

Relationship Between Pregnant Women's Knowledge of Iron (Fe) Tablets and Incidence of Anemia at PMB Shinta, Medan Polonia District, North Sumatera Province

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Abstract: Anemia during pregnancy remains a major public health problem in Indonesia. One of the contributing factors is inadequate maternal knowledge regarding iron (Fe) tablets, which may affect adherence to supplementation and increase the risk of anemia.

Objective: This study aimed to analyze the relationship between pregnant women's knowledge of iron (Fe) tablets and the incidence of anemia at PMB Shinta, Medan Polonia District, North Sumatera Province, in 2025. **Methods:** This quantitative study employed a cross-sectional design. The study involved all 30 pregnant women attending antenatal care at PMB Shinta, selected through total sampling. Data were collected using a structured questionnaire and hemoglobin examination. The data were analyzed using descriptive statistics and the Chi-Square test. **Findings:** The results showed that 56.7% of respondents had poor knowledge and 60.0% experienced anemia. A significant relationship was found between maternal knowledge and the incidence of anemia, with a p-value of 0.013. Pregnant women with poor knowledge had a 10.5-times higher likelihood of experiencing anemia than those with good knowledge (OR = 10.5; 95% CI: 1.889–58.359). **Implications:** The findings indicate the need to strengthen health education during antenatal care, particularly regarding the benefits, dosage, timing, and proper consumption of iron tablets. Improved maternal knowledge is expected to support adherence to iron supplementation and reduce the incidence of anemia during pregnancy. **Originality:** This study provides recent empirical evidence from a primary midwifery practice in Medan Polonia by directly examining the relationship between maternal knowledge of iron tablets and anemia incidence. The findings offer practical value for developing targeted, community-based maternal health education strategies.

Keywords: Anemia; Hemoglobin; Iron (Fe) Tablets; Knowledge; Pregnant Women.

INTRODUCTION

Pregnancy is a process of physiological, anatomical, and biochemical change. One of these involves changes in the hematological system, such as an increase in blood volume, a decrease in hemoglobin (Hb) levels, and an increased need for iron to support fetal growth and development. The World Health Organization (WHO) states that around 40% of the Maternal Mortality Rate (MMR) is caused by iron-deficiency anemia, which leads to

hemorrhage. In Asia, the incidence of anemia is high and remains a problem in developing countries, including Indonesia ([World Health, 2019](#)).

According to reports from the Indonesian Ministry of Health, anemia among pregnant women once increased from 37.1% to 48.9%, while the most recent survey estimated its prevalence at around 27.7% ([Kementerian Kesehatan, 2022](#)). Anemia remains a significant public health problem in Indonesia, including during and after the pandemic ([Ameline et al., 2025](#)). Pregnant women constitute one of the groups at high risk of anemia because of the physiological changes that occur during pregnancy, namely hemodilution.

Based on the Indonesian Health Profile, the coverage of Blood Supplement Tablet (Tablet Tambah Darah/TTD) provision of at least 90 tablets for pregnant women in 2022 was 86.2%, an increase from 84.2% in 2021. The province with the highest coverage was Bali (91.7%), whereas the lowest was West Papua (18.4%) ([Kementerian Kesehatan, 2022](#)). The impacts of anemia on pregnant women include abortion, premature labor, impaired fetal growth, low birth weight, hemorrhage, and an increased risk of maternal and infant mortality.

Data obtained from PMB Shinta, Medan Polonia District, North Sumatera Province, indicate that pregnant women's knowledge regarding compliance with Fe tablet consumption is still relatively low. Some pregnant women pay little attention to their pregnancy in terms of consuming iron tablets, so they often feel tired, appear pale, become easily fatigued, and experience dizziness. A preliminary survey of 10 respondents showed that 8 had poor knowledge about the benefits of Fe tablets and consumed them irregularly, whereas 2 had good knowledge and attitudes toward compliance with iron tablet consumption.

Previous studies on Fe tablet consumption compliance and anemia can be grouped into three approaches. First, studies emphasizing biological determinants and iron intake. The iron requirement of pregnant women increases sharply so that it cannot be met from food alone and requires Fe tablet supplementation. Iron-folic acid supplementation has been shown to be associated with a reduced risk of anemia, although its effectiveness depends heavily on the level of compliance ([Saragih et al., 2022](#); [Sendeku et al., 2020](#))

Second, studies highlighting behavior and compliance. Although Fe tablet distribution programs have been running, pregnant women's compliance remains low and is a key determinant of successful anemia prevention ([Kassa et al., 2019](#); [Yismaw et al., 2022](#)). Non-compliance is often triggered by side effects such as nausea, vomiting, and

constipation, as well as forgetfulness and boredom (Hardido et al., 2023; Saeed et al., 2024). In Indonesia, compliance levels vary across regions and remain a challenge (Laila, 2025; Rabiattunnisa & Mujahadatuljannah, 2024). Third, studies emphasizing the role of knowledge. Pregnant women's knowledge is positively associated with Fe tablet consumption compliance and anemia prevention efforts (Balcha et al., 2023; Niza et al., 2022; Utari & Al Rahmad, 2022). Several studies in Indonesia have found a significant relationship between pregnant women's knowledge or attitudes and compliance (Agnes Kusumasari et al., 2021; Andira & Sulastri, 2025; Fauzianty et al., 2024), while nutrition education during pregnancy has been shown to improve compliance and reduce the incidence of anemia (Engidaw et al., 2025). In contrast, most Indonesian studies have examined knowledge in relation to self-reported Fe tablet compliance, or were conducted in community health centers (puskesmas) and hospitals; relatively few have directly quantified the association between pregnant women's knowledge and the biologically confirmed outcome of anemia (via hemoglobin measurement) at an independent primary midwife practice (Praktik Mandiri Bidan/PMB). The novelty of this study is that it provides local, Hb-based evidence from a PMB in the urban Medan Polonia area to inform targeted, midwife-led education. This gap is the focus of the present study.

This study aims to analyze the relationship between pregnant women's knowledge of iron (Fe) tablets and the incidence of anemia at PMB Shinta, Medan Polonia District, North Sumatera Province, in 2025. Specifically, it identifies the level of pregnant women's knowledge, determines the proportion of anemia based on hemoglobin examination, and tests the strength and direction of the association between them using bivariate analysis.

This study is expected to provide a scientific contribution in the form of empirical evidence on the role of pregnant women's knowledge in preventing anemia during pregnancy, while also serving as a basis for health workers in designing more targeted education. The research hypotheses are: H_a - there is a significant relationship between pregnant women's knowledge of iron (Fe) tablets and the incidence of anemia; H_0 - there is no significant relationship between them.

RESEARCH METHOD

The unit of analysis in this study is pregnant women who attended antenatal care (ANC) visits at PMB Shinta, Medan Polonia District, North Sumatera Province, in 2025. This is a quantitative analytic study using a cross-sectional design, in which the

independent and dependent variables are measured at the same time. This design was chosen because it is suitable for testing the relationship between knowledge and the incidence of anemia at a single point in time.

The main data source is primary data obtained directly from respondents through a structured questionnaire assessing the level of knowledge about iron (Fe) tablets, together with hemoglobin (Hb) examination results to determine the incidence of anemia.

The study population comprised all pregnant women who attended ANC visits at PMB Shinta, totaling 30 people. The sampling technique was total sampling, so that the entire population (30 people) served as the sample. Data were collected through interviews, a structured questionnaire, and hemoglobin (Hb) examination, from May to June 2025. The independent variable was pregnant women's knowledge of iron (Fe) tablets, and the dependent variable was the incidence of anemia (categorized as anemic if the Hb level was below 11 g/dL and not anemic if 11 g/dL or above, in accordance with WHO criteria for pregnant women). The classification of knowledge into good and poor categories is detailed under the Instruments subsection below.

Pregnant women's knowledge of iron (Fe) tablets was measured using a self-developed questionnaire consisting of 20 multiple-choice items. Knowledge scores were classified as good (score $\geq 50\%$) or poor (score $< 50\%$), following the knowledge categorization approach. The instrument was tested for reliability prior to data collection and showed good internal consistency (Cronbach's alpha = 0.80).

Hemoglobin (Hb) levels were measured using an Easy Touch GCHb point-of-care digital analyzer at any gestational age (across all trimesters). Anemia was defined using the WHO threshold for pregnant women (Hb below 11 g/dL).

This study was reviewed and approved by the Ethics Committee of STIKes Mitra Husada Medan (ethical approval No. 360/KEP-MHM/VII/2025). Before data collection, all respondents received an explanation of the study's aims and procedures and provided written informed consent. Participation was voluntary, and respondents' confidentiality was maintained throughout the study.

Data were analyzed univariately to describe each variable as a frequency distribution, and bivariately using the Chi-Square test (with Continuity Correction for the 2×2 table) at a 95% confidence level. The strength of association was expressed as an odds ratio with a 95% confidence interval. A relationship was considered significant if the p-value was 0.05 or below.

RESULT

Respondent Characteristics

Respondent characteristics included age, education, and occupation. As shown in Table 1, the majority of pregnant women were 36–45 years old (21 respondents; 70.0%), followed by those aged 20–35 years (9 respondents; 30.0%). In terms of education, most respondents had completed senior high school (17 respondents; 56.7%), followed by junior high school (7; 23.3%), primary school (4; 13.3%), and a bachelor's degree (2; 6.7%). In terms of occupation, 17 respondents (56.7%) were employed and 13 (43.3%) were unemployed.

Table 1. Characteristics of Pregnant Women at PMB Shinta, Medan Polonia District, in 2025

Characteristic	Frequency (n)	Percentage (%)
Age		
20–35 years	9	30.0
36–45 years	21	70.0
Education		
Primary school	4	13.3
Junior high school	7	23.3
Senior high school	17	56.7
Bachelor's degree	2	6.7
Occupation		
Employed	17	56.7
Unemployed	13	43.3
Total	30	100.0

Pregnant Women's Knowledge and the Incidence of Anemia

The univariate analysis showed that the majority of pregnant women had poor knowledge (17 respondents; 56.7%), while 13 respondents (43.3%) had good knowledge, as presented in Table 2. Based on the incidence of anemia, the majority of pregnant women were anemic (18 respondents; 60.0%), while 12 (40.0%) were not, as shown in Table 3.

Table 2. Knowledge Category of Pregnant Women at PMB Shinta in 2025

Knowledge	Frequency (n)	Percentage (%)
Good	13	43.3
Poor	17	56.7
Total	30	100.0

Table 3. Anemia Incidence Category at PMB Shinta in 2025

Incidence of Anemia	Frequency (n)	Percentage (%)
Not Anemic	12	40.0
Anemic	18	60.0

Total	30	100.0
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The Relationship Between Knowledge and the Incidence of Anemia

As shown in Table 4, among all 30 respondents, 9 mothers (30.0%) had good knowledge and were not anemic, whereas 14 mothers (46.7%) had poor knowledge and were anemic. Expressed within knowledge groups, 9 of the 13 mothers with good knowledge (69.2%) were not anemic, while 14 of the 17 mothers with poor knowledge (82.4%) were anemic. The Chi-Square test confirmed a significant association (Pearson $\chi^2 = 8.167$, $p = 0.004$; Continuity Correction $p = 0.013$, < 0.05), with an odds ratio of 10.5 (95% CI 1.889–58.359). Therefore, there is a significant relationship between pregnant women's knowledge of iron (Fe) tablets and the incidence of anemia: the better a pregnant woman's knowledge, the lower the incidence of anemia.

Table 4. The Relationship Between Pregnant Women's Knowledge of Iron (Fe) Tablets and the Incidence of Anemia at PMB Shinta in 2025

Knowledge	Not Anemic		Anemic		Total		p-value
	n	%	n	%	n	%	
Good	9	30.0	4	13.3	13	43.3	0.013
Poor	3	10.0	14	46.7	17	56.7	
Total	12	40.0	18	60.0	30	100.0	

Knowledge or cognition is a very important domain in the formation of a person's behavior ([Notoatmodjo, 2017](#)). Behavior based on knowledge tends to last longer than behavior that is not. The level of knowledge is influenced by education, mass media exposure, information, and experience; low education reduces the ability to absorb information, including information about Fe tablets ([Niza et al., 2022](#)).

The quality of interaction with health workers also influences compliance; the more frequently a mother interacts with and has her pregnancy checked by health workers, the more information she obtains, so she is more likely to comply ([Yismaw et al., 2022](#)). Pregnant women with good knowledge but who do not regularly consume Fe tablets can still develop anemia, because iron requirements increase sharply in the later trimesters and cannot be met from food alone ([Saragih et al., 2022](#)). Structured nutrition education has been shown to improve compliance while reducing the incidence of anemia ([Engidaw et al., 2025](#))

These findings are consistent with ([Fauzianty et al., 2024](#)), who found a significant relationship between pregnant women's knowledge and compliance with blood supplement tablet consumption ($p=0.012$), as well as other studies concluding that the better a pregnant woman's knowledge, the higher her compliance and the lower the incidence of anemia ([Andira & Sulastris, 2025](#); [Utari & Al Rahmad, 2022](#)).

DISCUSSION

This study demonstrates that pregnant women's knowledge of iron (Fe) supplementation is significantly associated with the incidence of anemia. Women with good knowledge were more likely to be free from anemia, whereas the majority of women with poor knowledge experienced anemia. The odds ratio of 10.5 indicates that respondents with poor knowledge had a substantially higher likelihood of developing anemia than those with good knowledge. These findings suggest that knowledge is not merely a cognitive attribute but an important determinant of preventive health behavior during pregnancy.

The high proportion of respondents with poor knowledge (56.7%) reflects persistent gaps in maternal health education despite the availability of antenatal care services. Limited understanding of the benefits of iron supplementation, the correct timing of tablet consumption, possible side effects, and strategies for managing those side effects may reduce adherence to iron tablet intake. According to health behavior theory, knowledge serves as the foundation for attitude formation and behavioral change; therefore, inadequate knowledge may weaken motivation to consistently consume iron supplements throughout pregnancy ([Notoatmodjo, 2017](#)). Similar findings have been reported by ([Niza et al., 2022](#)), who observed that lower educational attainment and limited access to health information contributed to poorer knowledge regarding iron supplementation among pregnant women.

The present findings are consistent with previous studies conducted in Indonesia and other countries. ([Fauzianty et al., 2024](#)), reported that pregnant women with better knowledge demonstrated significantly higher compliance with blood supplement tablet consumption. Likewise, ([Andira & Sulastris, 2025](#)) concluded that improved maternal knowledge enhances adherence to iron supplementation, which subsequently reduces the risk of anemia. International evidence also supports this relationship, with systematic reviews demonstrating that knowledge-based interventions and maternal education consistently improve adherence to iron-folic acid supplementation across low- and middle-income countries ([Engidaw et al., 2025](#); [Saragih et al., 2022](#)).

Although knowledge is a key determinant, it is unlikely to be the only factor influencing anemia. Some respondents with good knowledge were still anemic, indicating that adequate knowledge alone does not always translate into optimal health outcomes. Physiological increases in iron requirements during pregnancy, particularly during the second and third trimesters, may exceed dietary iron intake when supplementation is inconsistent. Furthermore, gastrointestinal side effects, forgetfulness, inadequate family support, socioeconomic constraints, and limited access to quality antenatal services may reduce adherence despite adequate knowledge ([Hardido et al., 2023](#); [Saeed et al., 2024](#)). This finding highlights the need to combine educational interventions with continuous counseling, family involvement, and routine monitoring of iron tablet consumption.

The relatively high prevalence of anemia (60.0%) observed in this study also indicates that anemia remains an important maternal health problem in the study setting. This prevalence is consistent with reports showing that anemia during pregnancy continues to be a major public health concern in many low- and middle-income countries, including Indonesia ([Kementerian Kesehatan, 2022](#); [World Health, 2019](#)). Recent evidence from Indonesia similarly reported that maternal anemia remains common despite national iron supplementation programs, suggesting that program effectiveness depends not only on tablet distribution but also on improving maternal understanding and adherence ([Ameline et al., 2025](#)).

From a practical perspective, these findings emphasize the importance of strengthening health education during antenatal care. Midwives and other healthcare providers should deliver structured counseling on the benefits of iron supplementation, methods to minimize side effects, dietary practices that enhance iron absorption, and the importance of completing the recommended supplementation regimen. Educational strategies should be supported by regular follow-up, reminder systems, and family participation to improve compliance and ultimately reduce the burden of maternal anemia. Such comprehensive interventions are expected to contribute to better maternal and fetal health outcomes while supporting national efforts to reduce anemia among pregnant women.

CONCLUSION

The majority of pregnant women at PMB Shinta had poor knowledge (17 respondents; 56.7%) and were anemic (18 respondents; 60.0%). The Chi-Square test yielded a Pearson

p-value of 0.004 (Continuity Correction 0.013; odds ratio 10.5, 95% CI 1.889–58.359), indicating a significant relationship between pregnant women's knowledge of iron (Fe) tablets and the incidence of anemia. The better a pregnant woman's knowledge, the lower the incidence of anemia.

This study strengthens the empirical evidence on the role of knowledge as a determinant of anemia prevention among pregnant women. In practical terms, these findings underscore the importance of targeted health education by health workers, particularly midwives, to improve maternal knowledge, support Fe tablet consumption, and reduce the incidence of anemia.

This study has several limitations, namely a small sample size (30 respondents), a single location, and a cross-sectional design that cannot establish causal relationships. Future research is recommended to use larger samples, multiple locations, and a longitudinal design to strengthen the generalizability of the findings.

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AUTHORS' NOTE

The authors declare that there is no conflict of interest regarding the publication of this article. The authors confirmed that the paper was free of plagiarism.

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