

## **A formative study of weekly iron-folic Acid (WIFA) supplementation for adolescent school girls in West Java Indonesia**

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### **ABSTRACT**

**Introduction:** The weekly iron-folic acid (WIFA) supplementation program for adolescent school girls is mainly allocated in regencies where they are found as locusts of stunting. However, the prevalence of anemia in adolescent school girls in Indonesia remains high and the adherence of supplement consumption remains low. The objective of this study was to assess the performance of WIFA supplementation for adolescent school girls in West Java Indonesia.

**Methods:** This research is a formative study conducted to 280 adolescent school girls in ten high schools in Tasikmalaya and Ciamis, West Java Province, Indonesia. Systematic random sampling was used to select the adolescent school girls. Data collected using structured questionnaire including adolescent characteristics, knowledge, and history of WIFA tablets received and consumed. Data were analyzed descriptively.

**Results:** The study examined that while 99.3% participants knew about WIFA supplementation, only 64.1% consumed the tablets, and most (97.3%) took fewer than 24 tablets in six months. Side effects like nausea (70.7%) and dizziness (66.3%) were common. Knowledge gaps persisted, with only 32.4% understanding anemia diagnosis. Distribution at schools varied, often occurring at school events. Despite the program's intent to prevent anemia, low

adherence and misinformation about the tablet and the program remains high among the adolescent school girls.

**Conclusion:** Lack of understanding about anemia and WIFA supplementation among adolescent school girls and less optimal of WIFA management might have been responsible on adherence of consuming WIFA tablets. It indicated that nutrition education for adolescent school girls should be implemented, including the information on how to manage side effects from tablet consumption. In addition, WIFA program implementation should be improved by strengthening distribution mechanisms and increasing teacher's role in the program.

### **KEYWORDS**

Adherence, adolescent school girls, anemia prevention, iron-folic acid, supplement consumption.

### **INTRODUCTION**

Adolescence presents a second window of opportunity for establishing healthy lifelong nutrition. Adolescents are vulnerable to undernutrition because their rapid growth raises their nutritional needs. While prevention of stunting in the first 1,000 days remains a priority, adolescence provides an opportunity for a high return on investment with nutrition interventions. The prevalence of stunted children in Indonesia remains high (27.67%) in 2019 and 24.4% in 2021<sup>1,2</sup>. Meanwhile in 2018, 32% of Indonesian adolescents in Indonesia suffered from anemia<sup>3</sup>. It means that approximately 7.5 million Indonesian adolescents are at risk of experiencing problems in their developmental growth and cognitive abilities. Also, they

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become vulnerable to infectious diseases. The government put the strategy in stunting prevention by empowering sensitive intervention programs to educate adolescence.

Stunting is an intergenerational problem, which means the quality of life is determined by the history of nutritional and health conditions in the previous life cycle<sup>4</sup>. Adolescents who were malnourished during their childhood or had experienced prolonged malnutrition due to inappropriate eating behavior up to marriage and pregnancy will be at risk of giving birth to stunted babies. Parenting and eating patterns that do not support normal growth and development keep on repeating themselves and lead to a low intake of nutrients for the next generation of children, resulting in a decline in the quality of human resources<sup>5</sup>. One point in the life cycle that is the potential to break the chain is the nutritional intervention for adolescents who will take a role as mothers in the future.

Iron-folic acid (IFA) supplementation is an intervention given to pregnant women and adolescent school girls to reduce the prevalence of anemia. It is one of the efforts to accelerate the alleviation of stunting in Indonesia as an integrated stunting reduction intervention. Increasing stunting awareness among adolescent school girls through optimization of the implementation of weekly iron-folic acid (WIFA) supplementation is the potential way to induce behavioral change in improving lifelong nutrition and health to overcome stunting. The objectives of this study were to analyze WIFA program implementation for adolescent school girls in West Java, Indonesia.

## METHODS

### Design and Participant

A formative study was conducted in five high schools in Tasikmalaya and five high schools in Ciamis, West Java Province, Indonesia. The selection of high schools was made purposively based on the recommendation from education and health district offices. The research was conducted in July-September 2022.

The minimum sample was calculated based on the sample size calculation formula in cross-sectional studies. Where P is the delta proportion of adolescent school girls aged 13-18 years with the knowledge of IFA and anemia in the good category was 20,78%<sup>6</sup>, d is the precision (0.05) corresponding to the effect size,  $Z_{\alpha/2}$  is 1.96 as a normal deviate for two-tailed alternative hypothesis at 5% level of significance. Below is the sample size calculation:

$$n = \frac{Z^2 \times p(1-p)}{d^2}$$

$$n = \frac{1.96^2 \times 0.21(1-0.21)}{(0.05)^2}$$

$$n = \frac{3.8416 \times 0.1659}{0.0025}$$

$$n = \frac{0.6373}{0.0025}$$

$$n = 254.92 (+10\% \sim n = 280)$$

The calculated sample size is, therefore, 280. The final sample size of 280 was proportionally allocated to the 10 selected high schools from two districts. Systematic random sampling was used to select the adolescent school girls using random numbers generated for each class using school girl attendance register.

### Data Collection

A set of questionnaires was made systematically in either open or closed questions to answer the objectives of this study. Training of enumerator was conducted to verify the same perception and understanding between researcher and enumerator regarding the set of questionnaires, its objectives, and the process how to collect the data. The data collected were adolescent characteristics, history of receiving IFA supplementation, history of WIFA consumption, and knowledge related to anemia and WIFA supplementation.

All the research procedure and questionnaire have been through review by Ethical Committee of Human Research in the institution which the researchers belonged under registration number 699/IT3.KEPMSM-IPB/SK/2022. Prior to data collection all the participants were explained about the research aim, procedure, and side effects and benefits that they may have gained from the procedure. All participants agreed to the procedure and signed the informed consent document.

In-depth interview and focus group discussion were administered to obtain information on the management of WIFA supplementation. Subjects of in-depth interview and focus group discussion were teachers, adolescent school girls and staffs of public health center.

### Data Analysis

Estimation of elementary statistics consisting of mean and standard deviation were applied to all the quantitative variables. In addition, estimation of proportion was applied to all the categorical variables or quantitative variables which are categorized. The results of the estimation were presented in the form of tables. All analyses for quantitative data were carried out using Microsoft Excel and SPSS Version 22.0 for windows.

## RESULTS

The subjects in this study were high school and vocational high school students (adolescent school girls) in grade 11. The distribution of subject characteristics is presented in Table 1.

**Table 1.** Characteristics of adolescent school girls

Characteristics of adolescent school girls	n	%
District		
Tasikmalaya	142	50.0
Ciamis	142	50.0
School type		
Public/private high school	141	49.6
Vocational high school	143	50.4

Subjects are adolescent school girls who live in Tasikmalaya and Ciamis Regencies, with the proportion of subjects in each district being 50%. Two types of schools were the targets of the research, namely public/private high school and vocational high school, with the percentage of subjects being 49.6% and 50.4%, respectively.

Table 2 presents the distribution of adolescent school girls according to their history of receiving IFA supplementation. Adolescent school girls were asked to report their history of receiving IFA supplementation, including the duration of time, frequency of receiving, and the number of IFA supplements taken within the last year.

**Table 2.** Distribution of adolescent school girls based on history of receiving IFA supplementation

History of receiving IFA supplementation	n	%
Duration of time receiving IFA supplement at school		
Less than a year	214	75.4
1 year	28	9.9
>More than 1 year	42	14.8
Mean±SD (month)	9.1 ± 4.7	
Frequency of receiving IFA supplement		
Every week	155	54.6
Others	129	45.4
Numbers of IFA supplement received within the last year		
<24 tablet	143	50.4
≥24 tablet	141	49.6
Mean±SD (tablet)	17.8 ± 7.2	

Table 2 shows that most adolescent school girls (75.4%) have received IFA at school for less than a year, and only a few of them (9.9%) have received IFA in a year. This is due to the pandemic Covid-19 in 2020-2022 although the WIFA supplementation program has been started in 2018. The average duration of time that participants received the IFA supplement was 9.1 months. As many as 54.6% of participants had received it every week. The average number of IFA received within the last six months was 17 tablets, which is less than the recommendation (52 tablets per year or 26 tablets per six months).

Table 3 reported the history of WIFA consumption in adolescent school girls. Adolescent school girls who consumed IFA

**Table 3.** Distribution of adolescent school girls based on history WIFA consumption

History of WIFA Consumption	n	%
Consume the IFA tablets that have been provided		
Yes	182	64.1
No	102	35.9
The location to consume IFA tablet		
At school	98	53.8
At home	54	29.7
At school and home	30	16.5
The number of IFA tablets that have been consumed during the last six month (n=182)		
<24 tablet	177	97.3
≥24 tablet	5	2.7
Benefit after IFA consumption		
Have no benefit	100	55.6
Feeling fresh and well	72	39.6
Not easy to feel sleepy	34	18.8
Feeling more excited	29	15.9
More focus on learning	20	11.0
Feeling side effect after consumption		
No	97	53.3
Yes	85	46.7
Type of side effect		
Nausea	58	70.7
Dizziness	55	66.3
Iron-likely odor when belching	25	30.1
Vomiting	1	1.2

tablets were only 64.1%. It indicated that the program should be improved. As for the location to take IFA tablets, most adolescent school girls took them at school (53.8%), and some of them took them at home (29.7%), while a few (16.5%) took them both at school and home. Most participants (97.3%) had taken IFA for less than 24 tablets, with the average number of tablets consumed being 5 during the last six months. This result was in line with the previous study which reported that only 21% had consumed at least 27 tablets<sup>7</sup>.

Table 4 presented the distribution of adolescent school girls' general knowledge of anemia and WIFA supplementation, where almost all adolescent school girls (98.2%) have heard about the anemia and WIFA supplementation, and only 1.8 % of adolescent school girls did not know or have never heard about anemia and WIFA supplementation. Most of the adolescent school girls received information regarding anemia from their teachers (62.0%), health workers (59.9%), and the media (43.7%).

The knowledge of the adolescent school girls on how to understand anemia status was still below expectation, which

was shown by only 32.4 % of adolescent school girls who had a correct answer about how to measure anemia status (checking Hb level in the blood). In comparison, the others still answered wrong (67.6%). Almost all adolescent school girls (99.3%) have heard about the WIFA supplementation program, and only 0.7 % of adolescent school girls have yet to hear of iron tablets supplementation to increase the red blood cells of adolescent school girls.

The knowledge of adolescent school girls related to causes and symptoms of anemia is presented in Table 5. Most adolescent school girls (75%) understood that they must receive iron supplementation weekly. However, some of them (23.6%) said the frequency of iron supplementation needed was once a month, and 1.4 % of adolescent school girls stated that iron supplements were only given during menstruation. Within a year, only 38.7% of adolescent school girls knew that the requirement to consume iron supplementation tablets lasted for 52 weeks.

The general knowledge of adolescent school girls regarding the side effect of taking/consuming iron tablets is presented

**Table 4.** School adolescent girl knowledge related to anemia and WIFA supplementation

Questions	n	%
Do you know or ever heard about anemia		
Yes	279	98.2
No	5	1.8
If the answer is yes, where do you get information about anemia?		
Teachers	173	62.0
Media (printed or electronic)	122	43.7
Parents or Family	93	33.5
Friends	58	20.8
Extracurricular activities	5	1.8
Way to find out whether school adolescent girl have an anemia or not is by checking the hemoglobin level in the blood.		
False	192	67.6
True	92	32.4
Adolescent school girls have heard about IFA supplementation program		
Yes	282	99.3
No	2	0.7

**Table 5.** Adolescent school girls' knowledge related to dosage and duration of WIFA supplementation

Questions	n	%
Frequency of IFA supplementation in school to prevent or to overcome anemia		
Once a week	213	75.0
Once a month	67	23.6
During menstruation period	4	1.4
Within a year, for how long (time duration) the student must consume IFA supplement		
52 weeks	110	38.7
12 weeks	98	34.5
4 weeks	76	26.8
Nutrient content in IFA supplement		
Iron and Folic Acid	172	60.6
Iron and Calcium	97	34.2
Iron and Zinc	15	5.3
Iron dosage in IFA supplement		
50 mg of Iron	144	50.7
60 mg of Iron	121	42.6
70 mg of Iron	19	6.7

in Table 6. Most adolescent school girls answered that iron supplementation could provide benefits for preventing anemia (93%), not getting tired easily (59.5%), and increasing concentration (50%). According to these findings, the WIFA supplement tablets help replace lost iron due to the menstruation period and meet the iron necessity, which is insufficient from food. The iron substance in iron tablets is helpful in increasing concentration in learning, maintaining body fitness, and preventing anemia<sup>8</sup>.

**Table 6.** Adolescent school girls' knowledge related to benefit in consuming WIFA supplement

Benefit of Consuming WIFA Supplement	n	%
Prevent anemia	264	93.0
Not easily tired	169	59.5
Increase concentration	142	50.0
Increase work productivity	62	21.8
Increase study capacity	56	19.7
Sleep more soundly	47	16.5
Increase body weight	3	1.1

From the qualitative survey, it was found that the Weekly Iron-Folic Acid (WIFA) supplementation program for adolescent school girls is mainly allocated in regencies where they are found as locusts of stunting. The IFA supplement tablets administration is usually coordinated by Red Cross Youth (RCY) supervisors, teachers of the School Health Clinic, and/or Physical Education Teachers as the person-in-charge (PiC). The PiC responsibilities to IFA administration are receiving and distributing IFA tablets, monitoring-evaluating, and reporting activities regarding IFA distribution. Another duty is to invite Red Cross Youth cadres to distribute IFA tablets to adolescent school girls and record, monitor, and evaluate results. Several schools have some teachers in charge as School Health Clinic teachers. Meanwhile, there is also school that delegates only one person to be in charge of the IFA administration. The IFA supplementation program at the level of Public Health Centre is managed by Nutrition Counsellor, School-aged-children Counsellor, School Health Clinic Counsellor, and Health Promotion Counsellor. From organizational structure, the IFA program is supervised or under the responsibility of a Nutrition Counsellor, with its implementation assisted by other counsellors. However, during school visits, the in-charge IFA team can be selected from any work section since the IFA tablet administration program is usually accompanied by other health programs at the school.

The IFA distribution to adolescent school girls by the affiliated schools is carried out in several ways: (1) once a week, IFA is distributed on a specific day to be consumed together at schools (weekly flag ceremony, students' events, or during first lesson hour); (2) IFA tablets in some amounts are distributed one time (for example a stock for one month or one semester); and (3) only distributed to students who ask or need it. Ways to give IFA tablets in every school are also different. Some tablets are (1) distributed directly by the PHC when they visit schools, (2) given by PiC (IFA tablets are given when PiC visits every class), and (3) some tablets are given by the RCY members or the class leader. For schools that invite RCY members to help, they provide attendance schedules for the RCY members as the schedule for IFA distribution to adolescent school girls in the schools.

IFA socialization is carried out according to a variety of schedules. The socialization of IFA administration is taken within other health activities held at schools that are not limited to the IFA context. A routine health activity the Public Health Centre carries out in schools is health screening activities for school students. In this screening activity, several PHC also distribute the IFA tablets to new students at the same time. Some PHC is also looking for adolescent school girls' events for inserting the IFA socialization or Red Cross Youth activities by inviting the members to become peer groups as counselors for other adolescent school girls.

At the school level, the received IFA from the Public Health Centre will be stored in School Health Clinic room in a special cupboard, but other schools keep the tablets in a cool place and not exposed to direct sunlight or some schools use First Expire First Out (FEFO) system.

## DISCUSSION

Environmental differences such as school location and status can reflect differences in students' character between schools<sup>9</sup>. Environmental factors can influence compliance with the consumption of iron supplement tablets in female adolescents. According to social support and social network theory, one factor that affects a person's health is social support and its network. Adolescents are at an age of psychological development that requires support from the environment to grow and have good obedience<sup>10</sup>. Previous research results state that someone with good environmental support is likely to consume iron tablets times many more than someone with poor environmental support<sup>11</sup>.

According to the Ministry of Health recommendation, the number of WIFA tablets a person needs to consume in a year is 52 tablets delivered each week<sup>12</sup>. A study in East Nusa Tenggara showed that the proportion of adolescent school girls who received WIFA tablets was 93%<sup>13</sup>. The mean number of WIFA tablets consumed was only ten in the previous six months, which was lower than the number of



tablets received. Awareness of adolescents on WIFA supplementation to prevent anemia remained low, and that was due to the need for more information on anemia and health practice, which was contributed by social and cultural factors and food habits<sup>14</sup>.

The low knowledge about anemia and nutrition in adolescent school girls will lead to deviant consumption selection of WIFA supplementation. Their nutritional intake will not fulfill their needs, particularly their daily iron needs<sup>15</sup>. From this explanation, it is necessary to make a follow-up program to increase the knowledge and motivation of adolescent school girls. One form of realization is holding a nutrition education program for high school students. Nutrition education is an effort to change attitudes and behavior to make people understand the importance of nutritional intake for increasing concentration and learning achievement<sup>16</sup>. This study stated that adolescent school girls' knowledge about anemia must be improved to create behavioral changes in anemia prevention and to support a successful anemia prevention program. Therefore, it is necessary to socialize WIFA supplementation to adolescent school girls along with their parents<sup>17</sup>.

One causal factor of the low achievement from the WIFA supplementation program is the inadequate or lacking health facilities and infrastructures<sup>18</sup>. The information or general knowledge related to anemia and iron supplementation is crucial for adolescent school girls, and this understanding can be reflected in efforts to prevent and cure anemia. One of many attempts is consuming food as needed, having a healthy diet, and not undergoing extreme diets<sup>19</sup>. Moreover, to increase knowledge about anemia, it is necessary to carry out counseling for adolescent school girls. It is known that the knowledge of adolescent school girls about anemia has increased after counseling when compared to the state before counseling<sup>20</sup>. Thus, counseling is needed to improve the WIFA program with cross-sectoral support.

The regulation about the frequency, duration, dosage, and procedures for administering iron supplementation is listed in Official Circular Letter Number HK.03.03/V/ 0595 /2016 issued by the Directorate General of Public Health, Ministry of Health, Republic of Indonesia, which stated that IFA supplementation must be given for 1 tablet per week throughout the year (52 weeks) for adolescent school girls at school and women of childbearing age at work. The IFA supplementation contains 60 mg of elemental iron (Ferro Sulfate, Ferro Fumarate, or Ferro Gluconate) and 0.4 mg of folic acid<sup>21</sup>.

Adolescent school girls' attitudes regarding anemia and WIFA supplementation are influenced by several factors, one of which is knowledge of the benefits of iron supplements. Adolescent school girls' lack of knowledge and awareness regarding anemia and iron supplementation causes nutritional problems<sup>22</sup>.

## CONCLUSION

There were only 64.1% of adolescent school girls who consumed WIFA tablets. There were still many adolescent school girls (55.6%) who stated that there was no benefit of consuming IFA tablets. In addition, the average number of WIFA tablets received by adolescent school girls was only 18 tablets per year, while it should be 52 tablets. Lack of understanding about anemia among adolescent school girls and less optimal of WIFA management might have been responsible on adherence of consuming WIFA tablets. It indicated that nutrition education for adolescent school girls and the WIFA program implementation should be improved.

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