

# Knowledge, attitude, intention, and program implementation of iron supplementation among adolescent girls in Sidoarjo, Indonesia

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## Abstract

**Background.** The government established an iron supplementation program as a solution to overcome anemia in adolescent girls in Indonesia. Research shows that various factors influence the compliance of adolescent girls in consuming iron supplements, including knowledge, attitude, intention, and program implementation.

**Objective.** This study aims to determine adolescent girls' knowledge, attitudes, and intentions and explore the program

implementation of iron supplementation in high school adolescent girls in Sidoarjo, Indonesia.

**Materials and Methods.** This was mixed-method research. Quantitative data was collected on 202 girls students from 3 high schools in Sidoarjo using a questionnaire. Qualitative data was collected by interviewing 13 high school girls from 3 schools in Sidoarjo and Focus Group Discussion with the health office and primary health center representatives in Sidoarjo.

**Results.** Most adolescent girls' knowledge about anemia was still poor (59.9%), but knowledge about iron supplements was mostly good (59.9%). The attitudes towards anemia and iron supplements and intentions to consume iron supplements in adolescent girls were mostly low (51.0% and 51.5%). The focus group discussion found that the program was already referred to national guidelines, but the pandemic affected the implementation. Findings from the interview with adolescent girls show that the distribution of iron supplements in schools was carried out in 3 ways: distributed with explanations, distributed without explanation, and distributed only to students who request it or feel anemic.

**Conclusion.** There is a need to improve the knowledge, attitudes, and intentions of adolescent girls and improve the implementation of iron supplementation programs in schools in Sidoarjo, Indonesia.

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## Introduction

The government has implemented an iron supplementation program for high school girls to reduce the prevalence of anemia.<sup>1</sup> Of the 80.9% of adolescent girls who get iron supplements in school, only 1.4% consume iron supplements regularly, more than 52 tablets in one year.<sup>2</sup> The effectiveness of iron supplements as a solution to overcome anemia in adolescent girls has been proven in various studies.<sup>3-5</sup> In addition, various countries have also implemented iron supplementation as a solution to overcoming anemia in adolescent girls.<sup>6,7</sup> Various studies have shown that factors that affect compliance to iron supplement consumption among adolescent girls include knowledge about anemia, tablet quality, intention, availability of drinking water, and good distribution.<sup>8-11</sup> Thus, this study wants to see adolescent girls' knowledge, attitudes, and intentions in consuming iron supplements and the distribution mechanism of iron supplements in schools in the Sidoarjo district area.

## Material and Methods

This article was mix-method research. This study was conducted in three high schools located in Sidoarjo Regency. Initially, a cross-sectional survey was conducted to obtain an overview of the knowledge, attitudes, and intentions of 202 adolescent girls consuming iron tablets. After the survey, qualitative data collection methods were carried out to implement the iron supplementation program in each school. Data were collected through in-depth interviews with 13 students from the three high schools. The data triangulation was carried out to ensure the implementation of the iron supplementation program using focus group discussions (FGD). The FGD was conducted with two representatives from the nutrition division of the Sidoarjo health office and three representatives from three health centers in Sidoarjo, with a total of five FGD participants. Ethical clearance was obtained from the Faculty of Medicine Universitas Ciputra Surabaya.

Quantitative data collection using a questionnaire that had been tested for validity and reliability. Questions about knowledge of anemia consisted of nine questions which include questions about the definition of anemia, signs and symptoms of iron deficiency anemia, due to iron deficiency anemia, and how to fulfill iron. Knowledge about iron supplements consisted of eight questions, including the content of iron supplements, how to drink, when to drink, and side effects. Attitude questions about anemia and iron tablets consisted of ten questions, including student statements regarding anemia and iron tablets. The supplements consumption intention question consisted of ten questions that included a statement of their tendency to take supplements. The results of these answers will then be classified into two categories, below the average or above the average score, namely good or poor.

We collected qualitative data from in-depth interviews using a question guide in the form of questions related to the distribution of iron tablets in their respective schools, including time, amount of iron tablets, and how to distribute them. Data was also collected through FGDs using a question guide related to distribution methods, guidelines, barriers, and inputs for this program. Qualitative data from in-depth interviews and FGDs will then be analyzed through coding, conceptualization, and themes.

## Results

The characteristics of respondents involved in quantitative research are listed in Table 1.

### Knowledge about anemia and iron supplements, attitudes and intention

Knowledge of adolescent girls about anemia and iron supplements, their attitudes, and also intentions can be seen in Table 2.

### Distribution of iron supplements in schools

The results of interviews with 13 respondents are listed in Table 3 below. The findings then be grouped into three categories which are iron supplement distribution, timing of iron supplement distribution, intention to consume the iron supplements.

Interviews were also conducted with stakeholders from the

health office and representatives from 3 health centers in Sidoarjo. The following are the findings, open coding, conceptualization, and themes obtained from the interview (Table 4). There were four themes developed from the FGD namely program implementation guidelines, program implementation process, program evaluation, and constraints of program implementation.

## Discussion

Most respondents had low knowledge about anemia, attitudes, and intentions regarding iron supplements. This can happen due to various factors, such as lack of education/counseling, different distribution times for iron supplements to each school, and the method of implementing the program in schools that is not optimal.<sup>10,12-16</sup> Previous research has stated that education has a positive effect on increasing knowledge.<sup>17-19</sup> Interventions around nutrition education show a positive impact on knowledge, attitude, and practice among school-age children in Ghana.<sup>20</sup> Research conducted on adolescent girls in Jordan shows that nutrition education can improve knowledge, attitude, and practice toward anemia.<sup>21</sup> Increased knowledge, attitudes, and intentions toward the iron supplementation program can potentially increase student compliance in consuming iron supplements.

This study also found that the implementation of this program among adolescent girls was still different and not ideal following existing guidelines. The proper distribution of iron supplements could affect compliance with iron supplement consumption.<sup>22-26</sup> Also, the proper program implementation mechanism is crucial in realizing the objectives of iron supplementation. Iron distribution times in schools were different due to the limited number of health

**Table 1. Characteristics of respondents by age.**

Age (years old)	n	%
14	1	0.5
15	27	13.4
16	67	33.2
17	74	36.6
18	32	15.8
19	1	0.5
Total	202	100.0

**Table 2. Knowledge, attitude, and intention of anemia and iron supplement.**

Variable	n	%
Knowledge of iron deficiency anemia		
Poor	121	59.9
Good	81	40.1
Knowledge of iron supplements		
Poor	81	40.1
Good	121	59.9
Attitudes towards anemia and iron supplements		
Poor	103	51.0
Good	99	49.0
Iron supplements consumption behavior intentions		
Poor	104	51.5
Good	98	48.5

**Table 3. Finding, open coding, conceptualization of iron supplements' distribution mechanism.**

Findings	Open coding	Conceptualization
Iron Supplement was only given to girls' students who were interested or felt anemic. Given to all students once without explanation.	Iron Supplement Distribution	Not all students get the iron supplements Students do not know the reason for the importance of taking iron supplement, so it was not taken.
Iron supplement was given with information, but some students still feel that the information is incomplete.		Some students who get Iron supplements consume it, and some didn't because of a lack of information.
		<i>"Teachers offered the tablets. If you [students] didn't want to take it, they didn't give it [iron supplements] to you. I felt no need to take it, so I didn't get one" (I).</i> <i>"I didn't know about iron supplements, I never got the information. [I] once got an iron supplement, but I didn't take it. [I] just accepted it, kept it, and lost it" (I).</i>
The distribution timing was not ideal for regular consumption of iron supplement, which was given one tablet every month, 2-3 tablets in a year, or two tablets for a year. It is given regularly once a month one strip (4 tablets) to take weekly.	Timing of Iron Supplement Distribution	Students took iron supplement not according to the recommended dosage (once a week). Students have a sufficient supply of tablets every week.
		<i>"Four supplements were given in a month. It was taken once a week. The form of tablets were striped" (F).</i> <i>"Iron supplements were given from school every week, taken once a week" (E).</i> <i>"Once a year, in the middle of the semester and only two tablets. One tablet was taken directly, one another could be taken later" (J).</i>
The desire to consume iron supplement may arise when given sufficient socialization around the benefits.	Intention to Consume Iron Supplement	Perceived benefits can increase intentions
		<i>"There was no plan to buy because I felt that it was not important. Also, I usually got it free, so why I had to buy it" (C).</i>

**Table 4. Findings, open coding, conceptualization, and interview theme with stakeholders.**

Findings	Open coding	Conceptualization	Theme
The program implementation guidelines use national guidelines.	Program Implementation Guidelines	The flow of program implementation is straightforward.	Program Implementation Guidelines
		<i>"We use national guidelines for the guidelines if there are no specific guidelines." – Health Office</i>	
The program implementation in schools is different according to the policies of each teacher.	Program Implementation	Teachers' policies affect students' iron intake consumption.	Program Implementation Process
		<i>"We leave it to the school health teacher, and then most teachers have different ways of giving it. Last year we asked to take the supplement together after sports lessons. Some took it together after the ceremony." – Health Office</i>	
Distribution of iron supplements through schools.	Distribution of Iron supplements	The school has a stock of iron supplements for adolescent girls.	
Given to teachers Distribution never breaks.		The distribution of iron supplements is more centralized, with responsible parties. The supply of iron supplements at school is smooth.	
		<i>"So we distributed it through schools." - Health Office</i>	
Distribution before the pandemic reached 80%	Distribution Achievement	The distribution of iron supplements to schools has been good.	
		<i>"If [iron supplements' distribution to] the adolescent girls before the pandemic had reached above 80%" – Health Office</i>	
Distribution of iron supplements to schools every three months with 12 tablets per student.	Timing of iron supplements distribution	The distribution of iron supplements from schools to students every three months.	
		<i>"For the implementation, we usually leave it to the teacher, once every three months." – Health Office</i>	
Education from health workers was carried out during counseling at schools. Health worker did a general check for students' health about the importance of iron supplements, benefits, and how to consume.	Counseling/Education	Students rarely receive education from health workers. The students know the importance of iron supplements, its benefits, and how to take iron supplements.	
		<i>"We come to school to give information about iron supplements. Or sometimes when we did counseling, it was also related to iron supplements." –Health Center</i>	
Evaluation of the nutrition division of the health center every three months to validate program achievement data. Program monitoring in schools is left to each teacher. Evaluation from the health center is carried out during school visits.	Program Evaluation and Monitoring	Conducted evaluation for program implementation. Teachers play an essential role in the success of iron supplementation. Teachers can feel more responsible for their obligations if evaluations are carried out regularly.	Program Evaluation
		<i>"We leave the monitoring to the teacher, and each school has its way. Evaluation from us during school visits." – Health Center</i>	
Difficult in monitoring compliance with the consumption of iron supplements for adolescent girls who do not take iron supplements together at school. There is no method of recording iron consumption. Difficult in recording and reporting due to lack of coordination with schools. Adolescent girls complain about iron supplements' effects on nausea, constipation, etc. The iron supplements expiration period is short, making it challenging to distribute tablets.	Program Implementation Constraints	Compliance with the consumption of iron supplements for adolescent girls is less monitored. Adolescent girls' compliance was not recorded. It is difficult to determine the success of the program. Adolescent girls do not want to take iron supplements. Expired tablets before distribution.	Program implementation constraints
		<i>"We have difficulty in reporting and recording because we submitted it to the school, the teacher sometimes reported, but if we didn't ask, they didn't report it" – Health Center</i> <i>"They (adolescent girls) complain because they feel nauseous after took iron supplement, sometimes constipated, that's indeed the side effect of the supplement." –Health Center</i>	

center officers, many schools, and too many job desks of officers, so they could not focus on implementing the program optimally. Substandard distribution constraints were also experienced in implementing the iron supplementation program in Ghana.<sup>27</sup>

The process of program evaluation and monitoring is also a problem in implementing the iron supplementation program in Sidoarjo. Most of the health workers only distribute iron supplements to schools and do not carry out regular monitoring. Even though health workers have an important role in providing education about anemia and iron supplement, other studies have shown that lack of knowledge about iron supplements is actually caused by the lack of knowledge and communication skills of health workers.<sup>28,29</sup> The main obstacle that occurs is the lack of human resources, so the primary health center hopes that the school can assist in monitoring the iron supplementation program in their respective schools. Teachers are parties who play an important role in implementing and supervisors in ensuring the program runs smoothly in schools.<sup>30-32</sup> However, teachers may not run the program well because they do not get incentive support and feel that the iron supplementation program is not included in their duties.<sup>27</sup> A study shows that teachers will show good performance if they get recognition from schools and related parties.<sup>33</sup>

The implementation of iron supplement consumption in schools can be one solution to help facilitate program recording and monitoring. This activity can help overcome forgetfulness and increase adolescent girls' awareness or adherence to the consumption of iron supplements.<sup>11,34</sup> However, this activity does not aim to force adolescent girls to consume iron supplements. If adolescents feel compelled to consume it or choose not to consume it, it can be concluded that this activity is ineffective in reminding and raising awareness. A shared drinking day can be an effective reminder, but the decision to drink or not should be left to the students, which of course, is based on knowledge and awareness of the importance of this program for their health.

This research tries to obtain the adolescent girls' knowledge, attitudes, and intentions and explore the program implementation of iron supplementation in high school adolescent girls, comprehensively. Therefore, this study was conducted with both quantitative and qualitative approaches. However, information from the school, such as teachers, peer educators, or even parents, can be adding value to this study. This becomes the limitation of this research.

## Conclusion

Adolescent girls' knowledge, attitudes, and intentions toward consuming iron supplements in Sidoarjo still need improvement. The process of implementing the iron supplementation program also still needs to be improved.

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