



EMPOWERING WEEKLY IRON-FOLIC ACID (WIFA) SUPPLEMENTATION PROGRAM FOR ADOLESCENT SCHOOL GIRLS IN HIGH STUNTING AREAS

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SUMMARY

The WIFA (Weekly Iron-Folic Acid) supplementation program for adolescent school girls is mainly allocated in regencies where they are found as locusts of stunting. 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. In 2018, 32% of Indonesian adolescents in Indonesia suffered from anemia (MoH 2018).

Iron-folic acid (IFA) supplementation is an intervention given to pregnant women and adolescent girls to reduce the prevalence of anemia among pregnant women and adolescent girls. It is one of the efforts to accelerate the alleviation of stunting in Indonesia as an integrated stunting reduction intervention. Increasing stunting awareness among school-going adolescents through optimization of the implementation of 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: (1) to assess the knowledge of adolescent school girls regarding the causes and consequences of anemia and the benefit of WIFA supplementation, (2) to assess the attitude of adolescent school girls regarding the prevention of anemia and the WIFA supplementation program, (3) to explore the reasons the WIFA supplementation is needed among adolescent school girls, (4) to assess the consumption of iron source foods, vitamin C source foods (enhancing iron absorption) and tannin source foods (inhibiting iron absorption) among adolescent school girls, (5) to assess the knowledge and attitude of parents regarding anemia in adolescence and WIFA supplementation.

A situational analysis 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 Regency Offices. The research was conducted in July-September 2022.

The sample size of 280 adolescent school girls was proportionally allocated to the 10 selected high schools from two districts. Systematic random sampling was used to select the adolescent girls with their mothers using random numbers generated for each class using school girl attendance register. Besides adolescent school girls and their parents, the respondents from teachers, district health officers, Public Health Centers officers, and district education officers were selected purposively according to their participation in WIFA supplementation program management. Data collected were: socio-economic characteristics, knowledge and attitude of anemia and WIFA supplementation, food consumption, food habits, WIFA program management, and WIFA coverage and consumption. Estimation of elementary statistics consisting of mean, standard deviation, minimum score, and maximum score were applied to all the quantitative variables. In contrast, estimation of proportion was applied to all the categorical variables or quantitative variables which are categorized. The study concluded with five points as follows:

1. Adolescent school girls in the study have relatively low knowledge (82%) about anemia and WIFA supplementation. Most of them understand that blood loss and deficiency of iron intake can cause anemia (53.2%, and 66.9%, respectively). Still, less than half of them knew that deficiency of folic acid and vitamin B12, infectious disease, vegetarian lifestyle, etc., also contributes to the risks of anemia. Among the consequences of anemia, they

understand it will cause a lack of concentration (77.8%) and low blood pressure (74.3%). However, only 27.1% understand that anemia in school girls could increase the risk of low birth weight in future pregnancies. Almost all of them knew that consuming iron-folic acid supplements could help prevent anemia (95.1%), and it has to be consumed weekly (75%). They stated that side effects that could arise after consuming iron-folic acid supplements are nausea (78.9%) and headache (56.0), among other side effects. The adolescent school girls answered that consuming the supplement after a meal (65.5%) and consuming more water (66.5%) help relieve the side effects. It can be seen that the school girls are informed of basic information regarding anemia and WIFA supplementation. However, a deeper understanding is needed for the school girls to increase their awareness of anemia and the importance of WIFA supplementation.

2. Almost all the school girls (93.7%) were positive toward preventing anemia and WIFA supplementation. They agreed that anemia could disrupt daily activities (92.3%) and that iron-folic acid supplementation is needed to prevent anemia (93.0%). They also agreed that the benefits of WIFA supplementation are more significant than the possible side effects (68.3%) to prevent anemia and maintain health (93.3%). The positive attitude shown by adolescent school girls is an important factor in adolescent school girls' compliance with WIFA supplement consumption.
3. Nutritional status measurements showed that stunting is still prevalent among school girls. As many as 27.1% of school girls are stunted, and 3.2% are severely stunted. Moreover, overweight and obese were also observed among school girls (11.3%, and 6.0%, respectively). The double burden of malnutrition found among school girls was reported to be correlated with the incidence of anemia in previous studies. Thus, the effort to prevent and reduce the incidence of anemia among school girls is crucial. Based on the results, only 54.6% of the school girls received iron-folic acid tablets regularly per week. Moreover, only 64.1% of the school girls consumed the tablets received. Among them, the average number of tablets consumed in 6 months is only 5, which is very low compared to the targeted 24 tablets for 6 months. Among the reasons why the school girls did not consume the tablets are forgotten (52.7%), fear of the following side effects (49.8%), and unpleasant taste of the tablets (41.2%). This data showed that empowerment of the WIFA supplementation program at the school level is critical to increasing school girls' WIFA tablet consumption compliance.
4. Adolescent school girls' iron source foods consumption is relatively low, the average consumption of eggs is 5 times a week, and chicken is 3 times a week. Other animal sources are consumed less than one time a week. Moreover, iron source plant foods are also consumed seldomly. Food consumption recall data showed that only 4.2% of school girls meet the daily iron intake requirements. Among enhancers of iron-source foods, bananas, and oranges are the most frequently consumed 2 to 3 times a week. However, the consumption of inhibitors of iron-source foods is larger than the enhancer. The school girls reported the average consumption of tea 3 times a week and coffee 1 time a week. The foods the school girls consume are primarily snacks, fried foods, and noodles, which are energy-dense with high-fat contents. This brings the urgency of giving nutrition education to the school girls regarding healthy eating, emphasizing iron food source foods and its enhancer and inhibitor.
5. Most adolescent school girls' parents (68.3%) have good knowledge regarding anemia in adolescents and WIFA supplementation. From the answers, it is known that parents understand the causes, symptoms, and consequences of anemia and how to prevent it.

Parents also understand the IFA supplementation content and benefits; however, only half of them understand that the supplement must be consumed weekly (52.8%). Parents also showed a positive attitude towards the WIFA supplementation program at school (68.3%). These results were also observed among teachers who have good knowledge (96.1%) and attitude (73.3%) towards WIFA supplementation. Still, only 46.7% of them answered right on questions about the supplementation dosage. This means that nutrition education with an emphasis on the WIFA supplementation program and its importance for adolescent school girls must be given to the parents and teachers.

We believe certain action as follows, but it is not limited to what may lead to the prospect for the betterment of the WIFA supplementation program:

1. Nutrition and health education among adolescent school girls on how IFA supplement may benefit our health and well-being through social-media interest;
2. Empowering a peer group advancement knowledge and skills toward the effectiveness of the WIFA program in collaboration with the teachers;
3. Application of the self-monitoring card to achieve the expected compliance levels based on the recommendation;
4. Parents and teachers' nutrition and health education sessions to advance their knowledge, attitude, and practice towards the importance of IFA supplementation for the adolescent school girls.

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1. INTRODUCTION

1.1. Background

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 (MoH 2019, 2021). Meanwhile in 2018, 32% of Indonesian adolescents in Indonesia suffered from anemia (MoH 2018). It means that approximately 7.5 million Indonesian adolescents are at risk of experiencing problems in their developmental growth and cognitive abilities. Also, they 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. 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. 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 girls to reduce the prevalence of anemia among pregnant women and adolescent girls. It is one of the efforts to accelerate the alleviation of stunting in Indonesia as an integrated stunting reduction intervention. Increasing stunting awareness among school-going adolescents through optimization of the implementation of WIFA (weekly iron-folic acid) supplementation is the potential way to induce behavioral change in improving lifelong nutrition and health to overcome stunting.

Project description

Pregnant women malnourished are prone to having their babies at risk for stunting. Therefore, in Indonesia, pregnant women with chronic energy malnutrition with an upper arm circumference measured less than 23.5 cm have received supplementary nutritional foods from Public Health Center, and they also receive an iron supplement of 90 iron folic acid tablets during pregnancy. The program in stunting prevention also provides for adolescent girls by giving them weekly iron-folic acid supplementation, which may prevent them from the risk of anemia.

The WIFA supplementation program for adolescent school girls is mainly allocated in regencies where they are found as locusts of stunting. In 2020 the acceleration of the stunting prevention program targeted 260 regencies in Indonesia, and in 2021, 360 regencies out of 514 regencies in Indonesia. The stunting problem found in many regencies indicates Indonesia's vast range of nutritional and public health problems. The Indonesian government is targeting a reduction of stunting prevalence from 30.8% in 2018 to 14.0% in 2024.

Stunting can start from intra-uterine growth retardation (IUGR) because the pregnant women have macro and micronutrients deficiency. Preparing adolescent school girls to be healthy and not suffer from anemia is an important strategy to reduce stunting problems in their children in the future time. It is hoped that from this research, "best practices" will be obtained to overcome the problem of anemia among adolescent school girls.

In the first year, this study will assess the knowledge of adolescent school girls regarding the causes and consequences of anemia and the benefit of WIFA supplementation. Besides, it will explore the reasons for accepting or rejecting WIFA supplementation among adolescent school girls. And in the second year, the study will examine how the empowerment of the WIFA supplementation program in schools will eventually provide a role in overcoming anemia among adolescent school girls. In the end, it will prevent the generation of stunting from occurring in the community.

With the empowerment of nutrition programs, improvements will be made to change nutrition and health behavior among adolescent school girls and their parents. Changes in nutrition and health behavior among them will impact the adolescent school girls' awareness of consuming the iron-folic acid supplements so that they will get better nutrition and health status and the problem of anemia can be prevented.

Rationale of the project

Anemia is a nutritional problem that does not occur only in developing countries but also in developed countries. Adolescents are one of the groups in the life cycle who are at high risk of anemia. The 2013 Basic Health Research in Indonesia reported the prevalence of anemia in women of reproductive age was 22.7% and up to 32% in 2018 (MoH 2013, 2018). According to the classification of public health problems, the prevalence of anemia is in severe rate if the prevalence is $\geq 40\%$, moderate 20-39%, mild 5-19.9%, and normal $< 5\%$ (MOST 2004). Thus, the prevalence of anemia in the adolescent groups in Indonesia is in the moderate category. However, in certain areas (provinces, districts/cities), the prevalence is still severe.

In the life cycle, the second critical period for rapid physical growth after infancy is adolescence. Adolescence is a period of children's growth toward adulthood; physical changes will affect their health and nutritional status. The adolescent period is a critical stage of life and is categorized as a vulnerable group. Adolescents who experience anemia will be related to low productivity in their adulthood, which may affect economic growth in the future (Briawan 2014). Anemia in adolescents may link to productivity in adulthood, after that, may affect economic growth (Alderman and Harton 2007).

An inadequate intake of iron-source foods causes anemia in adolescents, the inadequate utilization of iron, knowledge, and an insufficient attitude to support the condition regarding anemia, pathology of bleeding due to infectious diseases and parasites, and household social and economic factors (Listiana 2016). Adolescent girls are at high risk of anemia due to menstrual cycles and inappropriate food habits. Dietary imbalance among adolescents is affected by their lifestyle and negative body image, which leads them to decrease their food intake (Astuti and Widayatun 2019).

The strategy for handling anemia since adolescence needs to be carried out with preventive efforts through the provision of iron supplements for prevention and treatment for people with anemia. Programs in schools can be carried out to overcome the problem of anemia by providing supplementation involving the School Health Unit distribution of supplements and accompanied by nutrition education to increase awareness of healthy

eating and living behavior (Briawan 2014). Research shows that providing nutrition education to adolescents has an influence on knowledge and attitude about anemia, and it is recommended to provide nutritional material related to the intake of iron-rich foods. Studies showed that nutrition education in adolescents might influence knowledge and attitude regarding anemia, and it is suggested that nutritional aspects related to iron-source-containing foods (Engidaw et al. 2013; Putra et al. 2019).

Permatasari et al. (2018) reported that there was a decline in the prevalence of anemia from 20.9% to 15.7% with iron supplementation in adolescent girls within 4 months. In Indonesia, weekly iron-folic acid (WIFA) supplementation has been started from 2016 until now. Basic Health Research (2018) showed that 76.2% of WIFA were supplemented through adolescent school girls provided by their schools. Alfiah et al. (2020) showed that only 31% of adolescent girls in East Java received iron tablets, while in East Nusa Tenggara, only covered by 10%, with a mean consumption was 0.4-0.7 tablets within 6 months. There were several reasons adolescent girls did not consume WIFA tablets: forgetting to consume, feeling no need to consume, and being afraid of the side effects.

Adolescents who experience anemia will result in impaired cognitive function, low academic ability, and decreased physical capacity. In adolescents who are still in school, it will affect their academic ability, while in adolescents who have anemia, it may lead to reduce work productivity. The nutritional problem of anemia in adolescents may lead to their state's nutrition and health conditions during menarche, pregnancy, and lactation (Briawan 2014). During pregnancy, there is an increase in nutritional requirements. Adolescents who suffer from anemia during pregnancy will increase the severity of anemia, which is more severe (Sulistiyorini and Maesaroh 2019). Mothers with anemia will be prone to get their children at risk for developing various disorders such as obesity, diabetes, hypertension, and cardiovascular events in the future (Wibowo et al. 2021). The impact of anemia on adolescents and women of childbearing age will continue into pregnancy which can lead to an increased risk of stunted fetal growth, premature birth, low birth weight, impaired child development, such as stunting and neurocognitive disorders, bleeding before and during childbirth, increasing the risk of neonatal morbidity and mortality, as well as increasing the risk of anemia in infants born with low iron stores (MoH 2018).

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. 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. 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.

Public Health Relevance (PHR)

Anemia and stunting are still categorized as public health problems in Indonesia. Based on the prevalence of anemia in non-pregnant women (32%) and children under five (38.5%), it is classified as a moderate public health problem. However, due to the high prevalence of anemia among pregnant women (48.9%), Indonesia is one of 68 countries with severe public health problems in pregnant women. On the other hand, although the prevalence of stunting

in children under five has decreased from 37.2% (Basic Health Research 2013) to 30.8% (Basic Health Research 2018), it is still classified as very high.

The severe problem of anemia will also impact the next generation, i.e., children born from anemic mothers are more at risk of becoming stunting. This will become a vicious cycle that needs to be stopped. Several programs have been done to reduce stunting, focusing on the first one thousand days of life. Most of these programs only target mothers and children under two years old. Nevertheless, recent studies showed that we must start stunting prevention programs as early as possible. Therefore, the current popular approach to reduce stunting is to start with adolescents before they become pregnant.

In the last five years, a school-based nutrition program for adolescents in Indonesia has emerged, such as IFA supplementation and nutrition education programs in the school curriculum. IFA supplementation for adolescent school girls started in Indonesia in 1997. However, the concept of weekly supplementation in schools only started in 2016. In its implementation, IFA tablet supplementation has several obstacles, such as rejection from the school girls and lack of parental supervision and support. Another obstacle in implementing IFA supplementation was the need for program management coordination between the school and the Public Health Center. The existing condition includes low supplementation coverage to the schools in the Public Health Center's work area and the irregular supply of tablets that affect the availability of tablets in school. These two factors contribute to the low compliance of WIFA tablet consumption among adolescent school girls.

This activity will explore the root causes of the constraints in implementing the WIFA supplementation program. We will focus on empowering the Public Health Center and Health Office program teachers and officers. Since they were the program implementers, it is expected that this will increase compliance of the school girls to consume WIFA. Furthermore, we also included the school girls and their parents in the nutrition education program. This will increase their knowledge and hopefully improve their practice of consuming IFA tablets and a balanced diet. In addition, we will also develop an app-based monitoring system to monitor the compliance of school girls. This will facilitate teachers to monitor WIFA tablet consumption, especially during this pandemic era. On the other hand, nutrition information embedded in the app will allow more exposure to the school girls besides our nutrition education program.

In summary, this study addresses the priority public health problem in Indonesia. It is also in line with National Nutrition Day's theme this year, "Healthy Adolescent, Free of Anemia. Moreover, this study tackles the barriers to implementing WIFA comprehensively; all stakeholders involved in WIFA will be the beneficiaries of the intervention, i.e., school girls, parents, teachers, and officers from the Public Health Center and Health Office.

Capacity building component (short and long-term)

This action-research project provides excellent opportunities for researchers at the Department of Community Nutrition, IPB University, and STIKes Mitra Keluarga to assist the Indonesian Government in preventing and overcoming anemia among adolescent school girls. The research team of IPB University and STIKes Mitra Keluarga, which in its daily work is obliged to carry out the *tri-dharma* of higher education (education, research, and community service), will have a real challenge in dealing with the problem of stunting in rural communities. To that end, the IPB University and STIKes Mitra Keluarga research team will develop the behavioral change extension materials related to the WIFA supplementation program and design a collaboration and empowerment approach for adolescent school girls

and their mothers. This project will sharpen the researchers' skills in communication, information, and education related to nutrition.

About 32% of young women in Indonesia are in anemic condition. Anemia causes low hemoglobin level in red blood cells, which functions to transport oxygen. Teenagers have a high risk of anemia because, during adolescence, the body requires higher nutrient levels, including iron, for growth and development. Young girls have a higher risk than young boys because girls experience menstruation period every month. In addition, young girls tend to be very concerned about their body figures, so they will limit their food intake or often restrict themselves by not eating certain foods.

Anemia in adolescents can reduce concentration and learning achievement. Moreover, anemia can also reduce the body's immunity, making it prone to infection. Anemia can affect a person's physical fitness level. Long-term anemia in adolescent girls will have a bad impact when they enter the age of marriage and then experience pregnancy; they cannot fulfill necessary nutrients for themselves and their fetuses, which can increase the risk of low birth weight and stunting babies.

The management of handling anemia cases in adolescent girls of 10-19 years of age must be prioritized because they can break the anemia cycle in pregnant women, which has a negative impact on delivery (birth) output. The WIFA supplementation program has received significant attention from the Indonesian Government, especially since there a high prevalence value of stunting in children under five (27.67%), had been acknowledged in 2019. The Indonesian Government is focusing WIFA supplementation program for Indonesia's regencies with a high prevalence of stunting. The Indonesian Government commits to reducing stunting by making stunting a national priority issue. Various nutrition-specific and sensitive programs are deployed in stunting locus areas throughout Indonesia, and one of them is the WIFA supplementation program for adolescent school girls.

Some obstacles in implementing the WIFA supplementation program are the need for more understanding of anemia and the uneven distribution of health information to the school environment. Thus, changes in public health and nutrition behavior related to anemia prevention cannot occur. This research will focus on developing the capacity of school and health staff and adolescent school girls in implementing the WIFA supplementation program.

In the long term, this project will significantly contribute to forming a school environment with good awareness of the danger of anemia for human resource development. Good nutrition knowledge will become an important foundation for adolescent school girls. In this action research, school and health staff will be trained and disseminated to adolescent school girls. Given that overcoming the anemia problem among adolescent school girls needs a multi-sector approach, the IPB University and STIKes Mitra Keluarga research team will collaborate with several stakeholders in this project. A series of workshops will be held with the health office, public health center, and education staff. Raising awareness about the anemia problem will concern the research team. It is hoped that during and after this action-research activity is implemented, the school and health environment can make a breakthrough to implement the WIFA supplementation program better. This will strengthen the national stunting alleviation program in Indonesia.

Sustainability

After this project ends, the program for providing iron-folic acid supplementation to adolescent school girls will be better implemented in the following years. As a national program, the sustainability of the WIFA supplementation program is guaranteed.

The action research will increase the program's quality and ensure compliance among adolescent girls to consume WIFA. Collaboration with schools and health institutions enables the sustainability of the WIFA supplementation program after the research activities have ended. To realize this collaboration, workshops participated by the District Health Office staff, public health center staff, and school teachers will be held.

Understanding nutrition knowledge will add value for school teachers and adolescent girls. Behavioral change intervention in health and nutrition for school and health staff, as well as adolescent school girls, are expected to be able to answer the difficulties of the WIFA supplementation program in the school environment. Empowering the WIFA stakeholders will make it easier for them to implement the program and increase the compliance of WIFA consumption among adolescent school girls.

Sustainability one year after the termination of the study

After completing this project, it is expected that school and health staff will be able to implement the WIFA supplementation program better. Establishing nutrition and health awareness in the school environment is an excellent first step to improving nutritional attitudes and practices related to the WIFA supplementation program to prevent anemia problems more optimally.

Sustainability 3 years after the termination of the study

Three years after the project ended, it is expected that more schools and public health center staff will be aware of health and nutrition issues to prevent anemia among adolescent school girls. They are expected to be more skillful in implementing the WIFA supplementation program.

Sustainability 5 years after the termination of the study

Five years after the end of the project, the project will become an excellent model for overcoming anemia among adolescent school girls. In the end, there will be more schools and public health centers implementing the WIFA supplementation program better, and finally, the anemia problem can be reduced significantly.

1.2. Objectives

Year-1:

1. To assess the knowledge of adolescent school girls regarding the causes and consequences of anemia and the benefit of WIFA supplementation
2. To assess the attitude of adolescent school girls regarding the prevention of anemia and the WIFA supplementation program
3. To explore the reasons the WIFA supplementation is needed among adolescent school girls
4. To assess the consumption of iron source foods, vitamin C source foods (enhancing iron absorption) and tannin source foods (inhibiting iron absorption) among adolescent school girls
5. To assess the knowledge and attitude of parents regarding anemia in adolescence and WIFA supplementation.

Year-2:

1. To empower the implementation of WIFA supplementation through behavioral change education of adolescent school girls, parents, and teachers.
2. To create a monitoring system to increase the compliance of WIFA supplement consumption among adolescent school girls.
3. To evaluate the implementation of WIFA supplementation after the empowerment program and monitoring system.

1.3. Research Hypotheses**Year-2:**

1. Intervention will be able to increase the knowledge, attitude, and practice of WIFA supplementation for adolescent school girls
2. Intervention will increase the compliance of WIFA supplement consumption of adolescent school girls.

2. METHOD

2.1. Research Design, Location and Time

The research is designed to be two years long project. In the first year, a situational analysis 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 selected high schools in Tasikmalaya were SMAN 1 Singaparna, SMAN 2 Singaparna, SMKS YPC, SMKN Rajapolah, and SMKS PCB. While the selected high schools in Ciamis were SMAN 1 Boregbeg, SMAN 1 Ciamis, SMAN 2 Ciamis, SMK Ma'arif, and SMKN 1 Ciamis. The research was conducted in July-September 2022. Meanwhile, intervention research will be implemented in the project's second year.

2.2. Research Steps

A situational analysis scheme was conducted in Year-1 activities. The situational analysis captured the knowledge and attitude of the adolescent school girls as the recipients of the WIFA supplementation program and their parents. The data will be used in Year-2 as the baseline to formulate the empowerment program for adolescent school girls. The diagram flow of study in Year-1 and 2 are shown below:

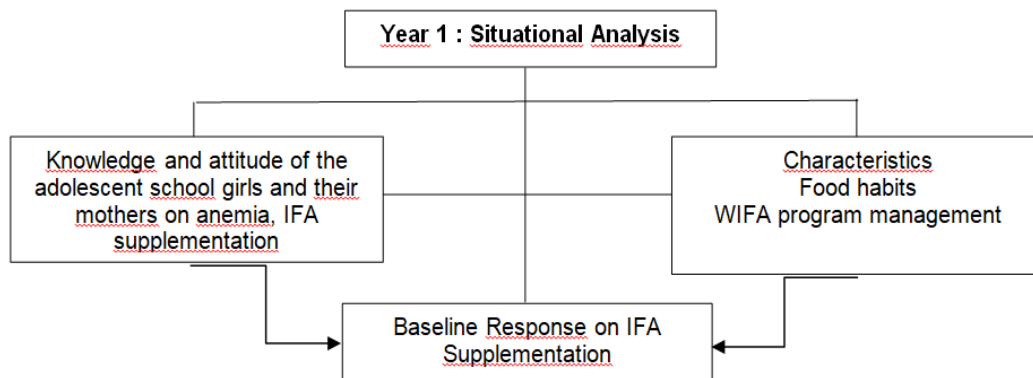


Figure 2.1. Diagram flow: Year-1 study

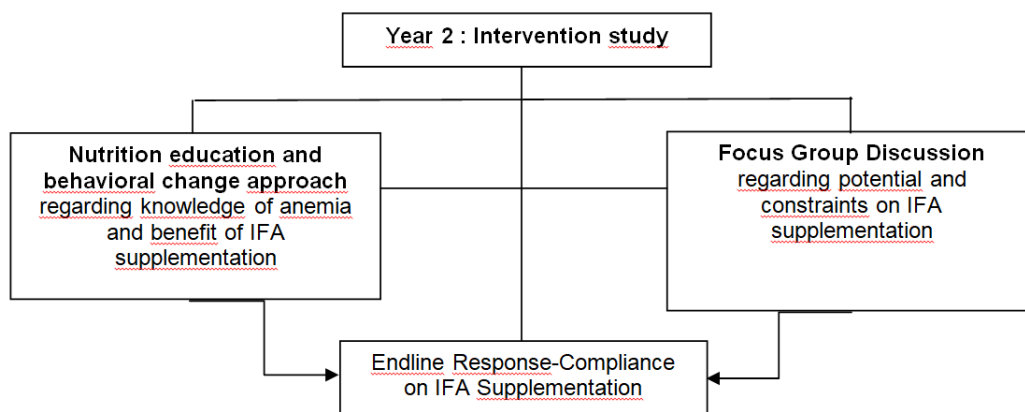


Figure 2.2. Diagram flow: Year-2 study

Year-1

1) Sampling

The minimum sample for the situational analysis study 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 (before versus after nutritional education) was 20,78% (Rahmiati et al. 2019), 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:

$$\begin{aligned}n &= \frac{Z^2 \times p(1-p)}{d^2} \\n &= \frac{1.96^2 \times 0.21(1-0.21)}{(0.05)^2} \\n &= \frac{3.8416 \times 0.1659}{0.0025} \\n &= \frac{0.6373}{0.0025} \\n &= 254.92 \text{ (+10\% ~ } n = 280)\end{aligned}$$

The calculated sample size for the preliminary study 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 girls with their mothers using random numbers generated for each class using school girl attendance register.

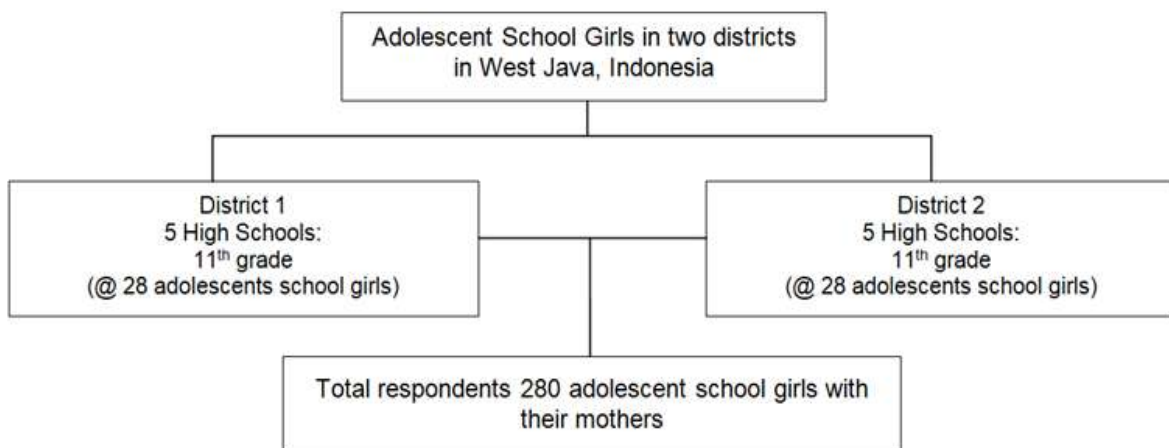


Figure 2.3. Sampling procedure for year-1 study

Besides adolescent school girls and their parents, the respondents from teachers, district health officers, Public Health Centers officers, and district education officers were selected purposively according to their participation in WIFA supplementation program management (see Table 2.1.). The recapitulation of respondents for the year-1 study is as follows:

Table 2.1. Recapitulation of the year-1 study respondents

Respondents	Number
School girls	285
Parents (285 person)	285
Teachers (10 schools @3 person)	30
District Health Officers	3
Public Health Center Officers (5 centers @3 person)	15
District Education Officer	2
Total	620

2) Data Collection and Methods

Developing Questionnaires. Prior to the data collection, researchers and team has conducted several meetings to develop study instruments in the form of questionnaires. A set of questionnaires was made systematically in either open or closed questions to answer the objectives of this study. The questionnaires were categorized according to the targeted respondents as following below:

A. Quantitative Questionnaires:

1. Questionnaire for students (adolescent school girls). The instrument consisted of variables including identity of respondent, characteristics of respondent, personal hygiene, current living condition related to sanitation, practice on iron folic acid consumption, knowledge and attitude regarding anemia and iron folic acid (IFA) supplementation, food habit, and 2x24 hours food recall, monthly food consumption frequency data.
2. Questionnaire for mothers. The instrument consisted of variables including identity of respondent, characteristics of family, knowledge and attitude regarding anemia and iron folic acid (IFA) supplementation.
3. Questionnaire for teachers. The instrument consisted of variables including identity of respondents, knowledge and attitude regarding anemia and iron folic acid (IFA) supplementation.

As our best practice for doing this study, we have had our questionnaire to be validated and measured its reliability. We have used our previous reference study conducted in Cianjur District, West Java and the questionnaires have been modified according to the present study objectives. Statistically, our set of questionnaires for collecting data of knowledge and attitude regarding anemia and IFA supplementation consist of 53 items of questions were having 39.6% items were validated at the first analysis, 85.7% were validated at the second-repeated analysis, and 100% were validated at the third-repeated analysis (n=62). In addition, the reliability test showed that all items were considered to be reliable (Cronbach's alpha 0.767). After the development of validated questionnaires, we have conducted training of enumerator, try out of questionnaires by the enumerator, and simulation of data entry.

B. Qualitative Questionnaires:

We were also developing a set of qualitative questionnaires to provide the data regarding WIFA program management (input-process-output) throughout an in-depth interview to the targeted respondents (health officers in Public Health Centers, correspondence teachers onto the program, and Local Health and Education Officers).

Training of enumerator, Questionnaires Tryout, and simulation of data entry.

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 questionnaires tryout was conducted in certain locations based on feasibility of the enumerator and the sample students for tryout were considered to be in similar criteria with targeted study respondents. The purpose of the tryout was to know the degree of feasibility of the instrument to be administered in the fields. Based on the questionnaire’s tryout, researchers re-developed the instrument until it was ready for data collection. After compile all the data collection, enumerator and researcher conducted the simulation of data cleaning and entry, hence each enumerator has the same understanding to do the data entry.

The knowledge scoring system was determined methodologically from the structured questionnaire of several questions related to anemia and IFA supplementation. Level of knowledge was categorized as good (>80), medium (60-80), and poor (<60) based on the percentage of the total score (Khomsan, 2021). While an attitude of anemia and IFA supplementation was measured using Likert Scale. The level of attitudes was categorized as positive (≥70) and negative (<70) based on the percentage of the total score. The list of variables and methods of data collection are specified in Table 2.2.

Table 2.2. Data collection during Year-1 study

Aspects	Variables	Respondents	Methods of Measurement	Methods of Collection
Socio-economic characteristics	Name Age Pocket money Hygiene and sanitation practice Frequency of consuming IFA tablets in the last 6 months Reasons of consuming or not consuming IFA tablets	- Adolescent school girls	Recording	Self-administered questionnaire
Knowledge and attitude of anemia and WIFA supplementation	Causes, symptoms, and consequences of anemia Ways to prevent anemia Dose and duration of WIFA supplementation Benefits of IFA supplements Side effects of IFA consumption Methods to overcome side effects of IFA consumption	- Adolescent school girls - Teachers	Recording	Self-administered questionnaire
Food consumption	Quantity of food consumed: Type of food consumed	- Adolescent school girls	- 2 x 24-hour food recall - Food frequency questionnaire	Direct interview

Table 2.2. Data collection during Year-1 study (*cont.*)

Aspects	Variables	Respondents	Methods of Measurement	Methods of Collection
Food habits	Eating frequency Breakfast habits	- Adolescent school girls	Recording	Self-administered questionnaire
WIFA program management	Human resources WIFA forms availability Technical guidelines Constraints of implementation Tablet procurement and availability Tablet distribution Tablet storage Monitoring Recording and reporting	- Program officers in the two districts	Recording	In-depth interview and secondary data collection
WIFA coverage and consumption	Number of school girls received IFA tablets Number of IFA tablets consumed by adolescent school girls	- Program officers in the two districts	Recording	In-depth interview and secondary data collection

3) Data analysis

Estimation of elementary statistics consisting of mean, standard deviation, minimum score, and maximum score were applied to all the quantitative variables. In contrast, 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 and diagrams. In addition, Pearson correlation test, chi-square test, independent t-test were performed on several data to enrich the discussion of the results. All statistical analyses for quantitative data were carried out using SPSS Version 22.0 for windows. P-values of less than 0.05 will be considered significant. Data analysis in the Year-1 was performed to assess the knowledge and attitude of adolescent school girls with their mothers on anemia and IFA supplementation. Some variables were also analyzed to determine the relationship between the knowledge and frequency of IFA consumption during the program.

3. DESCRIPTION OF THE STUDY SITES

3.1. Tasikmalaya

3.1.1 Description of Climate and Geographical Area

Tasikmalaya Regency is a part of West Java province, which is located at 7°02' 29"-7°49' 08" South Latitude and 107°54' 10"-108°25' 52" East Longitude by astronomical location, and from administrative regions is bordered by four regions: the north direction bordered by; Tasikmalaya City, Ciamis Regency, and Majalengka Regency, the east direction bordered by; Ciamis Regency, New Autonomous Region of Pangandaran Regency, the south direction bordered by Indian Ocean, and the west direction bordered by Garut Regency. Tasikmalaya Regency has a territorial area of 2,708.82 km² with a coastline length of 54.5 km, in addition to 306 km² of fishing ground. Administratively, Tasikmalaya Regency consists of 39 sub-districts, including 351 villages. Three districts of Tasikmalaya Regency have coastal and marine areas with a total area of 200.72 km² or 7.41 % of the total area of Tasikmalaya Regency (BPS, 2021). The average rainfall in Tasikmalaya Regency is 2.532 mm/year, with 128 effective rainfall days for one year. The highest rainfall rate occurs in November (320 mm), while the lowest rainfall rate occurs in August (92 mm).

3.1.2 Description of Population and Employment Data

The population of Tasikmalaya Regency is 1,883,733 people, consisting of 955,175 men and 929,558 women. Its density reached 695 per km² in 2021, with a population growth rate of 0.94 % (BPS of Tasikmalaya Regency, 2021). The total workforce of Tasikmalaya Regency in 2022 was 347,063 people, an increased number of 4,478 people when compared to the workforce number in 2021. The percentage of the Open Unemployment Rate (OUR) in 2022 was 6.62%, lower by 1.04 points when compared to the OUR percentage in 2021. The working population of this regency is 324,099 people, an increase of 7,750 people compared to the working population in 2021. The largest increase in the working population contribution was absorbed in the manufacturing sector (by an increasing point of 2.21 %). In contrast, the sector that experienced the largest contribution decline was the service sector, with decrease points of 2.95%. There were also 150,491 people (46.43%) working in the informal sector (with an increase of 1.10 %) compared to the percentage in 2021 (Tasik Regency Profile 2022). The poverty percentage in Tasikmalaya Regency in 2022 was 10.73%, a decreasing percentage when compared to the poverty percentage of 11.15 % in 2020 (BPS 2022).

3.1.3 Description of Education Data

The Net Participation Rate of educational level from elementary, junior, and senior/high /vocational schools are 94.79%, 84.84%, and 73.45%. In 2022, there were 352 kindergartens, 1.059 elementary schools, 294 junior high schools, 75 senior high schools, and 135 vocational schools in Tasikmalaya Regency (BPS Tasikmalaya Regency 2021). The Human Development Index for Tasikmalaya Regency in 2022 was 73.83, with an increase of 0.52 points (0.71%) compared to the previous year's

achievement (73.31). HDI points of Tasikmalaya Regency are included in a high category and have a rank of 9th out of 27 regencies/cities in West Java Province.

3.1.4 Description of Health Data

According to 2022 SSGI data, the stunting, wasting, and underweight prevalences among toddlers in Tasikmalaya Regency were stated in the following percentages: 27.2 %, 2.4 %, and 13.3 %. Whereas the list of health facilities in Tasikmalaya Regency in 2022 consisted of 3 hospitals, 1 maternity hospital, 51 polyclinics, 39 community health centers, and 77 pharmacies. Stunting prevention efforts in Tasikmalaya Regency are regulated in the Regional Regulation No. 42 of 2021, concerning the Stunting Prevention Efforts and Communication Strategies to Change the Community Behaviour. The activity stunting prevention efforts implemented in Tasikmalaya Regency are assisting prospective brides, pregnant women, and mothers who have toddlers with the expectation that the future children born from them will not become new stunted children generation.

3.2. Ciamis

3.2.1 Description of Climate and Geographical Area

Ciamis Regency is one district area in the West Java Province. Majalengka Regency and Kuningan Regency border Ciamis Regency location in the north direction, Tasikmalaya Regency and Tasikmalaya City in the west direction, Banjar City and Central Java Province in the east direction, and Indonesian Ocean in the south direction. Ciamis Regency has 27 districts, 7 sub-districts, and 258 villages. Its geographical location is a strategic position since the national road of Central Java Province crosses areas of West Java and Central Java provinces, and the provincial road crosses the route of Ciamis-Cirebon-Central Java. The astronomical location of Ciamis Regency stated in 108°20' to 108°40' East Longitude and 7°40'20" to 7°41'20" South Latitude. The total area of Ciamis Regency is 1,597,670 (BPS 2021), with an average rainfall of 116 days with a precipitation rate of 2.632 mm.

3.2.2 Description of Population and Employment Data

The population of the Ciamis Regency is 1,229,069 people, with a population density reaching 50.89 people per km² in 2020 and a population growth rate of 0.52 % (BPS Ciamis Regency, 2020). The total workforce in 2022 was 664,523 people, with an increase of 6,540 people compared to the total workforce in 2021. The Open Unemployment Rate in 2022 was 3,75 %, a declining number of 1.31 % when compared to the OUR in 2021. The number of impoverished people in Ciamis Regency for 2022 reached 9,396 people with a poverty severity index of 0.24, as put in percentage (7,72%) of impoverished people of Ciamis Regency in 2022, which this figure has decreased by 0.2 % when compared to the poverty figure in 2021 (BPS 2022).

3.2.3 Description of Education Data

The Net Participation Rate of the educational level of elementary, senior, and junior high/vocational schools is stated in the following percentages: 97.88%, 84.73, and 50.68%. In 2022, there were 304 kindergartens, 741 elementary schools, 134 junior high schools, 33 senior high schools, and 70 vocational schools in Ciamis

Regency (BPS of Ciamis Regency, 2022). The Human Development Index for Ciamis Regency in 2021 was 70.93, whereas the average length of school period in Ciamis Regency for 2021 was 14.65 for male students and 14.20 for adolescent school girls.

3.2.4 Description of Health Data

According to 2022 SSGI data, stunting, wasting, and underweight prevalences among toddlers in Ciamis Regency were 18.6 %, 7.1%, and 14.1 %, with a list of health facilities available in Ciamis Regency in 2020 consisting of 45 community health centers (Puskesmas), 45 polyclinics, 5 hospitals, and 58 pharmacies. The Stunting Prevention efforts in Ciamis Regency are regulated in The Regent Regulation (Perbup) no.38 of 2020 About the Acceleration of Stunting Prevention. Efforts to prevent stunting in Ciamis Regency are carried out by several strategies, including health education through family independence and health socialization by the Health Service Official regarding community movement for healthy living, a 1000 HPK movement, and the Integrated Health Care Center (Posyandu) revitalization.

4. WIFA SUPPLEMENTATION PROGRAM

4.1. WIFA Supplementation Program Management

Personnel

The IFA supplement tablets administration is usually coordinated by Red Cross Youth (PMR/*Palang Merah Remaja*) 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 Youth Cross 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.

"Since the school is the Red Cross Youth (RCY) program, the supervisor is responsible for it. We have three RCY supervisors in this school, but PMR cadres distribute the IFA to adolescent school girls. Sometimes, clinic teachers are also involved".

(Teacher, SMAN 2 Ciamis, Interview)

School officials are equipped with operational and technical guidelines for the IFA supplementation programs for adolescent school girls. However, not all school officials have them. Only the school's principal, the PiC for the IFA program, and several students as members of Red Cross Youth were invited to distribute the IFA tablets to adolescent school girls who have the guidelines.

The IFA supplementation program at the level of Public Health Centre is managed by Nutrition Counsellor (Tenaga Pelaksana Gizi/TPG), School-aged-children Counsellor, School Health Clinic (UKS) 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 counselors. 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..

IFA Availability

In general, at the school level, IFA tablets are always sufficient. Moreover, according to some teachers, IFA stocks had piled up because not all IFA tablets were distributed or taken by the students. The PHC also stated amount of IFA tablets was always sufficient because PHC always pre-calculated data of adolescent school girls in schools to apply the IFA tablets. However, the stocks of IFA tablets for female adolescents are equated with the stock of IFA tablets for pregnant women because the procurement is conducted all at once.

"Since we have a group of school health clinic teachers in the Ciamis Public Health Centre area, when there is a school that has not or has fewer IFA tablets listed within the group, the teachers are all active, so there is no accumulation of IFA tablets."

(School Health Clinic Staff, Ciamis Public Health Center, Ciamis, Interview)

"Those are from PHC. So far, the availability of tablets has piled up. Could be some problems with the adolescent school girls, if seen from the availability of the tablet has fulfilled the stocks, but not all (tablets) are distributed because there is a chance the tablets not fully consumed"

(Teacher, SMAN 1 Baregbeg, Ciamis, Interview)

IFA Distribution

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 Red Cross Youth (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.

"The distribution pattern in this school is scheduled to consume IFA tablets together on Wednesday. The Health Office and PHC supply IFA tablets, then IFA tablets are stored at the School Health Clinic, and every week member of Red Cross Youth (PMR) will pack IFA tablets and be given on every Wednesday to adolescent school girls in the school".

(Teacher, SMKN 1 Ciamis, Ciamis. Interview)

"So now, starting from yesterday, at the new academic calendar year, IFA tablets are given once a week every Wednesday, and the responsibility is given to the RCY members that have a coordinator for each class to monitor the consumption process (to be consumed at the class immediately) since there was a problem before when IFA tablets were given to students, they just held the tablets and did nothing, they just accepted it without consuming it."

(Teacher, SMAN 2 Ciamis. Ciamis. Interview)

"IFA tablets were given by Physical Education teacher to every class"

(Teacher, SMKN Rajapolah, Tasikmalaya, Interview)

"Directly from PHC, it has a team who gave IFA tablets to students in here"

(Teacher, SMK Maarif NU. Ciamis. Interview)

Some schools only distribute IFA tablets for students who need them and stated the decision was taken based on health screening results in the new academic year. Thus, IFA is

distributed only to those who need it, whereas the rest of the tablets will be kept to be given to those students who ask.

"Actually, everyone should get the tablets. However, some students said, "Sir, I don't need it; I think I am healthy," and they looked healthy too, so we kept the tablets and put them into stocks for those who didn't need the tablets and be distributed for those students who need it. So, when we run out of stock, we can still use the IFA tablets that we've kept from those students who did not want it"

(Teacher, SMK Pelita Cendekia Bangsa, Tasikmalaya. Interview)

At the Public Health Center level, the IFA tablets distribution process was carried out in several ways. Some PHC distribute the IFA tablets every month. Still, there are also PHC that distribute IFA tablets every three or six months, following the schedule agreement of the affiliated schools and the availability time from the PHC, because there are still other health programs or activities which need to be carried out besides from the IFA program. As previously explained, at the school level, some PHC directly gave IFA tablets to students, but there were also some PHC that only gave IFA tablets to the PiC of the IFA program. One problem from this distribution process (of just being handed over to someone) can delay the distribution process of IFA tablets to adolescent school girls, such an experience of one of the PHC who said IFA tablets were entrusted to the security guard of a school and turned out the tablets were not given immediately to the PiC of IFA program.

"The problem might be....at the school, sometimes when we deliver IFA tablets and you arrive at the schools, the package must be sent to security post and the packages can be not given directly or won't reach the students"

(Health Promotion Counsellor, Rajapolah Public Health Centre, Tasikmalaya, Interview)

"So, we distribute the IFA tablets to schools for 4 times distribution in one year, once for every three months, and depends on the school request"

(Nutrition Counsellor, Ciamis Public Health Centre, Ciamis, Interview)

Several PHC knew or received reports from the schools through photo documentation that IFA tablets had been distributed to adolescent school girls. However, some PHC also needed to know whether IFA tablets had been distributed to students or whether the IFA tablets were sufficient. The PHC is also aware that not every school is actively reported when their IFA tablet stocks are not sufficient or less in amount.

"We hope when IFA stocks were ran out, the school confirmed to us so we will restock the tablets again in that school, but sometimes there was a miscommunication or communication was not smooth, so they just waited and we were also did not know if the tablets supplies still sufficient or not."

(Nutrition Counsellor, Rajapolah Public Health Centre, Tasikmalaya. Interview)

Several PHC also gave extra amounts of IFA tablets to the schools. Usually, they give 10 % extra tablets of IFA tablet numbers that should be given, so whenever the PHC has

delayed or is late in distributing the next IFA tablets, there is a stock that the schools can distribute for their adolescent school girls. Yet, there were PHC that did not give an extra amount of IFA tablets for the schools to ensure the iron supplement stocks for pregnant women in their area are sufficient.

"At distribution time, because of time difference, for example, we must give 54 IFA tablets, at minimum we will drop 30 tablets first, then later, we will evaluate whether the adolescent school girls of that school consume all tablets (30 tablets) to prevent tablets' accumulation or piling up. If we immediately drop the whole amount (54 tablets) we are afraid a short shortage for the pregnant women because procurement of IFA tablets is only once a year. The usual method is reporting when the IFA stocks at school is empty and we will drop a new IFA supply for them."

(PHC staff, Tinewati Public Health Centre. Tasikmalaya. Interview)

IFA Socialization Program

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 (RCY) activities by inviting the members to become peer groups as counselors for other adolescent school girls. So, some socialization activities are not always directly targeted to adolescent school girls in general, but the targeted subject can be members of RCY, class leaders, or student board members. In addition, IFA socialization was also carried out when distributing the tablets at schools. The socialization activity is not always performed in a large hall or room but can be conducted through interpersonal communication between the health workers and the adolescent schoolgirls.

"The usual pattern goes to the member of Red Cross Youth first, then, from there, to their friends. It is more comfortable to have counsellor or the tutor from their peers, except, when there are health screening activities or blood donation week or when there is a school orientation event at the beginning of new academic year which they likely to include or insert the IFA socialization."

(Teacher, SMAN 1 Ciamis. Interview)

"The usual schedule is conducted when we have a schedule for distributing IFA tablets at the same time or if there is a school event, counselling, we socialize about IFA program. We do not have a fixed schedule yet"

(Health Promotion Counsellor, Rajapolah Public Health Centre. Tasikmalaya. Interview)

The source from IFA socialization is usually taken from on-duty personnel of PHC, such as the nutrition, school health clinic, or health promotion division. Not all officers prepare special materials for IFA socialization. The Public Health Centre only explains verbally to PiC of the IFA program, teachers, or appointed students. Materials are specific about IFA

and are usually accompanied by other health materials on nutrition, healthy lifestyle, etc. Some school clinic teachers also have the initiative to socialize IFA by inviting RCY members to help educate other students.

"There is no specific time, sometimes if I ask the school about their free schedules, it could be difficult, so, by individual, for example, whenever I have free hours, I would go to class after class to give IFA socialization. There are also RCY in here, so I invite them and given a counselling first to them, because they must learn to educate their friends, so they can help out with IFA counselling."

(Teacher, SMAN 1 Singaparna, Tasikmalaya, Interview)

"The socialization is conducted through verbal communication to the students. About how important the program is, for example, consuming IFA will bring good effect in the long term or for your future, what is the effect and others. So, there is no guidance in a form of book yet."

(Teacher, SMAN 2 Ciamis. Interview)

The PHC stated not all schools received socialization about IFA administration, with some reasons underlying it: (1) too many schools are under the supervision of the Public Health Centre while there are still busy agenda of PHC activities, (2) not every school has public/large hall that allows a socialization event being held, and (3) the time availability between school and PHC to do socialization not always compromise.

"The PHC/Public Health Centre of course they have a socialization agenda to every school....maybe now there are only several schools that receive a socialization from PHC because there are 15 Junior High Schools and 16 Senior High Schools in its territory, so only some of the schools are getting a socialization"

(TPG, Ciamis Public Health Center, Interview)

IFA Storage

At the school level, the received IFA from the Public Health Centre/PHC will be stored in School Health Clinic (UKS/*Unit Kesehatan Sekolah*) 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 FEFO system (First Expire First Out)

"When the IFA tablets arrive, we look at the expiration date then write it down in a note. If the expiration date is short or soon will be expired, then these tablets will be given first, but, it will be returned to PHC when it already expired."

(Teacher, SMK Pelita Cendekia Bangsa, Tasikmalaya, Interview)

At the PHC level, IFA tablets are stored in the pharmacy division. Whereas for PHC that are not integrated with Pharmacy, the IFA tablets are stored in the supplements warehouse where IFA is stored by using pallets.

4.2. Monitoring and Reporting WIFA Program

There are two types of monitoring and evaluation activities in schools. The first type is the school, which has a form to fill out as a reporting form. For schools that receive forms to be filled are assisted by Red Cross Youth members for filling the forms. Several schools that conducted the first type of monitoring and evaluation system are SMAN 1 Singaparna, SMK Pelita Cendekia Bangsa, SMKN 1 Ciamis, and SMKN 2 Ciamis.

"Yes, there is a form that you saw earlier. I held responsible for it. How to fill the form will be assisted by member of Red Cross Youth at the School Health Clinic for filling the attendance list"

(Teacher, SMAN 1 Singaparna, Tasikmalaya, Interview)

"The monitoring activity has a report form. So, for every student who distributes the tablets, for example for class A of Social Science that has 18 adolescent school girls, then the IFA cadre will automatically bring 18 tablets. So, the cadre will monitor one by one of the adolescent school girls in that class and find out who consume the tablet and who doesn't. In fact, there are some students who refuse to consume IFA tablets. The reasons are vary, from they have menstruation period, or another reason such as "M'am, the side effect is I get dizzy", or "M'am, I am not used to consume medicine". So it became difficult to make every students consume IFA tablets, but, there is already data on students who refuse to consume IFA tablets and students who consume it regularly.

(Teacher, SMAN 2 Ciamis, Interview)

"The system is interview. So, there will be one officer from School Health Clinic or Nutrition Counsellor and later we go there to have an interview about what is happening here, being asked, and usually the school official who will be interviewed is clinic teacher, because clinic teacher is in charge of IFA administration program"

(Teacher, SMKN YPC, Tasikmalaya, Interview)

The monitoring and evaluation (money) activity at the Public Health Centre (PHC) level is more varied than monitoring and evaluation at the school level. Types of monitoring and evaluation at the PHC level are (1) a form provided by the province government; (2) conducted when consuming the iron tablets together at school and be reported personally through Whatsapp; and (3) conducted when there are PHC activity or iron supplement tablets distribution.

It is said that only some schools fill out the type 1 monitoring evaluation forms. According to the Public Health Centre, the existing forms are provided by the provincial government, where the affiliated school can directly fill out the forms, and can be seen by the PHC. The contents of the form are the student's name, school, and whether they have received IFA tablets or not.

"The report is in the hand of Nutrition Counsellor through 'Si Ratu Manis', the program's name is Si Ratu Manis, by evaluation, recording, reporting. So, the process is started from school who given a link by the Health Service, which previously the health service goes to the Public Health Centre first, and later the PHC will give link to the school, after giving the link to the school, later, when the school take the iron tablets, evaluate, monitor, or report can be conducted directly via the provided link".

(The School Health Clinic Counsellor, Ciamis Public Health Centre, Interview)

While the Type 2 monitoring evaluation sees the monitoring process can be carried out by supervising the adolescent school girls while taking the iron tablets together at school. Thus, monitoring can be carried out directly by the PHC officer when they have activity at school or through teachers' reports to the PHC.

"Through documentation as well. So, there is evidence whether the tablets were consumed or not. Such as this morning when there was a WhatsApp call said "M'am, the children are being called (to gather around)" then, there was pictures of them consuming the tablets together"

(School Health Clinic Counsellor, Singaparna Public Health Center, Tasikmalaya. Interview)

"The system is an interview, so there will be 1 officer from school health clinic or Nutrition Counsellor, which later we will go there and having an interview about what is happening in here, being asked, and usually the school official who will be interviewed is UKS teacher because he/she is the one who in charge of IFA program"

(Nutrition Counsellor, Ciamis Public Health Centre, Interview)

Type 3 sees the monitoring and evaluation process can be carried out together with other health programs at school. Monitoring and evaluation were carried out by asking students about their experience consuming the IFA tablets. Type 3 is not based on written data but rather on verbal reporting.

"There is a schedule. So, we will ask, what day does this school administer the tablets, so later, we will monitor on the day of medicine administration, we'll go there first-hand, not only through WhatsApp, to see whether is there female student who did not consume or other?"

(Nutrition Counsellor, Singaparna Public Health Centre, Tasikmalaya, Interview)

Public Health Centre stated that the IFA administration program at school was reported once every three months through EPPGBM (electronic reporting system), where the data could be retrieved by CERIA (*Cegah Anemia Remaja Putri Indonesia* or Prevent Anemia for Indonesian Adolescents School Girls) application. This application has been introduced, but its utilization has been ineffective because not all students can fill it at school due to

school regulations of not accessing smartphones during school activities or some who do not own the device. The PHC also stated that so far, information that could be reported was the amount of IFA supplement tablets distributed and received by adolescent school girls. The compliance data still needs to be created because the students who received IFA tablets were automatically treated as already consumed the iron tablets.

4.3. Constraints and Solution

Constraints of the iron supplement provision are presented from the perspectives of students, teachers, and health workers. In adolescent school, girls perceived IFA tablets were not important. It was unpleasant, with a nauseous feeling after taking IFA and a fear of taking the drug. Also, some students felt they were healthy, so they did not require to take IFA tablets.

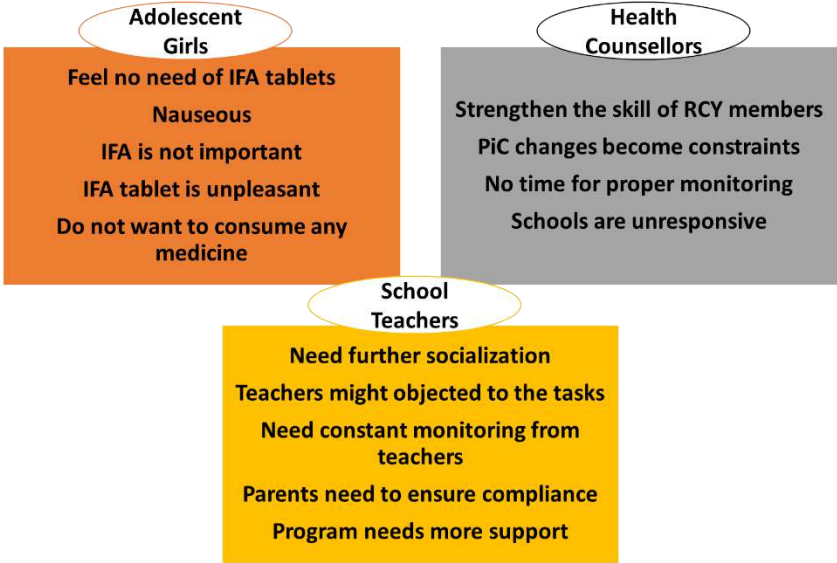


Figure 3.1. Constraints and solution of IFA program

For the health workers, it is necessary to strengthen the skill of RCY cadres/members, where they can be a peer counselors about IFA administration; difficulties in monitoring and evaluation conduct also reporting due to time trouble related to the busy agenda of PHC activities, also when the school unresponsive especially when it comes to school visit schedules. Apart from those, the health workers also felt that there were difficulties when the PiC of the IFA administration was changed.

As for teachers, a program for providing iron supplements in schools is a good/beneficial program because it can help students focus better on learning and support their health. However, the teachers felt it needed further socialization and the monitoring activity not only carried out by only one or two teachers. It needs help from many parties, such as teachers like homeroom teachers or anyone in the school community, to remind each other about the importance of consuming the IFA tablets. Moreover, teachers also feel parents can be involved in monitoring IFA compliance. Also, the IFA socialization should not only be limited to PiC of the IFA program and the appointed adolescent school girls but also to many parties at schools.

5. SOCIO-ECONOMIC CHARACTERISTICS OF ADOLESCENT SCHOOL GIRLS

5.1. Adolescent School Girls Characteristics

The subjects in this study were high school (SMA) and vocational high school (SMK) students in grade 11. The characteristics of the subjects observed in this study included district origin, school origin, school status, type of school, pocket money, and communication costs. The distribution of subject characteristics is presented in Table 5.1.

Table 5.1. Characteristics of adolescent school girls

Characteristics of adolescent school girls	n	%
District Origin		
- Tasikmalaya	142	50.0
- Ciamis	142	50.0
School Origin		
- SMK Negeri Rajapolah	34	12.0
- SMK Cendekia Pelita Bangsa	21	7.4
- SMAN 1 Singaparna	28	9.9
- SMAN 2 Singaparna	28	9.9
- SMK YPC Tasikmalaya	31	10.9
- SMA Negeri 1 Ciamis	28	9.9
- SMA Negeri 2 Ciamis	27	9.5
- SMK Negeri 1 Ciamis	30	10.6
- SMA Negeri 1 Baregbeg	30	10.6
- SMK Ma'arif NU Ciamis	27	9.5
School type		
- SMA (high school)	141	49.6
- SMK (vocational high school)	143	50.4
School status		
- Public school	205	72.2
- Private school	79	27.8
Pocket money (Rp per week) (<i>1US\$=Rp15,000</i>)		
- ≤ Rp 70,000	33	11.6
- >Rp. 70,000 – Rp. 140,000	173	60.9
- >Rp. 140,000 – Rp. 210,000	58	20.4
- >Rp 210,000	20	7.0
- Mean±SD	143.008 ± 77.521	
- Median (Min; Max)	140.000 (23.100 ; 700.000)	
Communication costs (Rp per week)		
- ≤ Rp 10,000	160	56.3
- >Rp. 10,000 – Rp. 20,000	76	26.8
- >Rp. 20,000 – Rp. 30,000	25	8.8
- >Rp 30,000	23	8.1
- Mean±SD	11.491 ± 17.903	
- Median (Min; Max)	7.000 (0 ; 150.000)	

Subjects are adolescent school girls who live in Tasikmalaya Regency and Ciamis Regency, with the proportion of subjects in each district being 50%. Two types of schools were the targets of the research, namely high school (SMA) and vocational high school (SMK), with the percentage of subjects being 49.6% and 50.4%, respectively. This research involved 10 schools, including SMK Negeri Rajapolah (12%), SMK Cendekia Pelita Bangsa (7,4%), SMAN 1 Singaparna (9,9%), SMAN 2 Singaparna (9,9%), SMK YPC Tasikmalaya (10,9%), SMAN 1 Ciamis (9,9%), SMAN 2 Ciamis (9,5%), SMK Negeri 1 Ciamis (10,6%), SMA Negeri 1 Baregbeg (10,6%), dan SMK Ma'arif NU Ciamis (9,5%). The subjects were scattered among two school statuses, namely public and private schools, with a proportion of subjects of 72.2% and 27.8% being private. Environmental differences such as school location and status can reflect differences in students' character between schools (Aulia et al. 2020). 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 (Silitonga et al., 2023). Research results by Risva et al. (2016) state that someone with good environmental support is likely to consume iron tablets 3.1 times more than someone with poor environmental support.

Pocket money is money brought by the subject and used for his needs. Most of the subjects received more than Rp. 70,000 to Rp. 140,000 (60.9%), and only a few subjects received pocket money of more than Rp. 210,000 (7%) in one week. In addition, 11.6% of the other subjects received an allowance of less than Rp. 70,000, and 20.4% of the subjects received an allowance of more than Rp. 140,000 to Rp. 210,000 in one week. In addition to pocket money, teenagers often set aside money to buy phone credits. The money allocated by the subject to buy phone credits varied, namely less than Rp. 10,000 (56.3%), more than Rp. 10,000 to Rp. 20,000 (26.8%), more than Rp. 20,000 to Rp. 30,000 (8.8%), and more than IDR 30,000 (8.1%). The average money to buy phone credits is Rp. 11,491, with a median value of Rp. 7,000. Teenagers generally use credit purchases to communicate and access the internet to get information. Information through communication media and the internet has proven effective in improving health standards. The results of Runiari dan Ruspawan (2021) state significant differences in compliance with taking blood-boosting tablets for teenage girls before and after being given health education through video media and WhatsApp Reminders.

Family is one factor influencing adolescent compliance with consuming iron supplements (Silitonga et al. 2023). Relationships with parents are the most significant factor in supporting children's health development (Grau et al. 2022). Family characteristics observed included the number of family members, the father's age, the mother's age, the father, the education level of the mother, the mother's occupation, and the father's occupation. The distribution of subject family characteristics is presented in Table 5.2.

Table 5.2 shows that the average number of family members among the research subjects is 4 to 5 people. As many as 57.7% of the subjects had more than four family members, 36.3% had 5 to 6 family members, and the other 6% had more than 6. Subjects have fathers and mothers with an average age of 49 and 43.9 years, respectively. The most significant proportion of the subject's father's age is 45 to 55. The most significant proportion of the subject's mother's age was women aged 35 to 45 years (57.9%).

Table 5.2. Adolescent school girls' family characteristics

Family characteristics	n	%
Number of family members (person)		
- ≤ 4	164	57.7
- 5-6	103	36.3
- >6	17	6
- Mean±SD		4.5±1.3
Father's age (n=270)		
- ≤35 years	2	0.7
- >35-45 years	95	35.2
- >45-55 years	125	46.3
- >55-60 years	26	9.6
- >60 years	22	8.1
- Mean±SD		49±7.4
Mother's age (n=278)		
- ≤35 years	15	5.4
- >35-45 years	161	57.9
- >45-55 years	84	30.2
- >55-60 years	15	5.4
- >60 years	3	1.1
- Mean±SD		43.9±6.7
Education Level of Mother (n=278)		
- Never attended school	0	0
- Elementary School (SD)	109	38.9
- Junior High School (SMP)	75	26.8
- Senior High School (SMA)	64	22.9
- University	32	11.4
Education Level of Father (n=270)		
- Never attended school	0	0
- Elementary School (SD)	114	42.2
- Junior High School (SMP)	55	20.4
- Senior High School (SMA)	67	24.8
- University	34	12.6
Mother's occupation (n=278)		
- Not working (Housewife)	206	74.4
- Civil Servant/Police/Army	14	5.1
- Private sector employee	7	2.5
- Laborer	7	2.5
- Entrepreneur/trader	29	10.5
- Services (Tailor, salon)	5	1.8
- Other	9	3.2
Father's occupation (n=270)		
- Not working	3	1.1
- Civil Servant/Police/Army	16	5.9
- Private sector employee	18	6.7
- Laborer	115	42.6
- Entrepreneur/trader	83	30.7
- Services (Tailor, salon)	10	3.7
- Other	25	9.3

Differences in the educational level of parents of students will result in different treatment in educating and raising children. Parents' education has a significant influence on children's knowledge. Experience from education achieved by parents will help children form better behavior that leads to a prosperous life (Idris et al. 2020). Based on Table 5.2, the highest proportion of mothers' and fathers' last diplomas in subjects were elementary school graduates, at 38.9% and 42.4%, while the smallest proportions were university graduates, with respective proportions of 11.4% and 12.6%. Mothers are very influential on children's health conditions because mothers are the biggest influence in education and family nutrition fulfillment. Mothers with better education tend to have better knowledge, which is significantly associated with compliance with taking iron supplements (Agegnehu et al. 2019). According to Savitry et al. (2017), a significant relationship exists between family support and the intention to consume iron supplement tablets in female adolescents.

Most of the subject's fathers worked as laborers, with a proportion of 42.6%. The proportion of fathers who had jobs as civil servants/police/armed forces was 5.9%, private employees 6.7%, entrepreneurs/traders 30.7%, services (tailor/salon) 3.7%, not working 1.1%, and others 9.3%. Most of the subjects' mothers did not work or acted as housewives, with a proportion of 74.4%. The proportion of mothers who work as civil servants/police/armed forces is 5.1%, private employees are 2.5%, entrepreneurs/traders are 10.5%, services (tailor/salon) are 1.8%, and others are 3.2%. The mother's employment status has a greater influence on the child's health than the father's. Mothers who don't work on average have more time to interact with children, so they tend to be able to educate and control children's knowledge better (Fauzia et al. 2019).

5.2. Hygiene and Sanitation Practice

When looking at personal hygiene practices, the adolescent school girls reported good practice on the frequency of bathing (2 times a day; 93.0%), brushing teeth (2-3 times a day; 88.0%), washing hair using shampoo (2-3 times a week; 78.5%), and changing clothes (2-3 times a day; 89.8%). Most also cut their nails at least once weekly (82.7%). They also use personal towels to dry their body after bathing (97.9%). However, only 52.1% of them dry the towels after use.

Among the practice of personal hygiene, it is found that 49.6% of school girls have only sometimes washed their hands before eating. Washing hands with soap before eating is one of the critical times to avoid direct transmission of microbes (Audiena & Siagian, 2021; Cumming & Cairncross, 2016). This means that personal hygiene education is still needed for adolescent schoolgirls.

Table 5.3. Adolescent school girls' personal hygiene practice

Personal Hygiene Practice	n	%
Washing hands with soap before eating		
- Always	138	48.6
- Sometimes	141	49.6
- Never	5	1.8
Frequency of bathing in a day		
- 1 time	14	4.9
- 2 times	264	93.0
- 3 times	6	2.1
Frequency of brushing teeth in a day		
- 1 time	3	1.1
- 2-3 times	250	88.0
- More than 3 times	31	10.9
Frequency of washing hair using shampoo in a week		
- 1 time	16	5.6
- 2-3 times	223	78.5
- More than 3 times	45	15.8
Frequency of changing clothes in a day		
- 1 time	29	10.2
- 2-3 times	255	89.8
Cutting nails at least once a week		
- Yes	235	82.7
- No	49	17.3
Use personal towels		
- Yes	278	97.9
- No	6	2.1
Dry towels after use		
- Always	148	52.1
- Sometimes	130	45.8
- Never	6	2.1

Most of the school girls live with their parents (82.4%) or relatives (6.7%), but some of them live alone in boarding houses (10.9%). The water source for drinking and bathing, and sanitation facilities was categorized based on World Health Organization (WHO) Nutrition Landscape Information System (NLIS) on improved sanitation facilities and drinking water sources (World Health Organization, 2022). Water sources used for drinking by adolescent school girls were mainly categorized as improved water sources (refilled water; 71.8%). Metered tap water and drilled/pumped healthy water are categorized as improved if processed before consumption. Water collected from water springs must be protected in closed storage and processed before consumption to be categorized as improved. 3.5% of adolescent school girls still use water springs as drinking water sources. Drinking water from an unimproved source in adolescent school girls has associated increased probability of poor nutritional status (Gebregyorgis et al., 2016; Tamrat et al., 2020). Unimproved water sources could contain parasites that can cause loss of appetite and infection in adolescent school girls. As for water sources for bathing, almost all school girls used improved water sources

such as metered tap water and drilled/pumped well water (21.8% and 70.4%, respectively). However, there is one girl that still uses water collected from the river for bathing.

Table 5.4. Adolescent school girls' sanitation facilities at current residence

Sanitation Facilities at Current Residence	n	%
Currently lives with		
- Parents	234	82.4
- Siblings/relatives	19	6.7
- Boarding houses	31	10.9
Water for drinking		
- Refilled water	204	71.8
- Metered tap water	15	5.3
- Drilled/pumped well	55	19.4
- Water springs (<i>unimproved</i>)	10	3.5
Water for bathing		
- Metered tap water	62	21.8
- Drilled/pumped well	200	70.4
- Water springs	21	7.4
- Surface water (<i>unimproved</i>)	1	0.4
Presence of bathroom		
- Present	279	98.2
- Not present	5	1.8
Ownership of sanitation facility (bathing/washing/toilet place)		
- Private	250	88.0
- Public	34	12.0
Distance of septic tank to water source (if sanitation facility is owned privately)		
- < 10 meters	91	33.2
- ≥ 10 meters	167	60.9
- Water source is not drilled/pumped well	16	5.8
Presence of ventilation that can be opened		
- Enough	269	94.7
- Not enough	15	5.3
Garbage disposal		
- Garbage dump	266	93.7
- Rivers, ditches, and others	18	6.3

Most school girls reported that their current residence has a bathroom (98.2%) and that the facility is owned privately (88.0%). The majority of them (60.9%) reported that the septic tank in their residence is located far enough (≥ 10 meters) from the water source used for drinking and bathing. Ventilation is important to maintain the health of adolescent school girls. Most school girls (94.7%) reported having enough ventilation in their current residence. In addition, they reported that the residents put their garbage in the proper place, such as the garbage dump. However, 18 school girls reported their residences to throw their garbage into the rivers, ditches, or inappropriate places that can pollute the environment.

5.3. Practice of IFA Consumption at School

History of receiving IFA supplementation

Table 5.5 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 to the teacher, including the duration of time, frequency of receiving, and the number of IFA supplements taken before, during, or after the last year.

Table 5.5. 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
- Within the last year (1 year)	28	9.9
- >More than 1-2 year	42	14.8
- Mean±SD (month)	9.1 ± 4.7	
Frequency of receiving IFA supplement		
- Every week	155	54.6
- Every month	47	16.5
- Every 3 month	45	15.8
- Every semester	37	13.0
Numbers of IFA supplement that received by adolescent school girls within the last year		
- <24 tablet	143	50.4
- ≥24 tablet	141	49.6
- Mean±SD	17.8 ± 7.2	

Table 5.5 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 for the last year. The average duration of time that participants received the IFA supplement was nine months. As many as 54.6% of participants have 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). The previous study by Prasetya et al. (2022) reported that the majority of adolescent school girls in Cianjur Regency (76.8%) had received IFA every week, with the average number of IFA tablets received within the last six months being higher than those from the current study but still lower than the recommendation (22 tablets).

History of WIFA consumption

Table 5.6 reported the history of WIFA consumption in adolescent school girls. Most participants consumed the provided IFA tablets (64.1%). As for the location to take IFA tablets, most adolescent school girls take them at school (53.8%), and some of them take them at home (29.7%), while a few (16.5%) take them both at school and home. Most participants (97.3%) have 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 by Prasetya et al. (2022), which reported that most adolescent school girls in Cianjur Regency consume IFA tablets for less than 26 tablets during a year (65.7% for less than 13 tablets and 12% for 14-26 tablets).

Table 5.6. 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
- Mean±SD		5.4 ± 5.7
- Median (Min:Max)		3 (0:24)
Benefit after IFA consumption		
- Feeling more excited	29	15.9
- Feeling fresh and well	72	39.6
- Not easy to feel sleepy	34	18.8
- More focus on learning	20	11.0
- Have no benefit	100	55.6
Feeling side effect after consumption		
- Yes	85	46.7
- No	97	53.3
Type of side effect		
- Nausea	58	70.7
- Vomiting	1	1.2
- Difficult to defecate	0	0.0
- Dizziness	55	66.3
- Iron-likely odor when belching	25	30.1

According to the Ministry of Health (2018) recommendation, the number of WIFA tablets a person needs to consume in a year is 52 tablets delivered each week. A study by Briawan et al. (2020) showed that in East Nusa Tenggara, the % of adolescent school girls who received WIFA tablets was 93%. The mean number of WIFA tablets consumed was only ten in the previous six months, which was lower than the number of tablets received (24). 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 (Seminar et al. 2020).

Concerning the side effects of IFA consumption, as many as 46.7% of adolescent school girls mentioned that they had experienced the side effects, with nausea and dizziness being the most common (70.7% and 66.3%, respectively). Approximately 56.6% of participants decided to stop consuming IFA supplements to overcome the side effect. In comparison, 23.2% of participants prefer to consume IFA supplements after meals to overcome the side effect. Some others consumed it with banana, asked for advice from a teacher or friend, and took it before going to sleep (Table 5.7).

Table 5.7. Distribution of adolescent school girls based on their methods to overcome the side effects of WIFA consumption

Methods to overcome the side effects	n	%
Stop to consume IFA supplement	47	56.6
Asked for advice from teacher	12	14.5
Asked for suggestion from friend	13	15.7
Consume IFA supplement before sleep	11	13.3
Consume IFA supplement after meal	19	23.2
Consume IFA supplement together with banana	16	19.5

Table 5.8 presents the history of compliance and the reasons why participants adhere to consuming the IFA supplement. The majority of participants (81.7%) obtained an explanation from the teacher regarding the IFA supplementation, and most of them (93.1%) mentioned that they got the information regarding the benefits of the IFA supplement.

Table 5.8. Distribution of adolescent school girls based on the compliance for taking IFA supplement

Compliance	n	%
Obtaining the explanation from teacher regarding the IFA supplementation		
- Yes	232	81.7
- No	52	18.3
The message(s) obtained from teacher's explanation		
- Benefit provided from IFA supplement	215	93.1
- IFA dosage of supplementation	90	38.8
- Duration/length of time taking the IFA supplement	74	31.9
- The method to overcome the side effect of IFA supplement	64	27.6
Compliance on WIFA supplementation		
- Yes	23	8.1
- No	261	91.9
The reason for compliance		
- Teacher's advice	11	50.0
- Recommendation from health workers	3	13.6
- To prevent anemia	17	77.3
The reason for non-compliance		
- Unpleasant taste of the tablet	106	41.2
- Feeling healthy	26	10.1
- Fear to side effect	128	49.8
- Fear for having adverse health effect	34	13.2
- Absence at school	18	7.0
- Forgetfulness	135	52.7
- Unnecessary	28	10.9
- Dark-colored stool	1	0.4
- Have no permission from family	3	1.2

In a previous study by Apriningsih et al. (2020), several factors related to high school female adolescent's compliance to consuming iron supplements were the student's age, knowledge, motivation, and self-efficacy; prior Hb level examination; school organization to take IFA together; and teacher educating on the benefit of the iron tablet. Moreover, determination to take IFA tablets was highly associated with the school organizing students to take IFA tablets at school. It is suggested that building the teacher's capacity to educate students to consume WIFA supplements is essential.

The current study in West Java is relatively higher in the coverage and compliance of WIFA supplementation compared to the previous study in East Java and East Nusa Tenggara by Alfiah et al. (2020). The level of compliance to consuming WIFA supplements was very low-1% in East Java and 0% in East Nusa Tenggara. On average, adolescent girls consumed only 0.4-0.7 tablets within the last 6 months. The reason for non-compliance was stated as they did not consume it because they forgot, felt any side effects, and did not like the tablet taste, and even some of them thought it was unnecessary to consume it.

Table 5.9 shows the crosstab data between the number of IFA tablets received and consumed by adolescent girls. Most participants received less than 24 tablets within the last six months; therefore, they consumed less than 24. Although as many as 95.5% of participants had received more than 24 tablets within the last six months, the consumption did not reach the targeted number.

Table 5.9. Crosstab analysis between the number of IFA tablets received and consumed by adolescent school girls within the last six month [n (%)]

IFA tablets received by adolescent school girls	IFA tablets consumed by adolescent school girls		Total
	<24 tablet	≥24 tablet	
<24 tablet	71 (100)	0 (0)	71 (100)
≥24 tablet	106 (95.5)	5 (4.5)	111 (100)
Total	177 (97.3)	5 (2.7)	182 (100)

5.4. Adolescent School Girls Nutritional Status

The average weight of school girls is 49.5 kg, with an average height of 152.3 cm. These measures are notably lower than the national average as stated in the Regulation of The Minister of Health of the Republic of Indonesia number 28 of 2019 about Recommended Nutrition Adequacy for Indonesian girls aged 16-18 with 52 kg weight and 159 cm height measures. Adolescent school girl's anthropometric measures can be seen in Table 5.10.

Table 5.10. Adolescent school girls' anthropometric measures

Variables	Mean	SD
Weight (kg)	49.5	10.9
Height (cm)	152.3	5.3

When looking at the nutritional status, most of the school girls have normal height-for-age Z-score (HAZ) and normal BMI-for-age Z-score (BAZ) (69.7% and 78.9%, respectively). This finding aligns with the study in East Java, where adolescent girls aged 15 to 18 mostly belonged to normal nutritional status according to their HAZ and BAZ (Oy et al., 2019). It is found that 27.1% of the girls are stunted, and 3.2% of others are severely stunted. A South Sulawesi study found that adolescent girls' stunting increased with large family sizes, low-income families, and parents' low education (Patimah et al., 2016). There are also 11.3% of

the girls are overweight and 6.0% others who are obese. These findings showed a double burden of malnutrition in the population of school girls. Similar findings were found in adolescent girls at Islamic Boarding School at Semarang, where 13% were overweight, and 18.5% were obese (Utami et al. 2022). The study noted that the incidence of overweight and obese were correlated to anemia which is prevalent in adolescent school girls.

Table 5.11. Adolescent school girls' nutritional status

Nutritional Status	n	%
Height-for-Age Z-score (HAZ)		
- Severely stunted (Z score < -3)	9	3.2
- Stunted (-3 ≤ Z score < -2)	77	27.1
- Normal (Z score ≥ -2)	198	69.7
- Mean ± SD		-1.57 ± 0.79
BMI-for-Age Z-score (BAZ)		
- Severely thin (Z score < -3)	0	0.0
- Thin (-3 ≤ Z score < -2)	11	3.9
- Normal (-2 ≤ Z score ≤ 1)	224	78.9
- Overweight (1 ≤ Z score ≤ 2)	32	11.3
- Obese (Z score > 2)	17	6.0
- Mean ± SD		-0.11 ± 1.19

6. KNOWLEDGE AND ATTITUDE OF ANEMIA AND WIFA SUPPLEMENTATION

6.1. Adolescent School Girls' Knowledge Related to Anemia and WIFA Supplementation

Good nutritional knowledge regarding anemia can affect the tendency of adolescent school girls to choose iron food sources and avoid iron-blocking foods and also affect their compliance to take WIFA supplementation. Consequently, the low nutritional knowledge related to anemia in adolescent school girls will impact the high incidence of anemia (Putri et al. 2017). The knowledge level of adolescent school girls about anemia and WIFA supplementation is categorized into three (3) levels: a low level (score <60), a moderate level (score 60-80), and a high level (score >80). The distribution of adolescent school girls based on their knowledge level related to anemia and weekly iron-folic acid (WIFA) supplementation is presented in Table 6.1.

Table 6.1. Adolescent school girls' level of knowledge related to anemia and WIFA supplementation

Level of Knowledge	n	%
Low (score <60)	233	82.0
Moderate (score 60-80)	51	18.0
High (score >80)	0	0.0
Mean ± SD	52.5 ± 8.1	

Note: Scores are measured from 52 questions about nutrition knowledge (minimum score 32.7 = 17 correct answers, maximum score 78.9 = 41 correct answers)

According to Table 6.1., there are 82.0% of adolescent school girls have a knowledge level related to anemia and WIFA supplementation included in the low category, only 18 % of adolescent school girls know the level in the moderate category, and no adolescent school girls who know the level in the high category. These findings align with research conducted by Putri (2018), which stated that adolescent school girls' knowledge about anemia was still in a low category, where 59 % of the respondents studied had low knowledge about anemia.

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 (Larasati et al. 2021). 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. According to Briawan et al. (2018), 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. The distribution of adolescent school girls based on their general knowledge about anemia is presented in Table 6.2.

Table 6.2. Adolescent school girls 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?		
- Friends	58	20.8
- Teachers	173	62.0
- Parents or Family	93	33.5
- Health Workers	167	59.9
- Media (printed or electronic)	122	43.7
- Extracurricular activities	5	1.8
Way to find out whether adolescent school girl have an anemia or not is by checking the hemoglobin level in the blood.		
- True	92	32.4
- False	192	67.6
Have you heard about IFA supplementation for adolescent school girls		
- Yes	282	99.3
- No	2	0.7

Table 6.2. 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 an 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%). This result is in line with Indriasari et al. research (2022) which 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.

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. One causal factor of the low achievement from the WIFA supplementation program is the inadequate or lacking health facilities and infrastructures (Yudiana & Fayasari, 2020). 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 (Budianto & Fadhilah, 2006). Moreover, to increase knowledge about anemia, it is necessary to carry out counseling for adolescent school girls. According to Safitri's research in 2022, it is known that the knowledge of adolescent school girls about anemia has increased after counseling when compared to the state before counseling. Thus,

counseling is needed to improve the WIFA program with cross-sectoral support. The knowledge of adolescent school girls related to causes and symptoms of anemia is presented in Table 6.3.

Table 6.3. Adolescent school girls' knowledge related to causes, symptoms, and impact of anemia

Questions	n	%
Primary Cause of Anemia		
- Loss plenty of blood due to menstruation period or accident	151	53.2
- Lack of iron intake	190	66.9
- Lack of folic acid intake	86	30.3
- Lack of vitamin B12 intake	54	19.0
- Infectious disease (worm infection, malaria)	16	5.6
- Vegetarian diet	20	7.0
- Lack of protein intake	104	36.6
- Lack of exercises	84	29.6
- Lack of fruit consumption	96	33.8
Symptoms/primary signs from adolescent school girls who suffers from anemia condition		
- Pale eyes, nail, and palms	150	52.8
- Thinness	39	13.7
- Obesity	3	1.1
- Headache	225	79.2
- Weakness	195	68.7
- Exhausted	176	62.0
- Lethargy	210	73.9
Impact of Anemia		
- Study achievement declines	71	25.0
- Hard to concentrate	221	77.8
- Work productivity declines	123	43.3
- When the individual gives birth, the baby has a risk of low birth weight	77	27.1
- Susceptible to infection	13	4.6
- High blood pressure	7	2.5
- Low blood pressure	211	74.3
How to Prevent Anemia		
- Consume IFA supplement	270	95.1
- Consume green leafy vegetables	123	43.3
- Consume vegetables and fruits rich of vitamin C content	158	55.6
- Consume meat or offal	116	40.8
- Consume antiparasitic medicine/deworming pill every 6 months	9	3.2
- Drink many cups of tea	14	4.9
- Doing light exercises often	101	35.6
- Have sufficient rest	166	58.5

Table 6.3. presented data about adolescent school girls' knowledge regarding the causes, symptoms, and impact of anemia in young women, where most answers regarding the cause of anemia were lack of iron intake (66.9%), followed by excessive blood loss due to

menstruation period or accident as the cause of anemia (53.2%). In contrast, most answers related to general symptoms/signs of suffering from anemia were dizziness (79.2%), lethargy (73.9%), and weakness (68.7%). In addition, difficulty in concentration was the most answers found related to the question about the impact of anemia on young women (77.8%), followed by the second highest answer was low blood pressure due to anemia (74.3%), then decreased work productivity due to anemia (43.3%). The majority of answers from adolescent school girls regarding ways of anemia prevention were consuming iron tablets (95.1 %), having enough/adequate rest (58.5%) as the second highest answer, then consuming green leafy vegetables (55.6%) as the third highest answer.

Agustina et al. (2021) stated that knowledge and attitudes towards anemia are essential for creating positive actions to prevent anemia for adolescent school girls. Knowledge about anemia can help them to prevent anemia. When these adolescent school girls understand how to prevent anemia, they will learn how to behave by practicing anemia-preventing behavior (Situmeang et al., 2022). One way to increase their knowledge is to conduct a counseling program. Through a counseling program, it is expected that positive attitudes and awareness or any information obtained from the counseling program can be applied in their daily life to prevent the effect of anemia (Husna & Saputri 2022). The general knowledge of adolescent school girls regarding the dose and duration of the WIFA supplementation program is presented in Table 6.4.

Table 6.4. 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		
- 4 weeks	76	26.8
- 12 weeks	98	34.5
- 52 weeks	110	38.7
Nutrient content within each IFA supplement		
- Iron and Zinc	15	5.3
- Iron and Calcium	97	34.2
- Iron and Folic Acid	172	60.6
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

Most adolescent school girls (75%) already understand that they must receive iron supplementation weekly. However, plenty of adolescent school girls (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 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 (Ministry of Health 2014). The general knowledge of adolescent school girls regarding the side effect of taking/consuming iron tablets is presented in Table 6.5.

Table 6.5. Adolescent school girls' knowledge related to side effect of WIFA supplement consumption

Side Effect from Consuming IFA Supplement	n	%
Feeling nauseous	224	78.9
Difficulties in defecation	8	2.8
Feces has black color	20	7.0
Rusty taste in tongue after consuming supplement	75	26.4
Headache / dizziness	159	56.0
Heart palpitation	25	8.8

According to Table 6.5., the majority of answers from adolescent school girls regarding the side effects of taking iron tablets were feeling nausea (78.9%), followed by headaches (56.0%), and a rusty taste on the tongue after consuming the tablet (26.4%). In line with these findings, Rosmiati and Sudarsono (2019) also stated the occurrence of adverse reactions or side effects, which may happen, become one of many factors that can affect the level of compliance of these adolescent school girls in consuming their iron supplementation. The general knowledge of adolescent school girls regarding how to prevent the side effects after consuming iron tablets is presented in Table 6.6.

Table 6.6. Adolescent school girls' knowledge related to how to prevent the side effect after WIFA supplement consumption

How to prevent side effect after consuming IFA supplement at school	n	%
Consume after mealtime	186	65.5
Consume with fruit (banana)	81	28.5
Consume with plenty of water	189	66.5
Consume with tea	24	8.5

The percentage of adolescent school girls who have answers they needed to consume lots of water to overcome side effects was the highest answer (66.5 %), followed by consuming iron tablets after having a meal (65.5%) as the second highest answer, consuming iron tablets with fruits (28.5%), and only 8.5 % who answered they needed to drink tea to reduce the side effect of iron tablets. Table 6.7. presented the distribution of adolescent school girls' knowledge about the benefit of consuming iron tablets.

Table 6.7 Adolescent school girls' knowledge related to benefit in consuming WIFA supplement

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

Most adolescent school girls answered that iron supplementation could provide benefits for (1) preventing anemia (93%), (2) not getting tired easily (59.5%), and (3) increasing concentration (50%). According to these findings, Dieny (2014) stated 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.

6.2. Adolescent School Girls' Attitude Related to Anemia and WIFA Supplementation

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 (Priya et al. 2016). The adolescent school girls' attitude related to anemia and WIFA supplementation is put into three categories negative, neutral, and positive. The distribution of adolescent school girls based on attitude categories related to anemia and WIFA supplementation is presented in Table 6.8.

Table 6.8 Categories of adolescent school girls' attitude related to anemia and WIFA supplementation

Category	n	%
Negative (scores <70)	1	0.4
Neutral (scores 70-80)	17	6.0
Positive (scores >80)	266	93.7
Mean±SD	91.6 ± 6.9	

Only 6 % of adolescent school girls have a neutral attitude, and only 0.4 % have a negative attitude. These data were in line with the research of Setyaningtyas et al. (2020), who that stated most adolescent school girls have a positive attitude toward WIFA supplements because they believe that consuming WIFA supplements; can prevent anemia and other side effects caused by anemia. However, from Setyaningtyas et al. (2020), it was evident there were 34 % of respondents still have a negative attitude regarding WIFA supplements. It indicates a need to reinforce both the knowledge and attitude of adolescent school girls toward the role of iron supplementation in preventing anemia and maintaining health. The attitude of adolescent school girls related to anemia and iron supplementation is presented in Table 6.9.

Table 6.9. Adolescent school girls' attitude related to anemia and WIFA supplementation

No.	Questions	Agree		Hesitate		Disagree	
		n	%	n	%	N	%
Causes, Symptoms, and Effect of Anemia							
1.	Poor eating habit and pattern can cause anemia	215	75.7	66	23.2	3	1.1
2.	Reason for often tired and feel so weak probably because of anemia	124	43.7	135	47.5	25	8.8
3.	Anemia can disrupt my daily activities	262	92.3	21	7.4	1	0.4
How to Prevent Anemia							
4.	Consumption of IFA supplement is necessary to prevent anemia	264	93.0	20	7.0	0	0.0
Dosage and Duration of IFA Supplement Administration for Adolescent School Girls							
5.	IFA supplement is consumed every week on a regular basis	210	73.9	62	21.8	12	4.2
6.	IFA supplement contains iron and folic acid that good for human body	242	85.2	42	14.8	0	0.0
Side Effect of IFA Supplement Consumption							
7.	Benefit of consuming IFA supplement is greater than the possible side effect	194	68.3	84	29.6	6	2.1
How to Prevent Side Effect After Consuming IFA Supplement							
8.	The side effect of consuming IFA supplement can be prevented	188	66.2	95	33.5	1	0.4
Benefit of IFA Supplement Consumption							
9.	Consumption of IFA supplement helps prevent anemia and maintain health	265	93.3	18	6.3	1	0.4

Statements regarding the attitude of adolescent school girls towards anemia and WIFA supplementation were measured by a Likert scale with 3 intervals: Agree, Hesitate, and Disagree attitudes. These statements include causes, symptoms, and effects of anemia; how to prevent anemia; dose and duration of IFA administration; side effects of consuming IFA; how to prevent side effects after taking the WIFA supplements; and the benefit of consuming IFA tablets. Whereas aspect which has lack of belief by adolescent school girls was 'the reason I often feel tired and weak is probably that I suffer from anemia' where 47.5 % of respondents answered 'Hesitate.' The perception of how to prevent anemia by taking/consuming iron supplement tablets was reasonably well understood by adolescent school girls (93.0 % of respondents answered with 'Agree'). Yet, 21.8 % of adolescent school girls were unsure that 'WIFA supplement tablets are consumed every week regularly,' and 68.3 % of adolescent school girls agreed that the 'benefit of consuming iron tables are greater than the possible side effects.' Most adolescent school girls (93.3%) agreed that 'consumption of WIFA supplements helps prevent anemia and maintain health.' However, 6.3 % of adolescent school girls still have unsure/hesitant attitudes, and there were 0.4 % of adolescent school girls who disagreed. These perceptions can explain the reason why there were adolescent school girls who still did not take iron supplementation regularly.

6.3. Parents' Knowledge Related to Anemia and WIFA Supplementation

Parents with good knowledge and attitude regarding anemia and iron supplementation will supervise their daughter when she consumes the WIFA supplements at home. This theory is in line with Widjaja et al. (2014), who stated that education about the importance of preventing and treating anemia for the parents, especially the mothers, will be part of efforts to overcome the prevalence of anemia in adolescent school girls. The distribution of parents based on their level of knowledge regarding anemia and iron supplementation is presented in Table 6.10.

Table 6.10 Parents' level of knowledge related to anemia and WIFA supplementation

Level of Knowledge	n	%
Low (score <60)	5	1.8
Moderate (score 60-80)	85	29.9
High (score >80)	194	68.3
Mean±SD	83.5±12.1	

The knowledge level of the parents regarding anemia and iron supplementation was obtained from the scoring result to 11 questions regarding the causes, symptoms, and effects of anemia; how to prevent anemia; doses and duration of IFA administration; side effects of consuming IFA tablets; how to prevent side effects after consuming WIFA supplements; as well as the benefits of consuming IFA tablets. Most parents (68.3%) already have a high level of knowledge, 29.9 % have a moderate level of knowledge, and only 1.8 % have low knowledge regarding anemia and WIFA supplementation. Based on the research result from Apriningsih et al. (2019), it was found that most parents who needed to be more knowledgeable about anemia did not supervise their daughters when consuming WIFA supplements at home. This is because the parents perceived their daughter had no problem with anemia. It can be the cause parents did not watch/supervise their daughters when they took the WIFA supplements at home, and some parents did not know whether their daughter complied with consuming the WIFA supplements given by the school. Therefore, knowledge regarding anemia and iron supplementation should be given to adolescent school girls and their parents. The distribution of parents who answered questions related to anemia and iron supplementation correctly is presented in Table 6.11. The form of the question for the parents was a true-false statement with 11 questions. According to Table 6.11, it is found that most parents have answered questions correctly about the matters regarding causes, effects, and symptoms of anemia. However, the correct answer to the question 'Anemia in young girls will not affect academic achievement at school' was sought in only 64.8% of all parents' answers. There were still 47.2% of parents who answered incorrectly about the dosage of WIFA supplementation for adolescent school girls, as a question about how to prevent the side effect after taking WIFA supplements was only answered correctly by 65.1 % of parents. The question of 'the benefit of taking WIFA supplements' was correctly answered by most parents (90.1%). These data showed the importance of increasing the parents' nutritional knowledge to support a successful WIFA supplementation program..

Table 6.11 Parents' knowledge related to anemia and WIFA supplementation program

No.	Questions	n	%
Causes, Symptoms, and Effects of Anemia			
1.	Anemia is a condition caused by iron, folic acid, or vitamin B12 intake deficiencies	282	99.3
2.	Anemia can cause paleness, dizziness, weakness, fatigue and lethargy	282	99.3
3.	Anemia in adolescent school girls will not affect their academic achievement at school	184	64.8
How to Prevent Anemia			
4.	Consumption of animal side dishes such as meat or liver can prevent anemia	273	96.1
5.	Consumption of IFA supplement can prevent anemia	283	99.6
6.	Tea and coffee are good for consumption by people with anemia	219	77.1
Dosage and Duration of WIFA Supplementation for Adolescent School Girls			
7.	IFA supplement given to adolescent school girls at school are consumed once a month	150	52.8
8.	IFA supplement given to adolescent school girls at school contain iron and folic acid	282	99.3
Side Effect of IFA Supplement Consumption			
9.	Nausea and difficulty of defecating are side effects that may arise from consuming IFA supplements	214	75.4
How to Prevent Side Effect After Consuming IFA Supplement			
10.	To reduce the side effects of WFA supplement, should be taken with tea	185	65.1
Benefit of IFA Supplement Consumption			
11.	Consumption of IFA supplement can increase learning concentration of adolescent school girls in school	256	90.1

6.4. Parents' Attitude Regarding Anemia and WIFA Supplementation

Knowledge and attitude are two main factors that play an important role in realizing individual behavior. A good attitude from the parents regarding anemia and WIFA supplementation can influence the behavior of adolescent school girls (Apriningsih et al. 2019). Three categories of parents' attitudes regarding anemia and iron supplementation were applied in this research: negative, neutral, and positive. Only 3.9 % of parents had a neutral attitude, and no parents had a negative attitude regarding anemia and WIFA supplementation. The distribution of parents based on attitude categories related to anemia and iron supplementation is presented in Table 6.12.

Table 6.12 Categories of parents' attitude related to anemia and WIFA supplementation

Category	n	%
Negative (score <70)	0	0
Neutral (score 70-80)	11	3.9
Positive (scorer>80)	273	96.1
Mean±SD		93.2±6.8

According to Aprianingsih et al. (2022), a positive attitude of parents is needed for the effectiveness of achieving program objectives for improving the anemia nutritional status in adolescent school girls because the parents' attitude as companions is related to the adolescent school girls' compliance in consuming the WIFA supplements. The distribution of parents based on the attitudes related to anemia and iron supplementation is presented in Table 6.13.

Table 6.13. Parents' attitude related to anemia and WIFA supplementation

No.	Questions	Negative		Neutral		Positive	
		n	(%)	n	%	n	%
Cause, Symptom, and Effect of Anemia							
1.	Poor eating patterns and habits can cause anemia	8	2.8	52	18.3	224	78.9
2.	The cause of feeling tired and weak from adolescent school girls at school probably because they suffer from anemia	9	3.2	67	23.6	208	73.2
3.	Anemia can cause disruption in the implementation of daily activities	1	0.4	26	9.2	257	90.5
How to Prevent Anemia							
4.	Consumption of IFA supplement by adolescent school girls is needed to prevent anemia	1	0.4	20	7	263	92.6
5.	IFA supplement needs to be consumed by adolescent school girls every week on a regular basis	10	3.5	69	24.3	205	72.2
6.	IFA supplement contains iron and folic acid which are good for the body	0	0	19	6.7	265	93.3
Side Effect of IFA Supplement Consumption							
7.	The benefits of consuming IFA supplement are greater than the possible side effects	2	0.7	77	27.1	205	72.2
How to Prevent Side Effect After Consuming IFA Supplement							
8.	The side effects of consuming IFA supplements can be prevented	10	3.5	95	33.5	179	63
Benefit of IFA Supplement Consumption							
9.	Consumption of IFA supplement helps to prevent anemia and maintain health	0	0	13	4.6	271	95.4

Most parents had positive perceptions from statements regarding anemia's causes, effects, and symptoms; how to prevent anemia; the side effects of consuming IFA tablets; and the benefits of consuming IFA tablets. However, only 63 % of parents had a positive attitude toward the statement, "Side effects of consuming WIFA supplements can be prevented". Almost all parents (95.4%) had a positive attitude towards the statement, 'Consumption of WIFA supplements helps prevent anemia and maintain health.' This perception is expected to be a supporting factor for parents to motivate adolescent school girls to consume WIFA supplements to prevent anemia and maintain their health.

6.5. Teachers' Knowledge Regarding Anemia and WIFA Supplementation

Teachers are an attributable aspect to the health sectors in distributing iron supplements. According to Dureja (2016), the prevalence of anemia by a high level of compliance is influenced by good cooperation between various parties, including teachers and parents. The characteristic of the teachers involved in the research is presented in Table 6.14.

Table 6.14 Teachers' characteristics

Characteristic	n	%
Regency Origin		
- Tasikmalaya	15	50
- Ciamis	15	50
Field of Study		
- Physical Education	10	33.3
- Science or Biology	10	33.3
- School Health Clinic	10	33.3

The total number of teachers who participated in the study was 100 teachers, consisting of 50 teachers from Tasikmalaya Regency and 50 teachers from Ciamis Regency. Teachers involved came from different science fields relevant to the research, such as physical education, science/biology, and School Health Clinic teachers. Aside from measuring the knowledge of students and their parents, the teacher's knowledge was also measured by asking a number of questions related to anemia and iron supplementation. The level of teachers' knowledge was divided into three categories: low, moderate, and high levels. The distribution of teachers based on their knowledge level regarding anemia and iron supplementation is presented in Table 6.15.

Table 6.15 Teachers' level of knowledge related to anemia and WIFA supplementation

Level of Knowledge	n	%
Low (score <60)	0	0
Moderate (score 60-80)	8	26.7
High (score >80)	22	73.3
Mean±SD	88.2±10.7	

The level of teachers' knowledge regarding anemia and WIFA supplementation was obtained from the result scores of 11 questions regarding causes, symptoms, and effects of anemia; how to prevent anemia; dose and IFA administration duration; side effects of consuming IFA tablets; how to prevent side effects after consuming WIFA supplements; as well as the benefit of consuming IFA tablets. According to Table 6.15, it is found that most teachers (73.3%) already have a high knowledge level, 26.7 % of teachers have a moderate knowledge level, and no teachers have a low knowledge level regarding anemia and WIFA supplementation. The distribution of teachers based on their correct answers regarding anemia and iron supplementation is presented in Table 6.16.

Table 6.16 Teachers' knowledge related to anemia and WIFA supplementation program

No.	Questions	n	%
Causes, Symptoms, and Effect of Anemia			
1.	Anemia is a condition caused by iron, folic acid, or vitamin B12 intake deficiencies	30	100
2.	Anemia can cause paleness, dizziness, weakness, fatigue and lethargy	30	100
3.	Anemia in adolescent school girls will not affect their academic achievement at school	23	76.7
How to Prevent Anemia			
4.	Consumption of animal protein source such as meat or liver can prevent anemia	28	93.3
5.	Consumption of IFA supplement can prevent anemia	30	100
6.	Tea and coffee are good for consumption by people with anemia	29	96.7
Dosage and Duration of WIFA Supplementation for Adolescent School Girls			
7.	IFA supplement given to adolescent school girls at school are consumed once a month	14	46.7
8.	IFA supplement given to adolescent school girls at school contain iron and folic acid	30	100
Side Effect of IFA Supplement Consumption			
9.	Nausea and difficulty of defecating are side effects that may arise from consuming IFA supplements	23	76.7
How to Prevent Side Effect After Consuming WIFA Supplement Tablets			
10.	To reduce the side effects of IFA supplement, it should be taken with tea	27	90
Benefit of IFA Supplement Consumption			
11.	Consumption of IFA supplement can increase learning concentration of adolescent school girls in school	27	90

According to Table 6.17, most teachers have correct answers to the questions regarding causes, effects, and symptoms of anemia; how to prevent side effects after consuming WIFA supplements; and the benefit of consuming IFA tablets. However, there were still many teachers who did not know that the iron supplement must be consumed once a week, so the answer to the question of "The WIFA supplements given to young girls at school is consumed once a month" was 'True,' although their answer was wrong. The low percentage of correct answers may indicate there are still some teachers who do not know the recommended dosage and frequency of iron supplement tablets to be given to their adolescent schoolgirls.

6.6. Teachers' Attitude Related to Anemia and WIFA Supplementation

There were three teacher attitudes related to anemia and iron supplementation: negative, neutral, and positive. The distribution of teachers based on attitude categories related to anemia and iron supplementation is presented in Table 6.17. It is found that most teachers have a positive attitude regarding anemia and iron supplementation, only 10 % of teachers have a neutral attitude, and no teacher has a negative attitude toward the anemia and iron supplementation program.

Table 6.17. Categories of teachers' attitude related to anemia and WIFA supplementation

Category	n	%
Negative (score <70)	0	0
Neutral (score 70-80)	3	10
Positive (score >80)	27	90
Mean±SD	95.4±8.0	

According to Listiani (2016), a positive attitude from teachers towards anemia and iron supplementation can make the teacher active supporters of adolescent school girls consuming iron supplements. With teachers' support in reminding adolescent school girls to consume WIFA supplements and providing information about the iron supplements, it can provide a positive attitude in adolescent school girls, so the positive behavior is also manifested in compliance in consuming WIFA supplements according to the recommendations. In addition, the teacher acts as a role model in school; thus, with support from their teacher, every effort conducted to influence the students' behavior can be run smoothly, including the activity of WIFA supplements administration at schools (Darmayanti 2019). The distribution of teachers based on attitudes related to anemia and iron supplementation is presented in Table 6.18.

Table 6.18 Teachers' attitude related to anemia and WIFA supplementation

No.	Questions	Negative		Neutral		Positive	
		n	%	n	%	n	%
Causes, Symptoms, and Effect of Anemia							
1.	Poor eating patterns and habits can cause anemia	3	10	1	3.3	26	86.7
2.	The cause of feeling tired and weak from adolescent school girls at school probably because they suffer from anemia	0	0	2	6.7	28	93.3
3.	Anemia can cause disruption in the implementation of daily activities	0	0	1	3.3	29	96.7
How to Prevent Anemia							
4.	Consumption of IFA supplement by adolescent school girls is needed to prevent anemia	0	0	0	0	30	100
Dosage and Duration of WIFA Supplementation for Adolescent School Girls							
5.	IFA supplement needs to be consumed by adolescent school girls every week on a regular basis	3	10	2	6.7	25	83.3
6.	IFA supplement contains iron and folic acid which are good for the body	0	0	0	0	30	100
Side Effect of IFA Supplement Consumption							
7.	The benefits of consuming IFA supplement are greater than the possible side effects	0	0	5	16.7	25	83.3

Table 6.18 Teachers' attitude related to anemia and WIFA supplementation (*cont.*)

No.	Questions	Negative		Neutral		Positive	
		n	%	n	%	n	%
How to Prevent Side Effect After Consuming IFA Supplement							
8.	Side effect from WIFA supplement tablets consumption is able to be prevented	3	10	8	26.7	19	63.3
Benefit of IFA Supplement Consumption							
9.	Consumption of IFA supplement helps to prevent anemia and maintain health	0	0	0	0	30	100

Most teachers have a positive perception of the statements regarding the causes, effects, and symptoms of anemia; how to prevent anemia; the side effects of consuming iron supplementation; and the benefit of consuming iron supplementation. There were 26.7% of teachers who had a neutral attitude toward the statement, 'The side effect of consuming WIFA supplements can be prevented.' All teachers (100%) have a positive attitude towards the statement, 'Consumption of WIFA supplements helps prevent anemia and maintain health'. It is expected this perception can be a supporting factor for teachers to motivate adolescent school girls to consume WIFA supplements to prevent anemia and maintain their health.

7. FOOD HABITS AND CONSUMPTION

7.1. Food Habits

Eating habits refer to people's way and pattern of eating, including why and how they eat, the types of food they consume, with whom they eat, and how they obtain, store, utilize, and dispose of food. According to Romandani et al. (2020), eating habits are a variety of information that provides an overview of types of foodstuffs and the amount consumed daily by an individual, which becomes characteristic of a particular community group. Many factors, such as culture, local tradition, personal preferences, health conditions, and social environment, can influence eating habits.

The reason for an individual to eat can vary; some people may eat due to hunger or to fulfill their nutritional needs, while others may eat to satisfy an emotional need or as a form of certain celebration. Moreover, factors such as daily routines, work schedules, and food availability can also influence how and when an individual eats. Also, the type of food the individual consumes can vary; some people may follow specific diets such as vegetarian, vegan, or low-carb diet followers. The influential factors in food choices include personal preference, religious or ethical beliefs, availability in their residence area, and health information about food.

The eating habits could be influenced by the people they eat with. Some people prefer to eat alone while others prefer to eat with family, friends, or in public places like a restaurant. Eating together can be a time to socialize and follow certain social norms. There are also other factors affecting eating habits, internal factors such as the physical activity of the individual and external factors related to food selection such as culture, religion, ethical decisions, economic factors, social norms, education, and individual awareness (Suriyati et al. 2019).

Furthermore, how people obtain, store, use, and dispose of food also contributes to their eating habits. Some people prefer to buy food at traditional markets, while others prefer to buy food through delivery services or cook food. Food storage methods, in refrigeration or through food preservation, can also influence food choices and food safety. In addition, the way to dispose of food is an important aspect of reducing wastage and environmental impact.

Eating habits are a combination of many influential factors about how people eat, the types of food consumed, whom they eat with, and how they store, use, and dispose of their food. The type of eating habits can differ between individuals and cultures and continue to evolve due to changes in lifestyle and social values.

There are several factors affecting an individual eating habits. The following section explains some factors which generally affect the diet of an individual:

1. **Culture and Environment:** The culture and environment where the individual lives play an important role in their eating habits. Cultural values, traditions, and social norms related to food can influence individual food choices and eating patterns.
2. **Personal Preferences:** Individuals' preferences for taste, texture, aroma, and food appearance may influence their eating habits. Since everyone has unique preferences regarding certain food, their selection can influence their choices.
3. **Knowledge and Education:** An individual's nutrition level and health knowledge can influence their eating habits. Good education about nutrition and the benefits of a balanced diet can help the individual to make healthier food selections.

4. **Food Availability:** food availability in the individual's surroundings can affect their food selection. If the individual has limited access to healthy foods and gets more exposure to high-fat, high-sugar, or high-salt foods, it can affect their eating habits.
5. **Economic factors** such as income, food prices, and cost of living can also influence individual eating habits. For example, people with a limited budget choose cheaper and less healthy food.
6. **Stress and Emotions:** stress and emotions can also affect an individual's eating habits. Some people tend to overeat or lose their appetite (eat less) when faced with stressful or emotional situations.
7. **Food Promotions:** food promotions and advertisements, restaurant/food store layouts, and the portion sizes of a meal can influence individual eating habits. If the individual gets exposed to strong promotion (of certain menus or food) frequently or the food dish is served in large portions, it can affect the type and amount of food consumed.
8. **Physical Necessities:** physical necessities of an individual that are related to age, gender, level of physical activity, and the state of health can also affect an individual physical habit. For example, growing teenagers require higher food intake than adult individuals or athletes who may have higher energy requirements.

In eating habits, these factors interact with each other and can shape an individual's eating pattern. It is important to understand these factors to be able to make healthier food choices and also to support a balanced lifestyle. One indicator of eating habits is eating frequency. In this study, the frequency of eating was found to be most adolescent school girls (62.7%) eat twice times in a day, and 28.9 % of adolescent school girls eat three times a day, although there were still adolescent school girls who eat only once time in a day (as presented in Table 7.1). According to research by Putera et al. (2020), bad eating habits can be caused by adolescent school girls' habit of skipping/less frequent breakfast and the habit of going on a diet.

There were three types of menu composition observed in this research: (a) rice + side dishes, (b) rice + side dishes + vegetables, and (c) rice + side dishes + vegetables + fruits. As the highest rank, adolescent school girls consumed a menu of rice + side dishes (52.5%), followed by a menu of rice + side dishes + vegetables (37.7%), and the lowest rank was rice + side dishes + vegetables + fruit (9.9%). This condition showed a majority of respondents (more than 50 % of adolescent school girls) have no diversity/no variety in their eating patterns. According to Putera et al. (2020), unvaried food menus consumed by adolescent school girls also a poor eating habits that can lead to a lack of calories and substance intake that the body needs. An effort that can be conducted to improve adolescent school girls' eating patterns is following the program of Piring Makanku (My Dining Plate) from the Healthy Living Community Movement by the Ministry of Health.

One crucial matter in meeting nutritional needs and improving the blood sugar level that goes down/drops in the morning after 6-7 hours of sleep is to have breakfast. Approximately 46.8 % of adolescent school girls have breakfast every day, and 47.5 % of adolescent school girls only have breakfast 2-3 times a week, while the lowest rank was 5.6 % of adolescent school girls never have breakfast. Skipping breakfast in the morning will make the blood sugar drop and, worse, can lead to hypoglycemia. The low blood sugar level will cause declined concentration during the learning process and ultimately can interfere with

their academic achievement. This is in line with the research of Monepa et al. (2022), which stated that the food consumed in the morning is responsible for supplying blood sugar levels. When the body does not eat for hours, the blood sugar will automatically drop. Blood sugar is the main energy source for the brain and blood cells, and breakfast helps store energy and restore blood sugar levels.

Table 7.1. Adolescent school girls' eating habits

Questions	n	%
Meal/Eating Frequency per Day		
- 1x /day	24	8.5
- 2x /day	178	62.7
- $\geq 3x$ /day	82	28.9
- Mean \pm SD	2.2 \pm 0.6	
Composition of Food Menu for Lunch and Dinner		
- Rice + Side Dishes	149	52.5
- Rice + Side Dishes + Vegetables	107	37.7
- Rice + Side Dishes + Vegetables + Fruits	28	9.9
Breakfast Habit Frequency		
- Always (every day)	133	46.8
- Sometimes (2-3x/week)	135	47.5
- Never	16	5.6
Common Menu Consumed for Breakfast (Option 1)		
- Rice	240	85.1
- Bread	11	3.9
- Cereal	1	0.4
- Milk	3	1.1
- Noodles/Vermicilli	3	1.1
- Chicken porridge	1	0.4
- Rice cake/ <i>lontong</i>	23	8.2
- Fried foods/fritters	0	0.0
- Other	0	0.0
Common Menu Consumed for Breakfast (Option 2)		
- Rice	1	0.4
- Bread	64	22.6
- Cereal	5	1.8
- Milk	40	14.1
- Noodles/Vermicilli	36	12.7
- Chicken porridge	40	14.1
- Rice cake/ <i>lontong</i>	13	4.6
- Fried foods/fritters	75	26.5
- Other	9	3.2
Water Intake Quantity in a day (glasses)		
- ≤ 3 glasses/day	45	15.8
- 4-5 glasses/day	113	39.8
- 6-7 glasses/day	38	13.4
- 8-9 gelas/day	57	20.1
- > 9 gelas/day	31	10.9
- Mean \pm SD	6.0 \pm 2.8	

Table 7.1. Adolescent school girls' eating habits (*cont.*)

Questions	n	%
Skipped Meal Time		
- Breakfast	102	35.9
- Lunch	96	33.8
- Dinner	76	26.8
- Never skip meal time	10	3.5
The Reason of Skipping Meal Time		
- To reduce food consumption	3	1.1
- Limited Time	101	36.6
- To cut/reduce body weight	18	6.5
- Less Appetite	154	55.8
Do you accustomed to or conduct intermitten fasting (Monday – Thursday Fasting According to Islam)?		
- Yes	70	24.6
- No	214	75.4

Note: other food types commonly consumed for breakfast are: water (2 respondents), eggs (4 respondents), and rice cake/*lontong* (1 respondent)

According to Mukhoiyaroh et al. (2020), globalization has resulted in changes in trends and lifestyles, particularly in people's eating habits. There are many activities in the morning, which would require more time to prepare breakfast. The density of people's activities has been the cause of negligence in having breakfast and starting their daily activities as early as possible. Types of food menu commonly consumed at breakfast were rice (85.1%), fried foods (26.5%), bread (22.6%), milk (14.1%), chicken porridge (14.1%), noodles/vermicelli (12.7%), and rice cake/*lontong* (8.2%). These data showed types of food generally consumed at breakfast were rice-based food menu. In line with this finding, Kurniasari et al. research (2021) stated the selection of a food menu that is easy to process for morning consumption could cause unvaried/no diversity in the menu consumption at breakfast time.

One of the many essential nutrients for the human body is water. According to Briawan et al. (2011), the water needs of each individual will vary significantly since it depends on the individual's physical activity, body weight, age, climate (temperature), and diet. Water intake necessity every day is around 8 glasses, as the recommendation in the Guidelines for Balanced Nutrition (Ministry of Health RoI, 2014). Water intake of less than 8 glasses can not fulfill the water needs. From data presented in Table 7.1, approximately 69 % of adolescent school girls still needed to meet the recommended amount of water needs. The average water intake also supports this finding was 6 glasses per day. A low water intake from adolescent school girls is probably caused by their busy activities at school, which makes them forget to drink, or they need to bring drinking water to school.

Due to busy schedules, many adolescent school girls sometimes neglect their meal time. Their habit of skipping meals can affect their daily intake, impacting their nutritional status (Kristy 2020). The skipped meal times that are being ignored vary, ranging from breakfast, lunchtime, or dinner. 35 % of the adolescent schoolgirls said they skipped breakfast, 33 % of the adolescent schoolgirls said they skipped lunch, and 26.8 % of the adolescent schoolgirls said they neglected their dinner. While only 3.5 % of adolescent school girls said, they never neglected meal time when it was the time to eat. Reasons that emerged for skipping meal time were generally lack of appetite (55.8%) and not enough/limited time

for having a meal (36.6%). These data align with the research by Rizqa et al. (2021) stated that most teenagers skip a meal due to insufficient time (busy time).

Most Indonesian are Muslim; therefore, religious teaching is also able to shape individual eating habits, where one of Islam's teaching is to go on fasting on certain days of the week. In this study, the researchers asked about Islamic fasting habits conducted on Monday and Thursday. The result showed that 25 % of adolescent school girls usually practice fasting on Monday and Thursday.

7.2. Food Frequency

One indicator of eating habits is food frequency. The frequency of food consumption can be used for observing the eating habit of an individual. The method that can be employed to determine the frequency of food consumption is the Food Frequency Questionnaire (FFQ). These questionnaires are given to obtain data on the consumption frequency of several food ingredients/processed foods over a certain period (Purwonugroho et al., 2018). As presented in Table 7.2, the frequency consumption of carbohydrate food sources ranges from the most frequently consumed, rice, with an average consumption frequency of 2.1 times per day. Rice is the main type of food consumed every day. In contrast, the frequency of other types of food consumed per week is noodles (2.8 times a week), bread (2.6 times a week), and potatoes (0.8 times a week). These data align with research conducted by Nisa (2017) that stated rice becomes the highest consumption choice when compared to other types of staple food since rice is the type of staple food that has the most contribution to energy and has the biggest consumers in Indonesia society. Corn, cassava, and sweet potatoes were other foods consumed with a frequency of less than or equal to 0.5 times. There were also found another type of food as a source of energy which consumed a lot by many adolescent school girls and contribute significantly to their daily intakes, such as snack (corn puff, small meatballs), fried food/fritters (fried meatball, fried rice, dumplings, fried tempeh, and fried tofu), noodles, and chicken porridge.

Table 7.2. Consumption frequency of carbohydrate source within last month

Food Ingredients	Mean±SD
Rice (times/day)	2.1 ± 0.7
Potato (times/week)	0.8 ± 1.9
Cassava (times/week)	0.3 ± 1.0
Sweet Potato (times/week)	0.2 ± 0.8
Corn(times/week)	0.5 ± 1.4
Noodles (times/week)	2.8 ± 4.0
Bread (times/week)	2.6 ± 3.1

Table 7.3 presents the frequency of consumption from protein food sources. The protein food sources are divided into two groups animal-based protein and vegetable-based protein. The type of most consumed animal-based protein food with the highest frequency was cow's milk (2.2 times a week) and sausages/nuggets (3.1 times a week). These data align with Purnamasari and Andriani's research (2020) reported that the most consumed types of food by teenagers were sausages and nuggets because these foods are quick and practical to be processed. In contrast, other types of animal based-protein that were rarely consumed were Indonesian fish brine (Ikan pending), freshwater fish, and salted fish with a consumption frequency of < 0.8 times a week.

The most frequent plant-based protein food consumed by adolescent school girls was tofu (4 times a week). According to Hamidah (2017), the high consumption frequency of tofu and tempeh can be caused by the availability of this vegetable-based protein food everywhere at affordable prices. Type of food which rarely consumed are fermented tempeh (oncom) and nuts, with a consumption frequency of 0.4 times a week. The type of protein food sources mostly consumed by adolescent school girls and has a significant contribution to their daily intake are chicken, fish, meatballs, sausages, nuggets, fried tempeh, and fried tofu.

Table 7.3. Consumption frequency of protein source within last month (apart from iron source) (times/week)

Type of Food	Mean±SD
Animal-based Protein Food	
- Brined fish (<i>Ikan Pindang</i>)	0.3 ± 1.1
- Fresh Water Fish	0.7 ± 1.8
- Salted Fish	0.6 ± 1.8
- Cow's Milk	2.2 ± 4.3
- Sausages/Nuggets	3.1 ± 5.3
Vegetable-based Protein Food	
- Tofu	4.1 ± 5.0
- Tempeh	4.0 ± 4.9
- Fermented Tempeh (<i>Oncom</i>)	0.4 ± 1.8
- Nuts	0.4 ± 1.1

Table 7.4 presents the consumption frequency of vitamin and mineral food sources. Type of vitamin and mineral food sources often consumed by adolescent school girls were carrots (1.6 times a week), cabbage (1.2 times a week), and bean sprouts (1.1 times a week). These data align with Pandiangan's research (2021), which reported carrots were the most popular vegetable because they have a neutral taste and attractive color. Aside from carrots, cabbage was also a vegetable type widely consumed by most subject groups. Other types of vitamin and mineral food sources that are rarely consumed are string beans, chayote, eggplant, and long beans, with a consumption frequency of less than once per month.

Table 7.4. Consumption frequency of vitamin and mineral source within last month (apart from iron source) (times/week)

Food	Mean±SD
Carrot	1.6 ± 3.1
Cabbage	1.2 ± 2.5
Chayote	0.2 ± 1.0
Eggplant	0.2 ± 0.7
String Beans	0.6 ± 2.0
Bean Sprouts	1.1 ± 2.6
Long Beans	0.2 ± 1.5

Snack, with their variety of types, is a favorite food for adolescent school girls. Snack foods are widely sold at school. Food traders also sell these foods in many public places, which can be eaten directly without preparation or reprocessing (Anton et al. 2019). The consumption frequency of snacks is presented in Table 7.5, and the most frequent snacks

Consumed by adolescent school girls were fried foods (such as fried tofu, fried tempeh, fried banana, fried sweet potato, and fried vegetable/corn fritter with the frequency of 5.3 times a week), corn puffs/chips (4.9 times a week), fried small meatballs such as cilok, caring, and basing (4.0 times in a week), and black or Sundanese spicy and savory wet chips soup (2 times in a week). Other types of snack foods consumed with a frequency of once a week were bakso (meatball soup), chicken porridge, fried/boiled dumplings with peanut sauce, or Siomay/Batagor and egg rolls. While for Other types of snack that is rarely consumed are gado-gado or vegetable salad with peanut sauce, ketoprak or tofu dishes with peanut sauce, karedok or raw vegetable salad similar to *gado-gado*, *empek-empek* or fishcake with a sweet and sour thin sauce, lontong sayur or rice cake in coconut milk soup, and mie ayam or chicken noodles.

Table 7.5. Consumption frequency of snacks within last month (times/week)

Type of Food	Mean±SD
Meatball soup (<i>Bakso</i>)	1.5 ± 2.4
Chicken Porridge	1.0 ± 1.9
Vegetable salad with peanut sauce dressing (<i>Gado-gado/Ketoprak/Karedok</i>)	0.3 ± 1.2
Fishcake in sweet, sour and savory sauce (<i>Empek-empek</i>)	0.4 ± 1.3
Ricecake in coconut milk soup (<i>Lontong sayur</i>)	0.3 ± 1.0
Fried/Boiled Dumplings in peanut sauce (<i>Siomay/Batagor</i>)	1.6 ± 2.7
Chicken Noodles (<i>Mie Ayam</i>)	0.8 ± 1.2
Fritters (tofu/tempeh/banana/sweet potato/corn or vegetable)	5.3 ± 6.5
Sundanese spicy and savoury wet chips soup (<i>Seblak</i>)	2.0 ± 2.8
Fried small meatballs (<i>Cilok/cireng/basreng</i>)	4.0 ± 5.3
Egg rolls	1.3 ± 3.2
Corn puffs/chips	4.9 ± 6.3

Healthy drink intake is important for adolescents to maintain hydration and general health. Adolescents are advised to drink sufficient water every day or approximately 8 glasses/ 2 liters. They can also consume drinks such as milk, natural fruit juice (no added sugar), or infusion drinks without caffeine. An important notice is the pattern and frequency of drink consumption in adolescents/teenagers. Consuming drinks with the right frequency and in healthy amounts will help to maintain their balance and health. The consumption frequency of drinks within the last month is presented in Table 7.6. It showed that adolescent school girls' most frequently consumed drinks were powdered drinks such as "Pop Ice," "Nutrisari," etc., with a consumption frequency of 5.1 times a week. Then followed by sweet drinks with a consumption frequency of 1.8 times a week. Whereas adolescent schoolgirls rarely consumed soft drinks such as soda pop.

Table 7.6. Consumption frequency of drinks within last month (tea and coffee excluded) (times/week)

Type of Drinks	Mean±SD
Soda Drink	0.5 ± 1.6
Fruit Flavor	1.8 ± 3.5
Instant Powdered Drinks	5.1 ± 5.7

Adolescent school girls are one of many groups that are prone to anemia due to the menstruation period. Anemia is when the body lacks healthy red blood cells or sufficient hemoglobin to carry oxygen to the body's tissues. The type of anemia often occurs in adolescent school girls is iron deficiency anemia (Nasrudin et al. 2021).

During the menstruation period, adolescent school girls will lose significant iron-containing blood. An iron deficiency condition can occur when the iron intake from food is insufficient to replace the blood loss. According to Nurbaya et al. (2019), iron substance is one essential nutrient needed in red blood cells productions and for the formation of hemoglobin. When the body lacks iron, red blood cells, and hemoglobin production will be disrupted, resulting in anemia.

To prevent anemia in adolescent school girls, it is important to consume rich iron food such as red meat, liver, chicken, fish, nuts, green leafy vegetables, and whole grains (Rini 2022). In addition, consuming foods containing vitamin C can also aid iron absorption (Rieny et al. 2021). When it is necessary, the doctor can provide iron supplements to overcome the deficiency.

Therefore, during adolescence, they need food intake that is relatively rich in iron content. Table 7.7 presents Iron food source consumption frequency within the last month. The type of most consumed iron food source was eggs (4.9 times/a week), followed by chicken (3 times a week), while spinach, kale, and mustard greens were only consumed once per week. Other types of iron food sources, such as beef, sea fish, liver, squid, and shellfish, are rarely consumed. These data results indicated adolescent school girls were less accustomed to consuming iron food sources, and the habit of consuming less iron food sources can be caused by less knowledge of adolescent school girls related to the harmful or dangerous effects of anemia (Rianti 2021).

Table 7.7. Consumption frequency of iron food source within last month (times/week)

Type of Iron Food Source	Mean±SD
Chicken Meat	3.0 ± 4.1
Cow Meat	0.3 ± 0.6
Goat Milk	0.04 ± 0.2
Sea Fish	0.2 ± 1.0
Eggs	4.9 ± 5.5
Liver/chicken offal	0.8 ± 2.0
Shrimps	0.2 ± 0.9
Squid	0.3 ± 1.0
Shells / Clamps	0.03 ± 0.2
Spinach	1.1 ± 2.5
Water Spinach / Kale	1.4 ± 2.4
Mustard Green	1.0 ± 2.5
Cassava Leaves	0.4 ± 1.8
Broccoli	0.5 ± 1.4

Several types of food can inhibit and increase iron absorption. The following explanation is an example of these food types.

1. Type of food that can inhibit iron absorption (Iron Inhibitor):
 - Caffeine: certain beverages such as coffee, tea, and other caffeinated drinks can inhibit the absorption of non-heme iron substances (iron nutrients from vegetable sources).

- Tannin: tannin is a compound found in black tea, green tea, red wine, and some fruits such as apples and pomegranates. Tannins are also able to inhibit the absorption of non-heme iron.
 - Phytate: phytate is a compound found in grains and cereals. Phytate can form complexes with iron and inhibit its absorption. However, soaking, fermenting, or processing the grains can reduce the phytate content to increase iron absorption.
 - Calcium: food rich in calcium is milk and milk products, which can inhibit the absorption of non-heme iron when both types of food are consumed together.
2. Type of food that can enhance iron absorption (Iron Enhancer):
- Vitamin C: any food ingredients that contain vitamin C, such as oranges, strawberries, kiwi, tomatoes, and green leafy vegetables, can increase the absorption of non-heme iron. Combining rich vitamin C types of food with iron sources can help enhance better iron absorption.
 - Heme Iron Enhancers: any food source containing heme iron (iron from animal sources) can increase the absorption of non-heme iron. Examples of the food types are meat, poultry, and fish.

To increase iron absorption, adolescent school girls are advised to consume food with rich iron and Vitamin C content. However, it must be noted that food's effect on iron absorption is not the only factor affecting the body's iron status. The individual's condition, digestive hygiene factors, and certain disorders or diseases can affect nutrient and iron absorption within the body (Indrawatiningsih et al., 2021).

The food consumption habit that can increase or inhibit iron absorption within the body is presented in Table 7.8. Food habitual of Indonesian in their diet is still dominated by vegetables, including iron food sources that are difficult to absorb, together with the habit of consuming types of foods or drinks that able to interfere the iron absorption (such as coffee and tea) at the same time with the meal can cause a lower iron absorption (Kristin et al. 2022). Whereas food types that can increase iron absorption, presumably with a high vitamin C content, are relatively rarely consumed. Two types of fruits with a consumption frequency of 1.6 times to 2.4 times per week are oranges and bananas, whereas other types of fruits that are rarely consumed are guava, pineapple, mango, and melon.

Table 7.8. Consumption frequency of iron enhancer and inhibitor sources within last month (times/week)

Type of Food	Mean±SD
Iron Enhancer	
- Guava	0.5 ± 1.4
- Papaya	0.9 ± 2.3
- Mango	0.6 ± 1.5
- Pineapple	0.3 ± 1.3
- Orange	1.6 ± 2.8
- Strawberry	0.3 ± 1.2
- Melon	0.7 ± 2.4
- Banana	2.4 ± 3.2
Iron Inhibitor	
- Tea (Bottled or package tea)	3.0 ± 4.3
- Coffee	1.0 ± 2.2

However, from a 24-hour recall, iron food sources which mostly consumed by adolescent school girls and have a significant contribution to their daily intake are foods made from wheat flour or type of food which use wheat flour (instant noodles, fried tofu, fried tempeh, meatball noodles, batagor, cilok, chicken noodles), chicken liver, meatball soup, milk, and beef rendang. The 24-hour recall also found that the vitamin C food source most consumed by adolescent school girls are oranges, guava, mango, and papaya. Then, the vitamin B6 food sources widely consumed by adolescent school girls are bananas, tempeh, meatballs, chicken, and fish. In contrast, adolescent school girls widely consume vitamin B12 food sources are instant noodles, chicken liver, fish, and meatballs. Furthermore, adolescent school girls widely consume folic acid food sources are chicken liver, instant noodles, tempeh, and instant cereal drink.

7.3. Nutrition Intake

Good nutrition is essential for optimal health, growth, and development in many life stages (Khadijah et al., 2022). There are several benefits of better nutrition about adolescents' or teenagers' health, such as:

1. Health of Children or Adolescents: good nutrition in childhood and adolescence is principal to support the growth of strong bones, brain development, and optimal immune system function. Proper nutrition provides the energy and nutrients needed for good physical activity, intelligence, concentration, and cognitive development.
2. Stronger Immune System: adequate nutrition, particularly vitamins and minerals nutrients, will play an important role in maintaining the function of the immune system. Thus, with a strong immune system, an individual could better fight infection and diseases.
3. Have a lower risk of non-communicable diseases: a balanced diet and good nutrition can help to reduce the risk of non-communicable diseases, such as type 2 diabetes, heart disease, hypertension, and some cancers. Consuming a diet rich in fiber, fruits, vegetables, whole grains, and quality protein sources can support the health of the heart and regulate blood sugar levels.
4. Longevity: good nutrition and an excellent healthy diet have been linked to longevity and delayed onset of age-related diseases. A diet rich in antioxidants (rich in vitamin C and E contents) and other essential nutrients can help protect body cells from oxidative damage and premature aging.

Therefore, it is important to prioritize a balanced diet, give special attention to nutritional needs for every stage of life, and consume a variety of rich nutrients to ensure optimal nutritional benefits for the health and development of the body (Akbar & Aidha 2020). Table 7.9 presents the intake and requirement (RDA) of energy and nutrients for adolescent school girls. As displayed in the table, it is clear that the intake of energy and nutrients from adolescent school girls in this study was below their requirement (RDA). Nutrient intake is very important for the formation of red blood cells for young girls who have a higher risk of anemia.

Table 7.9. Intake and RDA of energy, protein, iron, vitamin C, vitamin B, and folic acid

Nutrients	Intake		RDA	
	Mean	SD	Mean	SD
Energy (kcal)	1239	450	1866	161.0
Protein (g)	41.2	15.7	49.5	10.9
Vitamin C (mg)	13.5	30.7	74.8	1.6
Iron (mg)	5.7	2.8	15.0	0.0
Vit B6 (mg)	0.6	0.3	1.2	0.0
Folic acid (mcg)	96.4	60.9	400.0	0.0
Vit B12 (mcg)	2.3	3.8	4.0	0.0

Table 7.10 showed the energy intake of adolescent school girls in this study only fulfilled 67 % of their necessities (RDA), so more than 87 % of adolescent school girls have an energy intake less than the RDA. Table 7.10 also showed that protein intake only met 87 % of the RDA requirement, and 68.7 % of adolescent school girls did not meet their protein intake (RDA). Protein is a nutrient that has an essential role in the growth period. Protein is also vital in transporting iron to the spinal cord for red blood cell formation (Rizal et al., 2023).

Table 7.10. Adequacy level of energy, protein, iron, vitamin C, vitamin B, and folic acid (%)

	Intake	n	%
Energy (kcal)			
- <100% RDA		248	87.3
- ≥100% RDA		36	12.7
- Mean ± SD		67.0 ± 25.6	
Protein (g)			
- <100 RDA		195	68.7
- ≥100% RDA		89	31.3
- Mean ± SD		87.0 ± 38.4	
Vit C (mg)			
- <77% RDA		274	96.5
- ≥77% RDA		10	3.5
- Mean ± SD		18.1 ± 41.0	
Iron (mg)			
- <77% RDA		272	95.8
- ≥77% RDA		12	4.2
- Mean ± SD		37.9 ± 19.0	
Vit B6 (mg)			
- <77% RDA		252	88.7
- ≥77% RDA		32	11.3
- Mean ± SD		50.4 ± 23.5	
Folic acid (mcg)			
- <77% RDA		281	98.9
- ≥77% RDA		3	1.1
- Mean ± SD		24.1 ± 15.2	
Vit B12 (mcg)			
- <77% RDA		250	88.0
- ≥77% RDA		34	12.0
- Mean ± SD		56.6 ± 95.7	

The vitamin C intake was also very low since it only met 18 % of the RDA. Therefore, this study found around 96 % of adolescent school girls have less vitamin C intake than 77 % of their requirement (RDA). Vitamin C is an essential nutrient that can help iron absorption and also has a role as an antioxidant. Vitamin C's function in iron absorption is converting ferric ions (Fe^{3+}) into forms easily absorbed by the body, the ferrous ion (Fe^{2+}). When the availability of vitamin C is insufficient, the interaction of iron in forming hemoglobin can not be optimal. As a result, it will impact decreasing hemoglobin levels (Sholica & Muniroh 2019).

The iron intake was also low, only fulfilling 37.9 % of the RDA. The result analysis showed 95.8 % of adolescent school girls had iron intake below 77 % of the RDA. A low iron intake can interfere with the formation of red blood cells, so these adolescent school girls are at risk of developing anemia. According to Irianto (2014), iron is needed to form red blood cells, will be converted to hemoglobin, circulate throughout the body's tissue, and functions as an oxygen carrier.

Vitamin B6 also plays an essential role in red blood cell formation. Proverawati (2011) states that folic acid is needed for red blood cell formation and growth. Folic acid can be obtained by consuming green leafy vegetables and liver. Table 7.10 presented the vitamin B6 intake was also low since it only met half of the RDA. This finding is in line with the research of Rijal et al. (2013), which reported that the average folic acid intake for adolescent school girls is 267 mcg/day. It can be concluded that folic acid intake for adolescent school girls is still below the 2020 RDA recommendation of 400 mcg/day. The result analysis showed 88.7 % of adolescent school girls had folic acid intake below 77% of RDA. Folic acid is important for the formation of red blood cells. Their folic acid intake only meets a quarter of the RDA requirement.

Another vitamin which also important in red blood cell formation is vitamin B12. Vitamin B12 is important in the final maturation of red blood cells. Both processes are important for DNA (Deoxyribonucleic Acid) synthesis. Vitamin B12 is needed to convert folic acid into active form and for the normal functioning of all cells' metabolism, especially the gastrointestinal tract, bone marrow, and nervous tissue cells (Supriadi et al., 2022). On average, the vitamin B12 intake only meets 56 % of the RDA requirement, and the result analysis showed 88 % of adolescent school girls had vitamin B12 intake below 77 % RDA.

The low intake of energy and nutrients of adolescent school girls in this study is probably caused by their busy daily activities, so they do not have time to consume sufficient food, represented by a habit of skipping breakfast and lunch at school (see Table 7.1). Other reasons for reducing food intake are fasting, maintaining body appearance, and others.

8. CONCLUSIONS AND RECOMMENDATIONS

8.1. Conclusions

According to the objectives of the study. The study concluded with five points as follows:

1. Adolescent school girls in the study have relatively low knowledge (82%) about anemia and WIFA supplementation. Most of them understand that blood loss and deficiency of iron intake can cause anemia (53.2%, and 66.9%, respectively). Still, less than half of them knew that deficiency of folic acid and vitamin B12, infectious disease, vegetarian lifestyle, etc., also contributes to the risks of anemia. Among the consequences of anemia, they understand it will cause a lack of concentration (77.8%) and low blood pressure (74.3%). However, only 27.1% understand that anemia in school girls could increase the risk of low birth weight in future pregnancies. Almost all of them knew that consuming iron-folic acid supplements could help prevent anemia (95.1%), and it has to be consumed weekly (75%). They stated that side effects that could arise after consuming iron-folic acid supplements are nausea (78.9%) and headache (56.0), among other side effects. The adolescent school girls answered that consuming the supplement after a meal (65.5%) and consuming more water (66.5%) help relieve the side effects. It can be seen that the school girls are informed of basic information regarding anemia and WIFA supplementation. However, a deeper understanding is needed for the school girls to increase their awareness of anemia and the importance of WIFA supplementation.
2. Almost all the school girls (93.7%) were positive toward preventing anemia and WIFA supplementation. They agreed that anemia could disrupt daily activities (92.3%) and that iron-folic acid supplementation is needed to prevent anemia (93.0%). They also agreed that the benefits of WIFA supplementation are more significant than the possible side effects (68.3%) to prevent anemia and maintain health (93.3%). The positive attitude shown by adolescent school girls is an important factor in adolescent school girls' compliance with WIFA supplement consumption.
3. Nutritional status measurements showed that stunting is still prevalent among school girls. As many as 27.1% of school girls are stunted, and 3.2% are severely stunted. Moreover, overweight and obese were also observed among school girls (11.3%, and 6.0%, respectively). The double burden of malnutrition found among school girls was reported to be correlated with the incidence of anemia in previous studies. Thus, the effort to prevent and reduce the incidence of anemia among school girls is crucial. Based on the results, only 54.6% of the school girls received iron-folic acid tablets regularly per week. Moreover, only 64.1% of the school girls consumed the tablets received. Among them, the average number of tablets consumed in 6 months is only 5, which is very low compared to the targeted 24 tablets for 6 months. Among the reasons why the school girls did not consume the tablets are forgotten (52.7%), fear of the following side effects (49.8%), and unpleasant taste of the tablets (41.2%). This data showed that empowerment of the WIFA supplementation program at the school level is critical to increasing school girls' WIFA tablet consumption compliance.

4. Adolescent school girls' iron source foods consumption is relatively low, the average consumption of eggs is 5 times a week, and chicken is 3 times a week. Other animal sources are consumed less than one time a week. Moreover, iron source plant foods are also consumed seldomly. Food consumption recall data showed that only 4.2% of school girls meet the daily iron intake requirements. Among enhancers of iron-source foods, bananas, and oranges are the most frequently consumed 2 to 3 times a week. However, the consumption of inhibitors of iron-source foods is larger than the enhancer. The school girls reported the average consumption of tea 3 times a week and coffee 1 time a week. The foods the school girls consume are primarily snacks, fried foods, and noodles, which are energy-dense with high-fat contents. This brings the urgency of giving nutrition education to the school girls regarding healthy eating, emphasizing iron food source foods and its enhancer and inhibitor.
5. Most adolescent school girls' parents (68.3%) have good knowledge regarding anemia in adolescents and WIFA supplementation. From the answers, it is known that parents understand the causes, symptoms, and consequences of anemia and how to prevent it. Parents also understand the IFA supplementation content and benefits; however, only half of them understand that the supplement must be consumed weekly (52.8%). Parents also showed a positive attitude towards the WIFA supplementation program at school (68.3%). These results were also observed among teachers who have good knowledge (96.1%) and attitude (73.3%) towards WIFA supplementation. Still, only 46.7% of them answered right on questions about the supplementation dosage. This means that nutrition education with an emphasis on the WIFA supplementation program and its importance for adolescent school girls must be given to the parents and teachers.

8.2. Recommendations

According to the available quantitative and qualitative data regarding the potential challenges and constraints of the WIFA supplementation program, several points of importance need to be addressed in a certain approach. Students (adolescent school girls), teachers, parents, and peer groups as the cadre at schools may play a key role in increasing awareness, promoting compliance, and hence contributing to the success of the WIFA supplementation program. The action provided by specific intervention needs to be well designed; therefore, we could enhance the coverage and benefit of the program. We believe certain action as follows, but it is not limited to what may lead to the prospect for the betterment of the WIFA supplementation program:

1. Nutrition and health education among adolescent school girls on how IFA supplement may benefit our health and well-being through social-media interest;
2. Empowering a peer group advancement knowledge and skills toward the effectiveness of the WIFA program in collaboration with the teachers;
3. Application of the self-monitoring card to achieve the expected compliance levels based on the recommendation;
4. Parents and teachers' nutrition and health education sessions to advance their knowledge, attitude, and practice towards the importance of IFA supplementation for the adolescent school girls.

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