

EMPOWERING ADOLESCENT GIRLS THROUGH EDUCATION AND GUIDANCE IN CONSUMING BLOOD-ENHANCING TABLETS AND DRAGON FRUIT TO PREVENT ANEMIA

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Abstract

Anemia remains a significant public health problem among adolescent girls in Indonesia, including in Bungku Tengah, Morowali. This community service activity aimed to improve the knowledge and awareness of adolescent girls at SMP Negeri 1 Bungku Tengah regarding anemia prevention through regular consumption of iron supplementation tablets and dragon fruit, a local food source rich in iron and vitamin C. An educational and participatory approach was used, combining lectures, a video tutorial, leaflets, a banner, and interactive discussion, and was evaluated with pre-test and post-test instruments completed by 20 participants. The average knowledge score increased from 70.5 (moderate category) to 96 (good category), a relative increase of 36.2%, with 90% of participants showing improved knowledge. Participant satisfaction was very high, at 92.6%. All main output indicators of the activity were achieved. These findings indicate that health education combined with the utilization of local food sources effectively improves adolescent girls' knowledge of anemia prevention and can be replicated as a community-based strategy, provided it is followed by sustained mentoring so that knowledge gains are followed by lasting behavioral change.

Keywords: adolescent girls; anemia; dragon fruit; health education; iron supplementation tablets

INTRODUCTION

Anemia is a global health problem, especially in developing countries, with an estimated 30% of the world's population experiencing anemia, with adolescents being among the most vulnerable (Dwi Fara et al., 2025). Anemia is a condition where hemoglobin levels in the blood are below normal, reducing the capacity of red blood cells to transport oxygen and disrupting the body's biological needs (Sayekti and Sari, 2025). Adolescent girls are at higher risk of developing anemia than boys, primarily due to regular iron loss due to menstruation and an unbalanced diet due to concerns about weight (Dwi Fara et al., 2025).

According to the World Health Organization, the prevalence of anemia among adolescents worldwide ranges from 40-88% (Dwi Fara et al., 2025). Data from the 2023 Indonesian Health Survey (SKI) recorded a prevalence of anemia in the 15-24 age group of 15.5% (Ministry of Health, 2026), while of the 2,904,499 adolescent girls who underwent anemia screening nationally, 749,546 (25.8%) were diagnosed with anemia (Ministry of Health, 2023). In Morowali Regency, data from the Health Office shows a worrying trend: in 2025 the proportion of adolescent girls with anemia increased to 27.02%, while the coverage of Iron Supplement Tablet (TTD) consumption actually decreased from 69.54% in 2024 to 59.99% in 2025.

The government has implemented a program to provide iron supplements (IBF) as a primary effort to prevent anemia in adolescent girls, but its implementation has not been optimal. The 2023 Indonesian Health Survey (SKI) showed that 54.8% of adolescent girls had not received iron supplements and 51.4% were unaware of their benefits (Ministry of Health, 2023), indicating that the success of anemia prevention depends not only on the availability of supplements but also on health education and behavioral changes. In addition to low compliance with iron supplements, adolescent girls are also generally unaware of the importance of consuming foods rich in iron and vitamin C, such as dragon fruit, to support iron absorption in the body.

Red dragon fruit (*Hylocereus polyrhizus*) is a local food readily available in several villages in Morowali Regency and is rich in iron, vitamin C, betacyanin, and antioxidants that play a role in erythropoiesis and increasing iron absorption (Aulia, Kamilah, and Koto, 2026). However, its use as a food ingredient to support anemia prevention is still unknown to the public, especially adolescent girls, due to limited information regarding its nutritional content and processing methods.

Based on these conditions, a community service activity was carried out in the form of health education and assistance in consuming iron tablets and dragon fruit for adolescent girls at SMP Negeri 1 Bungku Tengah, Morowali Regency. This activity aims to increase the knowledge and awareness of adolescent girls regarding anemia prevention through adherence to iron tablet consumption combined with the use of dragon fruit as a local food source rich in iron and vitamin C. This article reports the results of the implementation of this activity, including the achievement of increased participant knowledge, satisfaction levels, and program output achievements.

LITERATURE REVIEW

Iron deficiency anemia is the most common type of anemia experienced by adolescents, caused by a combination of extrinsic factors such as nutritional knowledge, parental education and income, and intrinsic factors such as chronic diseases, worm infestations, and inadequate iron absorption (Sayekti and Sari, 2025). The impact of anemia on adolescents includes decreased concentration in learning, decreased physical fitness, and impaired immune function, so that anemia in adolescent girls is included in the third indicator of the Sustainable Development Goals (SDGs), namely ensuring a healthy life and well-being for all ages (Rohanah et al., 2023).

The Iron Supplement (TTD) program is the government's primary pharmacological strategy to reduce the prevalence of anemia in adolescent girls, with a recommended routine consumption of one tablet per week (Septika Y. Veronica et al., 2023). However, several studies have shown that the program's success is highly dependent on the target population's level of knowledge and compliance, so education-based interventions are still needed to complement supplement distribution (Ministry of Health, 2023).

In addition to pharmacological supplementation, local food-based interventions are increasingly being studied as supporting strategies for anemia prevention. Red dragon fruit contains protein, iron, vitamin C, and betacyanin, which play a role in red blood cell formation and increased iron absorption (Aulia, Kamilah, and Koto, 2026); 100 grams of dragon fruit contains 0.55–0.65 mg of iron and 8–9 mg of vitamin C (Binti Lulu Muthoharoh, 2024). Research by Sayekti and Sari (2025) and Aulia, Kamilah, and Koto (2026) shows that regular consumption of dragon fruit juice has the potential to increase hemoglobin levels in adolescent girls and elementary school children.

In terms of educational methods, Echa Effendi Siswanto Amir et al. (2024) found that counseling using an active lecture method that combines audio and visual elements effectively increases participants' knowledge because it conveys information more clearly. Binti Lulu Muthoharoh (2024) also emphasized that the success of health counseling is influenced by the learning media used, interactive methods, and the context of the implementation environment.

Based on this review, it appears that most previous studies have addressed iron supplement consumption and dragon fruit utilization separately, while integration of the two within a single educational program and direct mentoring for adolescent girls in areas with declining iron supplement program performance, such as Morowali Regency, is still limited. This community service activity seeks to fill this gap by combining iron supplement compliance education and mentoring on dragon fruit utilization as a single promotive and preventive intervention for anemia in adolescent girls.

IMPLEMENTATION METHOD

This community service activity uses an educational and participatory approach which was implemented at SMP Negeri 1 Bungku Tengah, Morowali Regency, on Friday, June 26, 2026. The approach used includes an educational approach through active participation-based counseling, a collaborative approach involving local educators and health workers, and an empowerment approach that places young women and teachers as the main partners in the sustainability of the program.

The target group for this activity was 20 eighth-grade female adolescents aged 13–14 years, accompanied by three accompanying teachers. An overview of the target group's characteristics is presented in Table 1.

Table 1. Characteristics of the Target Audience

No	Characteristics	Information
1	Number of participants	20 teenage girls from State Middle School 1 Bungku Tengah
2	Age Range	13-14 years
3	Gender	Woman
4	Level of education	Junior High School (grade VIII)
5	Knowledge about Anemia	Some already know, but most don't fully understand it.
6	Consuming Iron Tablets	Not yet routine
7	Utilization of Dragon Fruit	Not yet aware of its benefits in preventing anemia

The activity was carried out in three stages. The preparation stage included coordination and obtaining permits with the school, an initial survey with health workers at the Bungku Community Health Center, preparation of educational instruments and materials (leaflets, power points, video tutorials, pre-test and post-test questionnaires), and preparation of activity facilities and infrastructure. The implementation stage included participant registration, filling out the pre-test questionnaire, delivering educational materials through interactive lectures, group discussions, and questions and answers regarding the definition, signs, symptoms, causes, impacts, and prevention of anemia; presentation of a video tutorial on dragon fruit processing; filling out the post-test questionnaire; distributing educational leaflets; and providing fresh dragon fruit juice to all participants. The evaluation and follow-up stage included process evaluation (attendance, participation, and accuracy of implementation), outcome evaluation (increased knowledge based on the pre-test and post-test), and joint reflection with participants and the school to formulate follow-up actions for the program's sustainability.

Data were collected using a knowledge questionnaire (pre-test and post-test) with 10 assessment aspects including the definition of anemia, symptoms, causes, risk groups, hemoglobin-forming nutrients, the content and benefits of dragon fruit, and anemia prevention efforts, and a participant satisfaction questionnaire with a maximum score of 50. Data were analyzed descriptively by comparing the average knowledge score before and after education, the percentage of participants in each knowledge category (Good 76-100, Sufficient 56-75, Poor ≤ 55), and the percentage of participant satisfaction with the implementation of the activity.

RESULTS AND DISCUSSION

Overview of Activity Implementation

A community service activity with the theme "Empowering Young Women through Education and Mentoring the Consumption of Iron Supplement Tablets and Dragon Fruit for Anemia Prevention" was held on Friday, June 26, 2026, at SMP Negeri 1 Bungku Tengah. All planned stages, namely preparation, implementation of education, evaluation, and preparation of reports, were carried out well. The number of participants who attended was recorded at 20 young women as targeted, accompanied by 3 teachers. The attendance rate did not exceed the target because some students participated in extracurricular activities that took place simultaneously, but the participants who attended showed high enthusiasm and activeness during the discussion and question and answer sessions.

Participant Knowledge Improvement (Pre-Test and Post-Test)

Knowledge evaluation was conducted through a pre-test and post-test with assessment categories of Good (76-100), Sufficient (56-75), and Poor (≤ 55). The summary results for the 20 participants are presented in Table 2 and Figure 1.

Table 2. Distribution of Participants' Knowledge Level Before and After Counseling

Knowledge Category	Pre-Test (n)	Pre-Test (%)	Post-Test (n)	Post-Test (%)
Good (76-100)	5	25%	18	90%
Enough (56-75)	11	55%	2	10%
Less (≤ 55)	4	20%	0	0%
Amount	20	100%	20	100%

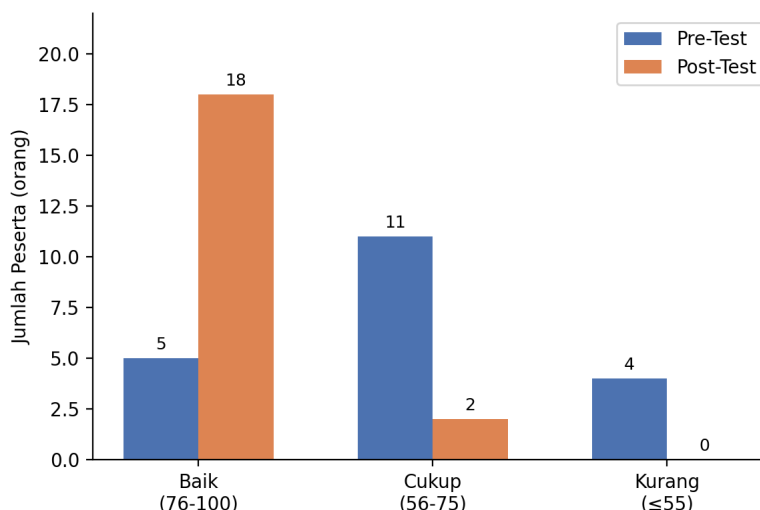


Figure 1. Comparison of Participants' Knowledge Categories during the Pre-Test and Post-Test

During the pre-test, the majority of participants were in the sufficient category (55%), while in the post-test, the majority of participants (90%) had reached the good category, with no participants remaining in the poor category. The average knowledge score increased from 70.5 (sufficient category) to 96 (good category), as shown in Figure 2, or equivalent to a relative increase of 36.2%, exceeding the minimum target of 30% improvement. Eighteen of the 20 participants (90%) experienced an increase in knowledge, exceeding the minimum success indicator of 80%.

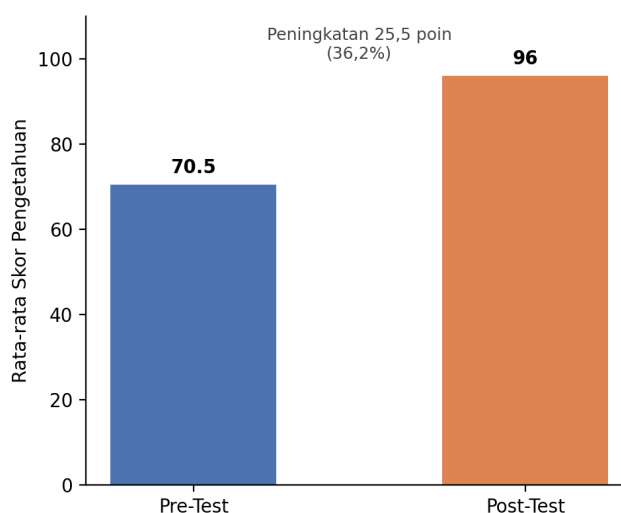


Figure 2. Comparison of Average Knowledge Scores of Pre-Test and Post-Test

Participant Satisfaction Survey Results

Participant satisfaction with the implementation of the activity was measured using an instrument with a maximum score of 50. The recapitulation results are presented in Table 3 and Figure 3.

Table 3. Results of the Participant Satisfaction Survey on the Implementation of Activities

Satisfaction Category	Number of Participants (n)	Percentage (%)
Very Satisfied (81-100%)	16	80%
Satisfied (61-80%)	4	20%
Quite Satisfied (41-60%)	0	0%
Less Satisfied (≤40%)	0	0%
Amount	20	100%

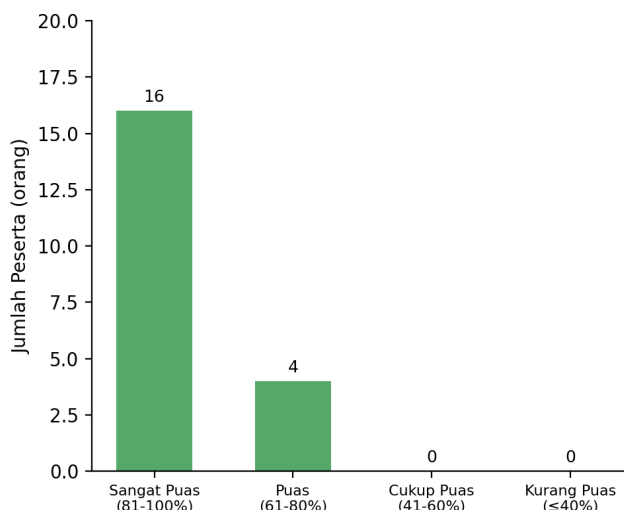


Figure 3. Distribution of Participant Satisfaction Levels

The average participant satisfaction score was 46.3 out of a maximum of 50, equivalent to 92.6%, which falls into the Very Satisfied category. The highest-scoring aspect was increased knowledge about anemia prevention, while the appropriateness of implementation time received more mixed reviews due to the limited duration of the counseling and its overlap with extracurricular activities.

Activity Output Achievements

A comparison of the set output targets with the actual achievements after the implementation of the activities is presented in Table 4.

Table 4. Comparison of Targets and Actual Activity Outputs

No	Targets and Outputs	Success Indicators	Achievements	Status
1	Improving the knowledge of adolescent girls	At least 80% of participants experienced an increase in scores	18 out of 20 participants (90%) experienced an increase in knowledge	Achieved
2	Educational media	PPT, video and leaflet available	PPT, video tutorials, and leaflets have been used.	Achieved
3	Activity Report	Compilation of the final activity report	Final report, data and documentation are available	Achieved
4	Scientific publications	Articles published in SINTA 3/4 accredited journals	Articles are compiled and submitted to SINTA indexed journals	Achieved
5	Collaborative networking	Active collaboration between educators and health workers	Schools provide participants, health workers provide anemia data	Achieved

Based on Table 4, all the main indicators of the activity have been achieved, including increasing participant knowledge, availability of educational media, preparation of activity reports, the process of submitting scientific publications, and the establishment of collaborative networks between the implementation team, educators, and health workers.

Discussion

The results of the pre-test and post-test evaluations showed a significant increase in knowledge after counseling and mentoring on the consumption of iron tablets and dragon fruit. This finding aligns with the research of Echa Effendi Siswanto Amir et al. (2024), which showed that counseling using an active lecture method that combines audio and visual elements can help increase knowledge and provide clearer information to participants. Health counseling not only functions as a process of raising awareness and increasing knowledge, but also as an effort to bridge behavioral change.

The increase in knowledge regarding the use of dragon fruit was also supported by the active participation of participants in the discussion and question and answer sessions, in line with the results of the study by Sayekti and Sari (2025) which emphasized that the combination of education in schools with appropriate delivery media is a strategic step to improve health status, although media is not the only determining factor in the success of health education. Educational media in the form of power points, video tutorials, and leaflets, which were complemented by direct provision of dragon fruit juice to participants, facilitated the understanding that in addition to consuming TTD, the use of dragon fruit can also support the prevention of anemia, in line with the findings of Binti Lulu Muthoharoh (2024) regarding the nutritional content of dragon fruit that supports increasing hemoglobin.

However, not all participants achieved a good knowledge score on the post-test; two participants remained in the adequate category, likely due to their divided focus on concurrent extracurricular activities. This finding aligns with Binti Lulu Muthoharoh (2024) who stated that the success of outreach is influenced by learning media, interactive methods, and the context of the implementation environment. Therefore, the implementation team needs to consider more personalized evaluation and follow-up education for these participants.

Inhibiting factors in the implementation of the activity, such as limited space, schedules that clash with extracurricular activities at school, and limited time for implementation, did not interfere with the achievement of the main target because it was supported by good coordination between the implementation team, the school, and the participants. Overall, the results of this activity indicate that health education combined with the use of local food is an effective and acceptable strategy for adolescent girls as an effort to prevent anemia, so it has the potential to be replicated in similar target groups in other areas, with the note that the need for ongoing mentoring so that increased knowledge is followed by permanent behavioral changes.

CONCLUSION

Community service activities in the form of education and mentoring for consuming Iron Supplement Tablets and dragon fruit for teenage girls at SMP Negeri 1 Bungku Tengah were carried out according to the planned stages, with 20 participants as targeted. This activity was proven to be effective in increasing participants' knowledge, indicated by an increase in the average score from 70.5 (sufficient category) to 96 (good category), or a relative increase of 36.2%, with 90% of participants experiencing an increase in knowledge, exceeding the minimum targets of 30% and 80% set. The level of participant satisfaction with the implementation of the activity was classified as very high (92.6%), and all activity output indicators had been achieved.

Health education combined with the use of local foods such as dragon fruit has been shown to be well-received by adolescent girls and has the potential to be replicated as a community-based anemia prevention strategy. However, successful knowledge gains require ongoing support to ensure lasting behavioral changes, particularly in adherence to iron supplementation and the inclusion of dragon fruit in daily diets. Schools are advised to utilize the educational materials provided during the School Health Program (UKS) on an ongoing basis, while community service teams should consider long-term support and personal evaluation for participants whose knowledge remains adequate.

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