

## **The Relationship Between Knowledge and Compliance in Consuming Iron (Fe) Tablets with The Incidence of Anemia Among Female Adolescents at SMA N 1 Suruh**

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### **Abstract**

*Anemia remains a significant health problem among adolescent girls, primarily due to low hemoglobin levels. Although the prevalence has declined in recent years, it is still considered relatively high according to global health standards. In several regions, from provincial to local levels, the proportion of adolescent girls affected by anemia remains substantial. In some primary healthcare service areas, the prevalence has even shown an increasing trend. One of the key contributing factors is the low level of knowledge and adherence among adolescents in consuming iron (Fe) supplements. Despite the increasing national coverage of iron tablet distribution, the proportion of adolescents who consume the recommended amount remains very low. Common reasons for non-compliance include discomfort after consumption, forgetfulness, lack of perceived benefits, and concerns about side effects. Iron supplementation programs have long been implemented as a government intervention to prevent anemia. However, their effectiveness largely depends on the behavior, awareness, and consistency of adolescents in taking the supplements regularly. = This study aims to determine the relationship between knowledge and compliance in consuming Fe tablets with the incidence of anemia among female adolescents at SMA N 1 Suruh. Research. This study used a descriptive correlational design with a cross-sectional approach. The sample consisted of 89 female students in grade XI at SMA N 1 Suruh who had undergone anemia screening. Sampling was conducted using purposive sampling. Data were collected through questionnaires to assess knowledge and compliance levels, and secondary hemoglobin data from Suruh Public Health Center. Data were analyzed using the Chi-Square test with a significance level of 0.05. The results showed that most respondents had low knowledge and low compliance in consuming Fe tablets. There was a significant relationship between knowledge and the incidence of anemia (p-value = 0.022, OR = 0.301), and between compliance in consuming Fe tablets and the incidence of anemia (p-value = 0.045, OR = 2.764). There is a*

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*significant relationship between the level of knowledge and compliance in consuming Fe tablets with the incidence of anemia among female adolescents. Strengthening education and consistent monitoring of Fe tablet consumption are essential to reduce anemia rates in this population.*

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## **Introduction**

Anemia is a condition in which the level of hemoglobin or the number of red blood cells in the body is below the normal limit, so that the blood is unable to bind and circulate oxygen optimally to all body tissues (Budiarti et al., 2021). According to World Health Organization (2023) anemia occurs when hemoglobin levels are less than 12 g/dL in women. This condition can interfere with the physiological functioning of the body, especially in vulnerable groups such as adolescent girls.

Adolescent girls have a high risk of experiencing anemia because they are in a growth period that requires optimal nutritional intake, coupled with menstrual factors that cause regular blood loss. Based on Indonesia Basic Health Research, 2018) the prevalence of anemia in the age group of 15-24 years reached 32%, with 27.2% of them being adolescent girls. The results of the 2023 Indonesian Health Survey (SKI) show a decrease in the prevalence of anemia to 16.2% nationally, and 15.5% in adolescent girls aged 15–24 years. Despite the decline, this figure is still relatively high because the WHO has determined that the prevalence above 10% has been categorized as a public health problem (Ministry of Health, 2023)

In Central Java Province, based on Central Java Provincial Health Office (2023), the percentage of adolescent girls in grades 7 and 10 who were screened for Hb levels reached 85.39%, with 30.45% of them experiencing anemia. In Semarang Regency itself, 26% of adolescents are recorded as having anemia (Central Java Provincial Health Office, 2023). In the work area of the Suruh Health Center, the prevalence of anemia in high school/vocational/MA adolescent girls was recorded at 7.3% in September 2024 and increased to 8.2% in February 2025. At SMA N 1 Suruh, the incidence rate of anemia increased from 3.5% to 4.6% in that period, while other schools in the Suruh area such as SMK Muhammadiyah, SMK NU, and MAN 1 Suruh also showed fluctuations in the incidence of anemia.

Anemia in adolescents negatively impacts physical health, cognitive abilities, and productivity. Adolescents with iron deficiency have a double risk of experiencing decreased academic achievement, especially in subjects such as mathematics (Setiani & Warsini, 2023). In addition, anemia also causes fatigue, concentration disorders, weak immunity, and emotional disturbances (Chisti et al., 2022). The risk of anemia in adolescent girls is known to be ten times higher than in adolescent men. Causative factors include unhealthy diet, fast food consumption, low iron intake, poor nutritional status, parasitic infections, and lack of understanding and compliance with Fe tablet consumption (Siyami et al., 2023)

Knowledge is an important factor in the prevention of anemia. Adolescents with a good understanding of anemia tend to be more concerned about diet and anemia prevention (Kusnadi, 2021). Research by Sulistyorini & Maesaroh (2019) shows a relationship between knowledge level and the incidence of anemia; Adolescents with good knowledge are more likely to maintain nutritional intake and are more active in preventing anemia.

In addition to knowledge, compliance in taking blood supplement tablets (TTD) is a determining factor for the success of iron supplementation programs (Asiyah, 2023). Low adherence is caused by laziness, boredom, side effects such as nausea, as well as a lack of motivation and understanding of the benefits of TTD (Georgieff et al., 2019; Ningtyias et al., 2020). Although TTD has been shown to be effective in increasing hemoglobin levels

Rizki Amalia et al. (2024), the success of the program is highly dependent on consistency of consumption by adolescents.

The TTD program for adolescent girls has been carried out since 2014 in accordance with the Regulation of the Minister of Health of the Republic of Indonesia No. 51 of 2016, with the target of adolescents aged 10-18 years through educational institutions. Young women are recommended to take one tablet per week and one tablet daily during menstruation (Ministry of Health, 2023). The coverage of TTD distribution nationwide continues to increase, from 31.3% in 2021 to 78.9% in 2023. In Central Java, coverage also increased from 29.3% to 59.3%. However, routine consumption is still low, only about 3% of adolescent girls consume TTD as recommended. Common reasons for not consuming include feeling unwell (31.2%), forgetting (22.5%), feeling unuseful (14.5%), and side effects (10.2%) (Ministry of Health, 2023).

At SMA N 1 Suruh, the TTD program has been active again since 2024. The distribution of tablets is carried out every three months along with anemia screening by the Suruh Health Center. Students get one tablet every month and consume it at school. However, compliance is still low (10%) because female students do not consume TTD outside of school. The implementing teacher said that the success of the program only reached 50%, due to limited stock and lack of awareness among students.

The results of interviews with 10 students of SMA N 1 Suruh showed that only 2 people knew about anemia and Fe tablets, and none of them complied in consumption as recommended. Most still consume junk food and drinks such as jumbo iced tea. As a result, 7 out of 10 schoolgirls had hemoglobin levels below 12 g/dL.

Research results Fitriany & Saputri (2018) it can be concluded that there is a significant relationship between knowledge and compliance in consuming iron tablets. Individuals with high knowledge have a 31 times greater chance of complying with iron tablet consumption compared to respondents with low knowledge. In addition to being influenced by knowledge factors, iron tablet consumption in adolescents is also influenced by other factors, such as lack of interest and motivation in consuming iron tablets as iron supplements. This is because individuals feel they are not sick and do not need supplementation, as well as the lack of acceptance of the side effects caused by iron tablets. Please explain the English correctly.

Based on the above background, the researcher is interested in conducting research with the title "The Relationship between Knowledge and Compliance of Fe Tablet Consumption with the Incidence of Anemia in Adolescent Girls at SMA N 1 Suruh".

## Method

This study used a descriptive correlational method with a cross-sectional approach. This design was chosen to determine the relationship between the level of knowledge and compliance in consuming iron (Fe) tablets and the incidence of anemia among adolescent girls. The cross-sectional approach allows researchers to collect data at a specific point in time, providing an overview of the relationships between variables simultaneously without observing changes over time.

The research was conducted at SMA Negeri 1 Suruh, located in Suruh District, Semarang Regency. Data collection was carried out in June 2025. The population in this study consisted of all 11th-grade female students of SMA Negeri 1 Suruh in June 2025, totaling 119 students. The sample included 89 female students selected using a purposive sampling technique. The samples were deliberately chosen based on specific criteria established by the researcher to ensure that they accurately represented the population relevant to the research objectives.

The inclusion criteria included 11th-grade female students who had received Fe tablets and participated in anemia screening (hemoglobin examination), were in good physical and mental health, and were willing to participate as respondents. The exclusion

criteria included students who were absent during data collection, unwilling to participate, experiencing illness or serious health problems, and those who had not undergone anemia screening. The final sample size was determined based on attendance and fulfillment of the predetermined criteria.

Furthermore, bivariate analysis was performed using the Chi-square test to determine the relationship between knowledge and compliance variables and the incidence of anemia among adolescent girls at SMA Negeri 1 Suruh.

## Results and Discussion

### Results

#### Respondent Characteristics

Overview of the Distribution of Respondent Characteristics Based on the Age of Grade XI Students of SMA N 1 Suruh

Table 1.1 Frequency Distribution of Respondent Characteristics by Age

Age	Frequency (f)	Presentase (%)
17 years	48	55,8 %
16 years old	38	44,2 %
<b>Total</b>	<b>86</b>	<b>100</b>

Based on table 1.1 above, it can be seen that the characteristics based on the age of 17 years there were 48 respondents (55.8%) and the age of 16 years there were 38 respondents (44.2%).

Overview of Classification Distribution Ever and Never Getting Information About Fe Tablets Grade XI Students of SMA N 1 Tell

Table 1.2 Frequency Distribution of Respondents by Classification Have and Never Received Information About Fe Tablets

Category	Frequency (f)	Presentase (%)
<b>Pernah</b>	68	79,1 %
<b>Never</b>	18	20,9 %
<b>Total</b>	<b>86</b>	

Based on the table, 68 respondents (79.1%) have received information about Fe tablets and 18 respondents (29.1%) have never received information about Fe tablets.

### Univariate Analysis

Overview of Knowledge About Fe Tablets for Grade XI Students of SMA N 1 Tell

Table 2.1 Frequency Distribution of Knowledge About Fe Tablets

Knowledge Categories	Frequency (f)	Presentase (%)
Less	23	26,7 %
Good	63	73,3 %
Total	86	100 %

Based on table 4.3 above, after measuring Fe tablet knowledge using a questionnaire, the results showed that there were 23 respondents (26.7%) in the low category of knowledge and 63 respondents (73.3%) in the good category. This shows that the majority of respondents have good knowledge.

Overview of Tablet Consumption Compliance for Grade XI Students of SMA N 1 Command.

Table 2.2 Frequency Distribution of Fe Tablet Consumption Compliance

Compliance Categories	Frequency (f)	Presentase (%)
Non-compliant	62	72,1 %
Obedient	24	27,9 %
Total	86	100

Based on table 2.2 above, after measuring compliance with Fe tablet consumption using a questionnaire, the results showed that respondents who did not comply with Fe tablet consumption as many as 62 (72.1%) and respondents who complied with Fe tablet consumption as many as 43 (27.9%). This shows that the majority of respondents are not compliant in consuming Fe tablets

Overview of the incidence of anemia in adolescent girls in grade XI of SMA N 1 Suruh

Table 2.3 Distribution of Frequency of Anemic Events in Young Women

Category Anemia	Frequency (f)	Presentase (%)
Anemia	40	46,5 %
No anemia	46	53,5 %
Total	86	100 %

Based on table 2.3 above, it can be seen that 40 (46.5%) respondents had anemia and 46 (53.5%) respondents did not have anemia. This indicates that anemia among young women in grade XI of SMA N 1 Suruh is still quite high, because almost half of grade XI students experience anemia. In this study, anemia data was obtained from the Suruh Health Center, so the researcher did not know whether or not at the time of the anemia examination.

### Bivariate Analysis

The Relationship Between Knowledge of Fe Tablet Consumption and the Incidence of Anemia in Grade XI Adolescent Girls at SMA N 1 Suruh

Table 3.1 Relationship of Knowledge of Fe Tablet Consumption with the Incidence of Anemia in Adolescent Girls in Class XI at SMA N 1 Suruh

Knowledge	Event Anemia				p-value	OR 95% CI	
	Anemia		No				
	n	%	n	%			N
Good	34	39,5%	29	33,7%	63	73,3%	0,022 0,301 (0,105- 0,864)
Less	6	7,0%	17	19,8%	23	26,7%	
Total	40	46,5%	46	53,5%	86	100%	

Based on table 3.1 above, it can be seen that respondents who have a good level of knowledge who experience anemia are 34 respondents (39.5%), while those who do not experience anemia are 29 respondents (33.7%). Respondents who had a low level of knowledge experienced anemia as many as 6 respondents (7.0%), while those who did not experience anemia were 17 respondents (53.5%).

In this study, the results of a statistical test using *the chi square test* were obtained with a p value of 0.022 which means it is smaller than 0.005. Thus, it can be concluded that

there is a significant relationship between knowledge about Fe tablets and the incidence of anemia in adolescent girls in grade XI at SMA N 1 Suruh. An OR value of 0.301 indicates that respondents who have good knowledge are 0.301 times less likely to develop anemia compared to those with less knowledge.

The Relationship Between Fe Tablet Consumption Compliance and the Incidence of Anemia in Grade XI Adolescent Girls at SMA N 1 Suruh

Table 3.2 Relationship of Compliance with Fe Tablet Consumption and the Incidence of Anemia in Grade XI Adolescent Girls in SMA N 1 Tell

Compliance	Event Anemia						p-value	OR 95% CI
	Anemia		No					
	n	%	n	%	N	%		
Obedient	7	8,1%	17	19,8%	24	27,9%	0,045	2,764 (1,005- 7,601)
Non-compliant	33	38,4%	29	33,7%	62	72,1%		
Total	40	46,5%	46	53,5%	86	100%		

Based on table 4.9 above, it can be seen that respondents who have a level of compliance with anemia are 7 respondents (8.1%), while those who do not experience anemia are 17 respondents (19.8%). Respondents who had a level of non-compliant knowledge experienced anemia as many as 33 respondents (38.4%), while those who did not experience anemia were 29 respondents (33.7%).

In this study, the results of a statistical test using *the chi square test* were obtained with a p value of 0.045 which means it is smaller than 0.005. Thus, it can be concluded that there is a significant relationship between compliance in consuming Fe tablets and the incidence of anemia in grade XI students at SMA N 1 Suruh. An OR value of 2.764 showed that respondents who did not comply in consuming Fe tablets had a 2.764 times greater risk of developing anemia compared to respondents who complied with consuming them.

## Discussion

### Univariate Analysis

#### Overview of Knowledge About Fe Tablets for Grade XI Students of SMA N 1 Tell

According to (Notoarmodjo, 2018) knowledge is the result of the process of human sensing an object through the five senses. Knowledge can also be interpreted as the result of a person's understanding of an object, both in the form of objects and events.

Adolescents' knowledge of Fe tablets plays an important role in shaping consumption behaviors, influencing diet, and helping to understand the benefits of Fe tablets in achieving optimal nutritional status (Georgieff et al., 2019).

Factors that affect adolescents' knowledge include education, information media, economic conditions, environment, socio-culture, experience, and age. In this study, the researcher assumes that age and information are the main factors that affect the knowledge of grade XI students at SMA N 1 Suruh. The older a person gets, the more maturity and thinking ability he or she can think (Rusdiana & Zubaidah, 2024).

#### Overview of Tablet Consumption Compliance for Grade XI Students of SMA N 1 Command.

According to (Blass, 1999) obedience is the attitude of a person who is willing to follow orders or directions from others. Obedience can be seen in various forms, as long as a person shows obedience to others or to the rules that apply. In compliance with the rules,

there are three important things, namely *belief*, acceptance, and acting. Compliance also plays an important role in preventing anemia. Compliance is a behavior that arises as a result of the interaction between health workers and patients, where the patient understands the plan given, agrees to the consequences and executes it. A high level of adherence in consuming blood-boosting tablets can help young women avoid anemia. Adherence to consuming Fe tablets is one of the main factors that affect the success of an iron supplementation program. (Asiyah, 2023)

The results are in line with a study conducted by (Hasianna Silitonga et al., 2023) in Jakarta that 60% of adolescent girls do not comply with the recommendations in consuming Fe tablets, even though the supplement has been provided by the school. The results of this study show that although the intervention has been carried out adequately, there are still obstacles such as lack of understanding of the importance of iron or discomfort when consuming Fe tablets, which can be an obstacle to achieving optimal levels of compliance.

### **Overview of the incidence of anemia in adolescent girls in grade XI of SMA N 1 Suruh**

According to WHO, anemia occurs when the level of hemoglobin in the blood is below 12 g/dL, which leads to a reduction in the blood's capacity to transport oxygen (Rahman & Fajar, 2024) Adolescent girls are more susceptible to anemia due to increased nutritional needs, blood loss during menstruation, malnutrition, low iron intake, and food consumption that inhibits iron absorption. This nutritional anemia is generally caused by a lack of consumption of iron-rich foods, especially during menstruation (Nasruddin et al., 2021).

Research by (Zakiyyah et al., 2025) at MTs Nurul Iman Sekincau shows an anemia prevalence of 51%, indicating that the rate of anemia in adolescent girls can vary between regions, but it is generally caused by diet, nutritional status, menstrual cycle, and low knowledge and compliance with Fe tablet consumption.

Based on this, researchers assume that the high rate of anemia in grade XI students at SMA N 1 Suruh is caused by low knowledge about nutritious foods, especially those containing iron, as well as lack of compliance in consuming Fe tablets. In fact, knowledge and adherence to the consumption of Fe tablets is very important in increasing adolescents' awareness of anemia prevention.

### **Bivariate Analysis**

#### **The Relationship Between Knowledge of Fe Tablet Consumption and the Incidence of Anemia in Grade XI Adolescent Girls at SMA N 1 Suruh**

Adolescent knowledge plays an important role in shaping attitudes and behaviors, including in the prevention of anemia. Good knowledge of blood supplement tablets (TTD) can encourage adolescents to develop the habit of consuming tablets regularly (Azizah & Fatah, 2023). This affects food choices as well as awareness of the importance of iron to prevent anemia.

Research by (Sab'ngatun & Riawati, 2021) shows a significant relationship between the level of knowledge and consumption of TTD, with a value of  $p = 0.001$ . However, it is also known that high knowledge is not always followed by the right behavior, as seen from 39.5% of well-informed respondents who still experience anemia. This shows that knowledge alone is not enough, as behavior is also influenced by other factors such as the environment, information media, education, and age (Ledy Ervita et al., 2026).

Lawrence Green also emphasized that knowledge is a basic component of the formation of behavior. Good understanding can form confidence and awareness to act, including in regular consumption of TTD (Andani et al., 2020)

The results of research at SMA N 1 Suruh support this. Respondents with good knowledge were mostly not anaemic (33.7%), while in the less knowledgeable group, some

were also not anaemic (19.8%). This indicates that good knowledge can be a protective factor against anemia.

Overall, good knowledge tends to encourage adolescents to choose nutritious foods, regularly consume TTD, and avoid risk factors for anemia. Conversely, a lack of knowledge can lead teens to overlook the importance of iron supplementation.

The study of (Astrika Yunita et al., 2020) also showed a significant association between knowledge of iron consumption and the incidence of anemia ( $p = 0.004$ ), while (Yanniarti et al., 2023) found different results, where there was no significant association ( $p = 0.068$ ), although the prevalence of anemia remained higher in low-knowledge adolescents. This shows that in addition to knowledge, other factors also affect the incidence of anemia.

### **The Relationship Between Fe Tablet Consumption Compliance and the Incidence of Anemia in Grade XI Adolescent Girls at SMA N 1 Suruh**

The results of this study are in line with the theory that adherence to taking Fe tablets regularly plays an important role in the prevention of anemia. According to Notoarmodjo (2018) positive health behaviors, such as adherence to iron supplement consumption, are a crucial factor in preventing malnutrition. Health Belief Model (HBM) theory and health behavior theory also explain that a person's actions are greatly influenced by perceptions of disease risk, severity, benefits, and obstacles in prevention efforts (Priyoto, 2021).

Adolescents with a good understanding of anemia tend to have a high awareness of the risks and are more motivated to take Fe tablets regularly. Research by (Yanniarti et al., 2023) supports this, showing that adolescents who are not compliant have a 79 times higher risk of anemia than those who are compliant ( $p=0.000$ ).

However, another study by Nuraina & Hidayani (2024) found no significant association between adherence to Fe tablet consumption and the incidence of anemia ( $p=1,000$ ), although the proportion of anemia was higher in the group that did not regularly take tablets. This suggests that compliance is not the only factor that affects anemia.

The researchers assume that while adherence to Fe tablet consumption is important, other factors such as knowledge, diet, menstruation, and rest also play a role. This is supported by (Nurjanah & Azinar, 2023) who found that attitudes, support from parents, teachers, and health workers had a significant effect on adolescent compliance levels ( $p<0.05$ ).

In addition, research by (Anisa Yulianti et al., 2024) shows that the incidence of anemia in adolescents is influenced by many factors, including knowledge ( $p=0.000$ ), compliance with Fe tablet consumption ( $p=0.000$ ), rest pattern ( $p=0.000$ ), menstrual pattern ( $p=0.000$ ), and diet ( $p=0.025$ ). Thus, a multidimensional approach is needed in efforts to prevent anemia in adolescent girls.

### **Conclusion**

This study highlights that anemia among adolescent girls remains a significant public health concern, even in settings where prevention programs such as iron supplementation have been implemented. The findings emphasize that both knowledge and compliance with Fe tablet consumption play important roles in reducing the risk of anemia. Better knowledge tends to act as a protective factor, as it encourages healthier behaviors, including improved dietary choices and awareness of anemia prevention. Meanwhile, low compliance with Fe tablet consumption is associated with a higher likelihood of anemia, indicating that behavioral adherence is a critical determinant of program effectiveness.

These results have important implications for practice and policy. Efforts to reduce anemia in adolescent girls should not only focus on increasing the distribution coverage of Fe tablets but also prioritize strengthening health education, behavioral interventions, and

monitoring systems to ensure consistent consumption. School-based programs need to be optimized through regular supervision, engaging health promotion strategies, and collaboration between teachers, health workers, and families to improve both knowledge and adherence. In addition, addressing barriers such as side effects, forgetfulness, and low motivation is essential to enhance the success of supplementation programs.

However, this study has several limitations. The use of a cross-sectional design limits the ability to determine causal relationships between variables. Data collection was conducted at a single point in time and in one school setting, which may limit the generalizability of the findings to other populations. In addition, reliance on secondary data for hemoglobin levels and self-reported questionnaires for measuring knowledge and compliance may introduce bias. Therefore, future research is recommended to use longitudinal designs, larger and more diverse samples, and more objective measurement methods to obtain a more comprehensive understanding of factors influencing anemia in adolescent girls.

### **Suggestion**

Based on the results of the study, the recommendations are directed toward improving knowledge and compliance with Fe tablet consumption as key factors in preventing anemia among adolescent girls. For respondents, these findings are expected to serve as a basis for increasing awareness and understanding of the importance of regularly consuming Fe tablets, thereby encouraging more compliant behavior in preventing anemia.

For schools, particularly teachers at SMA N 1 Suruh, an active role is needed in monitoring and supervising students when consuming Fe tablets at school. This is important considering that the study found low levels of compliance among students. Direct supervision, along with continuous health education, can help improve adherence and reduce the incidence of anemia.

For the public health center (Puskesmas), the results of this study can be used as a reference in strengthening health education programs, especially regarding the importance of Fe tablet consumption among adolescent girls. In addition, Puskesmas are expected to develop more effective and innovative strategies for delivering health information and to conduct regular monitoring to ensure that the supplementation program is implemented optimally.

For future researchers, it is recommended to develop this research further by considering its limitations, such as the use of a cross-sectional design and the limited research setting. Future studies are encouraged to use more comprehensive approaches, such as longitudinal or interventional designs, and to develop more engaging, interactive, and innovative educational methods to improve knowledge and compliance among adolescents in preventing anemia.

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