission from the Tanjung Agung Public Health Center.

RESULTS AND DISCUSSION

This section presents the research findings regarding the relationship between pregnant women’s level of knowledge about iron (Fe) tablet consumption and the incidence of anemia in the working area of Tanjung Agung Public Health Center, Ogan Komering Ulu Regency. The data were obtained from 65 pregnant women who met the inclusion criteria. Univariate analysis was conducted to describe the respondents’ characteristics, while bivariate analysis was performed to examine the relationship between pregnant women’s level of knowledge and the incidence of anemia using the Chi-Square (χ^2) statistical test with a 95% confidence level.

Table 1. Frequency Distribution of Respondents’ Characteristics

Respondent Characteristics	Frequency (n)	Percentage (%)
Anemia Status		
Anemia	35	53,8
Nor anemic	30	46,2
Age		
<20 years	1	1,5
20-35 years	59	90,8
>35 years	5	7,7
Occupation		
Civil servant	4	6,2

Housewife	56	86,2
Self-employed	3	4,6
Farmer	2	3,1
Education Level		
Primary school	9	13,8
Junior high school	17	26,2
Senior high school	31	47,7
Higher education	8	12,3
Parity		
Primiparous	6	9,2
Multiparous	57	87,7
Grandemultiparous	2	3,1

Based on Table 1, out of 65 pregnant women, 35 respondents (53.8%) were anemic, while 30 respondents (46.2%) were not anemic. The majority of respondents were aged 20–35 years (90.8%), worked as housewives (86.2%), had a senior high school education (47.7%), and were predominantly multiparous (87.7%). These findings indicate that most pregnant women were within the productive age group and had prior pregnancy experience; however, the prevalence of anemia remained relatively high.

Table 2. Relationship between the Level of Knowledge of Pregnant Women and the Incidence of Anemia

Variables	Anemia Status				Total	%	pvalue
	Anemia		Nor anemic				
	f	%	f	%			
Level of Knowledge							0,031
Good	14	40	7	23,3	21	21	
Moderate	5	14,3	13	43,4	18	18	
Poor	16	45,7	10	33,	26	26	

The analysis results showed that among 21 pregnant women with good knowledge, 14 women (40%) experienced anemia and 7 women (23.3%) were not anemic. In the group with moderate knowledge, 5 women (14.3%) experienced anemia and 13 women (43.4%) were not anemic. Meanwhile, in the group with poor knowledge, 16 women (45.7%) experienced anemia and 10 women (33%) were not anemic. The Chi-Square test yielded a p-value of 0.031, indicating a statistically significant relationship between pregnant women’s level of knowledge regarding iron (Fe) tablet consumption and the incidence of anemia. These results indicate that the lower the level of knowledge among pregnant women, the higher the risk of anemia. Therefore, improving nutrition education and adherence to iron tablet consumption should be prioritized in antenatal care services at Tanjung Agung Public Health Center.

This condition confirms that knowledge plays an important role in determining adherence behavior toward iron supplementation during pregnancy (Shofiana, Widari, & Sumarmi, 2018). These findings are consistent with the study by Awalamaroh, Rahayu, and Yuliana (2018), which reported that pregnant women with higher levels of knowledge were more compliant with iron tablet consumption and thus had a lower risk of anemia. Adequate knowledge encourages pregnant women to understand the benefits of iron supplementation in maintaining their own health and that of the fetus. This result also supports the findings of Yunita, Supiyah, and Isdana (2018), who emphasized that education and knowledge are directly associated with adherence to iron tablet consumption.

Pregnant women’s knowledge regarding iron tablet consumption is shaped through education and experiences during pregnancy. Women who actively attend antenatal care services have greater opportunities to receive accurate information about the benefits of iron supplementation (Laksono, Rukmini, & Wulandari, 2020). A study by Nurmasari and Sumarmi (2019) found that regular antenatal

care visits were positively correlated with adherence to iron tablet consumption. In addition, frequent interactions with health workers are one of the factors that can increase pregnant women's awareness of the importance of anemia prevention (Ruwayda, 2016). Thus, antenatal care services should not only focus on physical examinations but also strengthen educational components to enhance pregnant women's knowledge.

Adherence to iron tablet consumption is highly dependent on pregnant women's understanding of the benefits and possible side effects. Women with poor knowledge often discontinue iron tablet consumption due to negative perceptions of side effects such as nausea or constipation (Kamau, Mirie, & Kimani, 2018). The findings of this study are consistent with those of Birhanu, Birarra, and Mekonnen (2018) in Ethiopia, who reported that women with low knowledge levels and insufficient explanations from health workers were more likely to stop taking supplements. Psychological factors such as fatigue or irregular intake of iron tablets are also commonly found among women with poor knowledge (Abebaw et al., 2020). Therefore, structured educational interventions are essential strategies for building understanding and improving adherence to iron supplementation.

The results of this study also indicate that although most respondents had a secondary education level and were multiparous, a substantial proportion still experienced anemia. This finding suggests that previous pregnancy experience does not necessarily improve health behavior, especially when it is not accompanied by continuous education (Sri Hartatik, 2013). Rosmala et al. (2018) reported that multiparous women who did not regularly attend antenatal care were more likely to experience anemia. Socioeconomic factors also influence this condition, as women with lower income have limited access to iron-rich foods and health information (Yuliansyah, Trismiana, & Keswara, 2015). Therefore, formal education and pregnancy experience need to be supported by ongoing health education to improve iron tablet consumption behavior.

In addition to knowledge and education, family and health worker support also play important roles in reducing the incidence of anemia. Tarekegn et al. (2019) found that support from husbands and health workers increased pregnant women's adherence to regular iron tablet consumption. A positive supportive environment motivates pregnant women to maintain their own health and that of their fetus. These findings are consistent with the study by Siabani et al. (2018) in Iran, which emphasized that social and emotional family factors influence pregnant women's adherence behavior toward iron supplementation. Therefore, strategies to reduce anemia prevalence should involve families in the health education process to optimize support and supervision of iron tablet consumption.

From a health service perspective, nutrition counseling and iron tablet distribution still face challenges in the field. Guspaneza, Martha, and Health Promotion (2019) reported that the implementation of iron supplementation programs remains uneven due to limited personnel and time for providing individual education to pregnant women. Similar findings were reported by Widji Utomo, Nurdiati, and Padmawati (2015), who found that low iron intake and poor adherence to iron tablet consumption were directly associated with increased anemia incidence at Kembaran Public Health Center, Banyumas. Furthermore, Dunneram and Jeewon (2015) emphasized that anemia prevention efforts require multilevel strategies involving communities, health workers, and educational institutions to create long-term behavioral change.

Pregnant women's level of knowledge is also related to access to health information provided by medical personnel. Kassa et al. (2019) stated that women's knowledge and behavior improved significantly after receiving counseling on the benefits of iron supplementation. Pathirathna et al. (2020) in Sri Lanka also showed that routine counseling provided at each antenatal care visit positively influenced pregnant women's adherence to iron supplementation. Thus, health workers play a strategic role in delivering clear, understandable information and motivating pregnant women to adhere to iron tablet consumption. Targeted educational efforts can foster positive and sustainable health behavior changes.

Overall, the findings of this study reinforce global evidence that improving knowledge is one of the key determinants of successful anemia prevention programs among pregnant women. The World Health Organization (WHO, 2018) emphasized that nutrition education interventions and regular iron supplementation can reduce anemia prevalence by up to 50% among pregnant women. Juanda (2020) added that good knowledge promotes positive attitudes and consistent iron tablet consumption behavior. Based on the results of this study, continuous educational strategies through antenatal care programs using an interpersonal approach between midwives and pregnant women are needed. This approach is expected to improve knowledge, enhance adherence to iron tablet consumption, and ultimately reduce the incidence of anemia in the working area of Tanjung Agung Public Health Center.

CONCLUSION

There was a statistically significant relationship between pregnant women's level of knowledge regarding iron (Fe) tablet consumption and the incidence of anemia ($p = 0.031$). Pregnant women with lower levels of knowledge tended to have hemoglobin levels below 10 g/dL compared to those with good knowledge. This finding indicates that better knowledge among pregnant women is associated with higher adherence to iron tablet consumption, thereby reducing the risk of anemia. Factors such as educational level, regularity of antenatal care visits, family support, and the role of health workers also contribute to iron tablet consumption behavior. Therefore, improving pregnant women's knowledge through health education is a strategic approach to reducing the prevalence of anemia in the working area of Tanjung Agung Public Health Center, Ogan Komering Ulu Regency.

Based on the study results, it is recommended that health workers, particularly midwives and nutrition officers, enhance routine nutrition education and counseling activities for pregnant women regarding the importance of iron tablet consumption during pregnancy. Public health centers are expected to develop group- and family-based educational programs to strengthen social support in improving adherence to iron supplementation. In addition, regular monitoring of hemoglobin levels and iron tablet distribution is necessary to ensure the sustainability of anemia prevention programs. Future researchers are encouraged to explore other factors, such as daily dietary intake, medication side effects, and spousal support, that may influence adherence to iron tablet consumption, so that the interventions developed can be more comprehensive and effective.

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