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# Strengthening Tiwisada Cadres Through Participatory School-Based Engagement to Prevent Anemia Among Adolescent Girls in Lamongan

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**ABSTRACT**
**Background:** Anemia in adolescent girls is a nutritional problem that has a significant impact on them. During adolescence and as pregnant women, they will experience impaired fetal growth and development, potentially leading to complications during pregnancy and childbirth, and increasing the risk of stunting in children, even leading to maternal and child mortality. State Junior High School 2 Lamongan had a very high anemia case rate in June 2023, at 67.05% (175 of 261 total samples of adolescent girls).
**Purpose of the Study:** This activity aimed to increase knowledge among tiwisada cadres in carrying out their roles and functions by empowering them to prevent anemia in adolescent girls.
**Methods:** The methods used in this community service were as follows: first, identifying the number of tiwisada cadres in each class; second, health education on strengthening the role and function of tiwisada cadres in anemia prevention; third, demonstration and guidance on how to distribute iron tablets to adolescent girls; and fourth, evaluating and planning follow-up.
**Results:** The implementation of the community service activities went smoothly. All tiwisada cadres were very active, enthusiastic, and eager to participate in various stages of the activity. The evaluation results showed that health education had a significant impact on the knowledge level of tiwisada cadres regarding anemia prevention ($p = 0.000$). There was an increase in knowledge among the tiwisada cadres following the receipt of health education. During supervised practice, cadres participated in distributing iron tablets, facilitating collective consumption, and recording intake. Long-term independent performance and sustained tablet adherence were not assessed.

**Keywords**
Adolescent Girls; Anemia Prevention; Tiwisada Cadres

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## Introduction

Nutrition is a crucial component and plays a central role in achieving several Sustainable Development Goals (SDGs). It is hoped that all forms of malnutrition will be eliminated by 2030, and that the internationally agreed target of meeting the nutritional needs of adolescents will be achieved by 2025 (Sekretariat Nasional SDGs, 2023). Indonesia faces a triple burden of nutritional problems: malnutrition (including stunting and wasting), overnutrition (encompassing overweight and obesity), and micronutrient deficiencies, such as anemia (Kementerian Kesehatan Republik Indonesia, 2023a). The prevalence of anemia among pregnant women and adolescent girls in Indonesia remains high (Kementerian Kesehatan Republik Indonesia, 2023a). The incidence of anemia among women aged 15-24 years in 2018 was 32%, and by 2023, it had decreased to 15.5% (Kementerian Kesehatan Republik Indonesia, 2023b). Anemia is characterized by hemoglobin (Hb) levels in red blood cells that are lower than the standard (Hb < 12 g/dL) and has the function of binding oxygen and delivering it to all body tissue cells, including muscles and the brain, to enable their functions. Anemia is typically characterized by lethargy, fatigue, tiredness, weakness, and limpness (Kementerian Kesehatan RI, 2020).

Adolescent girls are particularly vulnerable to anemia because menstrual blood loss increases iron requirements, while inadequate dietary intake may further contribute to iron deficiency. Beyond its immediate effects on adolescents' health and functioning, anemia can have longer-term consequences when affected adolescents enter pregnancy, including impaired fetal growth, pregnancy and childbirth complications, an increased risk of stunting in their children, and, in severe circumstances, maternal and child mortality (Kementerian Kesehatan Republik Indonesia, 2018b).

State Junior High School 2 Lamongan is one of the State Junior High Schools in Lamongan Regency with a high anemia incidence in June 2023. The data obtained were 67.05% (175 of 261 total adolescent girls sampled), and the lowest Hb value was 4.8 g/dl. Activities at school have been carried out to reduce the number of cases of anemia in adolescent girls students, one of which is the School health units cadres or "Bhakti Wiyata Husada" cadres (in Indonesian abbreviation as "tiwisada").

Tiwisada Cadre (Bhakti Wiyata Husada) distributes every 2 weeks and does not always ensure their friends consume the iron tablets. Still, the efforts of the Tiwisada cadres were not entirely successful due to several reasons, namely 1) female adolescents did not want to consume iron tablets because they tasted bad, did not know how to consume iron tablets, 2) iron tablets were taken home but not consumed, there were also iron tablets that were immediately thrown away, 3) iron tablets were taken when they were first given, but then rarely drank.

Management of anemia in adolescent girls involves adopting a healthy lifestyle, including consuming iron-rich foods, eating fruits and vegetables, limiting caffeinated beverages, engaging in regular exercise, and taking iron supplements (Kementerian Kesehatan Republik Indonesia, 2018a). Regular administration of iron supplements can rapidly increase hemoglobin levels and should be continued to increase iron stores in the body (Rachmi et al., 2019). Compliance with iron supplementation is crucial, as 8.3 million of the 12.1 million adolescent girls do not take iron supplements, which increases the risk of anemia (Kemeterian Kesehatan RI, 2022). The coverage of iron supplementation programs in 5 provinces in Indonesia is <50%, and the acceptance of iron supplementation programs that meet standards is 0–25.2%. The majority of iron supplementation programs and distribution methods are not standardized, are not consistently administered on a weekly basis, and are not consumed simultaneously in schools. Factors influencing the consumption of iron supplements in adolescent girls include knowledge, motivation, self-efficacy, attitudes, parental support, peer influence, school policies and commitments, and the availability of iron supplements (Helmyati et al., 2023).

Anemia prevention in adolescent girls is integrated into schools. The role of School Health

Units (in Indonesian, "UKS") for adolescent girls in schools is to convey messages on anemia and to develop communication, information, and educational materials (Kementerian Kesehatan Republik Indonesia, 2018b). Efforts to foster and implement UKS through the UKS triad activities require the involvement of various elements, including adolescent health cadres (Directorate of Junior High Schools, 2021). Health cadres, also known as Bhakti Wiyata Husada cadres (tiwisada cadres), are students who meet the criteria and have been trained to carry out health maintenance and improvement efforts for themselves, their friends, their families, and their environment (Nugraheni et al., 2018).

Adolescent health cadres with good knowledge can serve as role models for their peers (Wardhani et al., 2022). The presence of peers is related to the behavioral habits of consuming iron tablets in female adolescents. Adolescents should encourage one another to engage in positive activities, such as regularly consuming iron tablets according to established recommendations (Putri et al., 2025). There is a relationship between the role of cadres and the consumption of iron tablets for adolescent girls reproductive preparation. Cadre support for adolescents contributes to compliance with consuming iron tablets because cadres consistently motivate, encourage, and raise awareness of the problems associated with not taking iron tablets, and can help develop potential problem-solving skills, such as finishing the iron tablets according to the government program (Ristanti et al., 2023). Adolescent girls who receive positive peer support have the highest levels of compliance. Peers who serve as role models can influence other students in understanding anemia prevention and in sharing similar perspectives on anemia, thereby contributing to anemia prevention efforts (Hasmita, 2025).

This community service activity aims to increase knowledge in carrying out roles and functions through empowering Tiwisada cadres in preventing anemia in adolescent girls so that previous problems do not recur. This event aligns with two SDG goals: 1) the second (Zero Hunger), which aims to eliminate all forms of malnutrition, especially among adolescent girls; 2) the third (Healthy and Prosperous Life), which aims to reduce maternal and infant mortality due to anemia (LOCALISE SDGs Indonesia, 2025).

## Method

This community service activity was conducted at State Junior High School 2 Lamongan in July 2024 with 30 School Health Unit (UKS) cadres. The program used a participatory school-based community engagement approach in which the university team worked with school authorities, the UKS supervisor, and the Lamongan Community Health Centre to identify local needs, strengthen existing student health assets, facilitate skills practice, and develop a follow-up plan. Within this engagement process, health education and demonstrations were used as capacity-building techniques rather than as the methodological framework itself. The process consisted of four interconnected stages: (1) identifying and validating Tiwisada cadre representation in each class with school partners; (2) strengthening cadres' knowledge of anemia prevention and their roles in the Adolescent Nutrition Programme "Aksi Bergizi"; (3) guided practice in distributing, recording, and facilitating collective iron-tablet consumption; and (4) evaluating immediate outcomes and jointly planning follow-up activities (Figure 1).

### *Identifying the number of tiwisada cadres in each class*

In the first stage, the community service team coordinated with school partners and the UKS structure to identify students who could serve as Tiwisada cadres. Existing UKS cadres from Grades VIII and IX were used as the school's primary student health resource, with two to three representatives considered from each class. Grade IX was selected as the pilot group, while Grade VIII representatives were included to support continuity across school years. This process was

aligned with the national guidance that UKS cadres should represent at least 10% of the student population (Kementerian Pendidikan dan Kebudayaan Republik Indonesia, 2019).

### *Health education on strengthening the role and function of Tiwisada cadres in anemia prevention*

The second phase involved health education on strengthening the role and function of Tiwisada cadres in anemia prevention and the Adolescent Nutrition Programme "Aksi Bergizi". The resource person for this activity was Rima Farid Iskandar, S.Kep., Ns., the School Health Units Coordinator of the Lamongan Community Health Centre. The health education covered the role and function of Tiwisada cadres, their participation in consuming iron tablets among their peers, the eight objectives of school health units, understanding anemia, the causes of anemia, preventing anemia, how to consume iron tablets, how to overcome the side effects of iron tablets, and the role of Tiwisada cadres in Adolescent Nutrition Programme "Aksi Bergizi". The community service team also provided Tiwisada cadres with a pocketbook, titled "Bestie aksi bergizi."

### *Demonstration and guidance on how to distribute iron tablets to adolescent girls*

The third stage was a demonstration and assistance in distributing iron tablets to adolescent girls. The community service team conducted demonstrations in small groups, followed by assistance in administering iron tablets to the adolescent girls on Fridays. This activity aimed to demonstrate how to distribute, record, and administer the iron tablets together, led by Tiwisada cadres.

### *Evaluating and planning follow-up*

The third stage involves evaluation and the development of a follow-up plan. The assessment of Tiwisada cadres' knowledge regarding strengthening their role and function in preventing anemia was measured before (pre-test) and after (post-test) health education. Data were presented in frequency distribution tables and percentages. At the same time, differences in cadre knowledge levels (pre-test and post-test) were measured using the non-parametric Wilcoxon signed-rank test (Dahlan, 2013).

The fourth stage focused on evaluation and follow-up planning. Immediate cognitive outcomes were assessed by measuring Tiwisada cadres' knowledge before (pre-test) and after (post-test) the health education session. Data were summarized using frequencies and percentages, and pre-test and post-test scores were compared using the non-parametric Wilcoxon signed-rank test (Dahlan, 2013). In addition to the knowledge assessment, process performance was observed during guided practice, including cadres' participation in distributing iron tablets, facilitating collective consumption, and recording tablet intake. These observations were used as implementation indicators rather than as longitudinal behavioral outcomes. Because the activity did not include post-program follow-up after the university team withdrew, sustained independent cadre performance and long-term adherence to iron-tablet consumption could not be determined.

### *Facilities and Infrastructure*

Community service activities utilized equipment such as LCDs, laptops, pocket books, iron supplement tablets, iron supplement tablet documentation sheets, questionnaires, and other supporting tools (loudspeakers) to deliver material during health education and demonstrations.

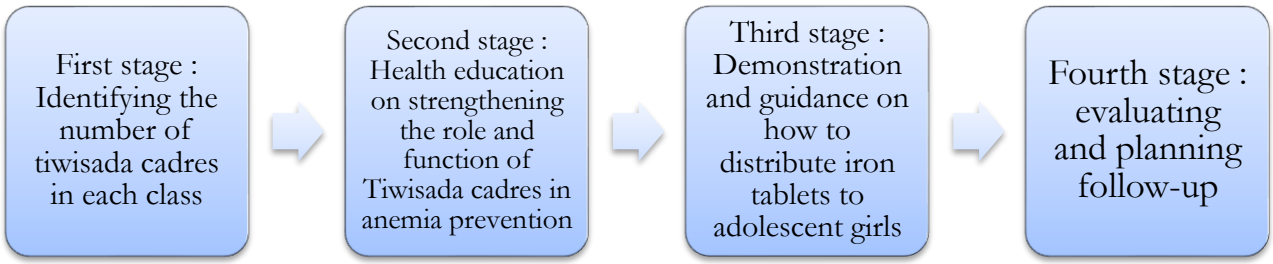



*Figure 1.* Activity Flow Diagram

## Result

The activity began with coordination among the university team, the Head of the Lamongan Community Health Centre, the Principal and school representatives of State Junior High School 2 Lamongan, and the Investment and Integrated One-Stop Services Agency of Lamongan. This coordination covered the timing, location, participant involvement, activity sequence, and required facilities. The involvement of school and health-service partners from the preparation stage helped situate the program within the existing UKS and "Aksi Bergizi" structures rather than establishing a parallel activity led solely by the university team.

### *Identifying the number of tiwisada cadres in each class*

The identification of Tiwisada cadres began one week before the capacity-building session. In coordination with the school's UKS structure, existing School Health Unit cadres were identified as the primary pool of peer facilitators. Grade IX served as the pilot group, with 20 Tiwisada cadres, while 10 representatives from Grade VIII were included to support continuity. The total number of girls in Grade IX was 170. This arrangement was consistent with guidance that School Health Unit cadres should comprise at least 10% of the student population (Kementerian Pendidikan dan Kebudayaan Republik Indonesia, 2019).

### *Health education on strengthening the role and function of Tiwisada cadres in anemia prevention*

The second phase of the health education program began with selected Tiwisada cadres completing a registration form and receiving a pocketbook, titled “Bestie aksi bergizi.”. It was followed by an opening and remarks by the head of the community service team and the Vice Principal of State Junior High School 2 Lamongan. The event was attended by the Vice Principal of Student Affairs, the Head of Public Relations, the School Health Unit Supervisor, the speaker, and Tiwisada cadres (Figure 2).



*Figure 2.* Remarks by the Vice Principal

This health education method used lecture and discussion methods. Thirty Tiwisada cadres attended the health education. All participants received health education on strengthening the role and function of Tiwisada cadres in preventing anaemia and the Adolescent Nutrition Programme "Aksi Bergizi". The material covered the role and function of Tiwisada cadres, their participation in consuming iron tablets among their peers, the eight objectives of the School Health Unit (UKS), understanding anemia, the causes of anemia, preventing anemia, how to consume iron tablets, how to overcome the side effects of iron tablets, and the role of Tiwisada cadres in Adolescent Nutrition Programme "Aksi Bergizi" by the speaker. All Tiwisada cadres were very interested in the material presented. The activity continued with an active discussion, during which several participants asked questions. All participants were very enthusiastic and actively discussed the activity until the end (Figure 2).



*Figure 3.* Health Education by Speaker

### *Demonstration and guidance on distributing iron tablets to adolescent girls*

The third phase involved demonstration and guided practice in distributing iron tablets to adolescent girls. The community service team facilitated practice in five small groups so that cadres could rehearse how to distribute tablets, document consumption, and guide their peers in taking the tablets correctly. The activity then progressed to collective iron-tablet consumption on Friday, led by Grade IX Tiwisada cadres as the pilot group and accompanied by the school health unit supervisor. During this supervised implementation, the cadres were able to carry out the distribution process, guide their peers through tablet consumption, and proceed with recording consumption. These observed tasks provided an immediate indication of role performance during the project period, although they did not establish sustained independent performance after the activity ended.



*Figure 4.* Demonstration and Guidance on How to Distribute Iron Tablets to Adolescent Girls

### *Evaluating and planning follow-up*

The fourth stage evaluated immediate learning and implementation processes and developed a follow-up plan. Knowledge was assessed before and after health education (Figure 5). Cadre performance during guided practice was also observed through their participation in distributing iron tablets, facilitating collective consumption, and recording intake. These process observations were intended to assess whether cadres could apply the demonstrated tasks during the activity; they were not designed as longitudinal measures of behavior or program sustainability.



*Figure 5.* Pre-Test and Post-Test Evaluation

Knowledge levels were divided into three levels: poor (≤55%), sufficient (56-75%), and good (76-100%; Arikunto, 2016). Data analysis used the Wilcoxon signed-rank test (Dahlan, 2013).

*Table 1.* Results of Pre-Test and Post-Test Analysis of Knowledge Level

| Characteristics of Knowledge | Cadre Knowledge | | | |
|---|---|---|---|---|
| | Pre-test | | Post-test | |
| | Frequency (f) | Percentage (%) | Frequency (f) | Percentage (%) |
| Good | 10 | 33.3 | 23 | 76.7 |
| Sufficient | 9 | 30 | 7 | 23.3 |
| Poor | 11 | 36.7 | 0 | 0 |
| Total | 30 | 100 | 30 | 100 |
| Wilcoxon signed-rank test | | $p$ = 0.000 | | |

Table 1 shows a statistically significant improvement in Tiwisada cadres' knowledge of anemia prevention after health education (Wilcoxon signed-rank test, p = 0.000). Before the intervention, 10 of 30 cadres (33.3%) were in the good-knowledge category; after the intervention, this increased to 23 of 30 cadres (76.7%), while no cadre remained in the poor-knowledge category.

During the guided implementation, cadres also participated in distributing iron tablets, facilitating collective tablet consumption, and recording intake under the supervision of the UKS supervisor. These findings indicate immediate gains in knowledge and the practical application of cadre tasks during the project period. However, the activity did not measure whether these practices were maintained independently after the external team left. The follow-up plan therefore emphasized continued cadre leadership, intergenerational transfer of knowledge and skills to junior cadres, weekly iron-tablet activities, and ongoing supervision by the school and community health center within the "Aksi Bergizi" program.

## Discussion

The purpose of this community service activity is to enhance the role of Tiwisada cadres in preventing anemia and to ensure the success of the Adolescent Nutrition Programme, "Aksi Bergizi", which aims to provide adolescents with adequate nutrition. This includes physical activity, group meals, and the habit of taking iron supplements once a week for adolescent girls at State Junior High School 2 Lamongan. To ensure smooth implementation and address iron deficiency during menstruation, adolescent girls should adopt a healthy lifestyle, including consuming iron-rich foods, eating fruits and vegetables, limiting caffeinated beverages, engaging in regular physical activity, and taking iron supplements (Kementerian Kesehatan Republik Indonesia, 2018a). Compliance with iron supplementation is crucial, as 8.3 million of the 12.1 million adolescent girls do not take iron supplements, which increases the risk of anemia (Kemeterian Kesehatan RI, 2022).

Adolescent health efforts aimed at preventing anemia must prepare adolescents to become healthy, intelligent, qualified, and productive adults who participate in maintaining, preserving, and improving their health (Kementerian Kesehatan RI, 2023), including at school. Regulation of the Coordinating Minister for Human Development and Culture Number 1 of 2022 concerning the National Action Plan for School-Age Children and Adolescent Health mandates a strategy to increase the knowledge and skills of school-age children and adolescents regarding eight adolescent health issues in line with the Guidance and Implementation of School Health Unit (UKS) through the three main UKS programs, namely health education, health services, and fostering a healthy environment (Menteri Koordinator Bidang Pembangunan Manusia dan Kebudayaan Republik Indonesia, 2022). In line with the Circular Letter of the Director General of Early Childhood Education, Primary Education, and Secondary Education, Number: 1725/C.C4/DM.00.02/2024, concerning the Healthy School Program. Implementation of the Healthy School Program in educational units is carried out through the following activities. a. Healthy Nutrition, healthy physical, healthy immunization, healthy mental, and healthy environment. In connection with the implementation of the Healthy School Program with a focus on 5 (five) healthy by educational units. The implementation of the Healthy School Program: Healthy Nutrition is carried out, among others, through the habit of consuming iron-boosting tablets for adolescent girls in Junior High Schools/equivalent and Senior High Schools/equivalent at least 1 (one) time per week. The Healthy School Program, which supports the implementation of the three main school health unit programs, requires the role of the UKS mentoring and implementing team (Direktorat Pendidikan Anak Usia Dini Pendidikan Dasar dan Pendidikan Menengah, 2024).

The implementation of the three main UKS programs requires the form of a UKS implementation team; certified UKS mentor teachers; a separate UKS room; UKS cadres of at least 10% of the total number of students; implementing the three main UKS programs; and having a UKS Implementation team name badge (Kementerian Pendidikan dan Kebudayaan Republik Indonesia, 2019). Health cadres, or so-called tiwisada cadres, are students who meet the criteria and have been trained to carry out efforts to maintain and improve their own health, the health of their friends, family, and their environment (Nugraheni et al., 2018) and tiwisada cadres

also contribute to the success of the Adolescent Nutrition Programme, "Aksi Bergizi," launched by the Government. This activity aims to increase awareness among adolescents and all school residents about meeting their nutritional needs, including the importance of physical activity, eating together, and consuming iron tablets for adolescent girls (Kemeterian Kesehatan RI, 2022).

Health education has been shown to significantly impact the knowledge level of Tiwisada cadres in preventing anemia. During the pre-test assessment, it was found that nearly half of the Tiwisada cadres possessed good knowledge. In contrast, the post-test revealed that almost all of the Tiwisada cadres had acquired good knowledge. This health education initiative aims to provide new information/refresh knowledge about strengthening the role of Tiwisada cadres in preventing anemia among adolescent girls. The increase in knowledge among Tiwisada cadres is likely due to the fascinating and applicable explanations from the resource person, active participant discussions, and the emphasis and assistance in distributing iron supplements. Knowledge is the result of human perception, or the process of knowing about objects through the use of the five senses, especially hearing and sight (Notoatmodjo, 2012). Knowledge or cognition is a critical domain for the formation of a person's actions. Behavior based on knowledge will be better than behavior that is not based on knowledge (Nursalam & Pariani, 2010; Rachmawati, 2019). Health promotion is community empowerment through health education (learning) to improve health (Rachmawati, 2019). Community empowerment is a process that enables people to gain greater control over decisions and actions that affect their health, to mobilize vulnerable individuals and groups by strengthening their basic life skills, and to increase their influence on the underlying social and economic conditions (Green & Kreuter, 2005; Rachmawati, 2019). Good knowledge increases awareness, fosters positive attitudes, and can ultimately lead to a positive change in behavior towards health (Green & Kreuter, 2005).

Several studies have shown that health education can improve the knowledge of tiwisada cadres and young women regarding the prevention of anemia. Anemia is a condition characterized by hemoglobin levels that are lower than normal, resulting in symptoms such as lethargy, dizziness, blurred vision, and a pale complexion (Apriyanti, 2019). Deficiencies in iron, vitamin B12, and folic acid, which are essential nutrients for red blood cell formation, are the leading causes of anemia (Arifin et al., 2024). Anemia in adolescents can have both physical and developmental impacts. Anemia causes adolescents to experience frequent dizziness and blurred vision, as well as pale eyelids, lips, tongue, skin, and palms, leading to lethargy, weakness, fatigue, and tiredness (Apriyanti, 2019). Decreased hemoglobin levels due to anemia can reduce oxygen supply to the brain, negatively impacting cognitive functions such as concentration, memory, and learning ability. Most adolescent girls with anemia have failing academic achievement scores (Arifin et al., 2024). Comprehensive training is necessary for anemia patients to enhance their knowledge and foster a positive attitude, thereby making proactive practices in anemia management more effective and positively impacting their health (Yao et al., 2024).

The strategy implemented to address anemia in adolescents is to optimize the role of school cadres and increase student participation in anemia management efforts. School Health Unit (UKS) cadres (tiwisada), also known as "little doctors" in the School Health Program (UKS), are students who act as promoters and motivators in the school environment. Srikandi Gizi is a peer group established by community health centers (Puskesmas). It is expected to act as an intermediary between health workers and students in tackling anemia in each school. Cadres are tasked with promoting health and encouraging students to live clean and healthy lives (Purwantiningsih et al., 2017).

The duties of Srikandi Gizi include providing nutrition education to their peers, coordinating the distribution of iron tablets, and assisting the health center (UKS) teacher in distributing the tablets until their peers have fully consumed them. "The little doctors" are students who meet the criteria and have been trained to carry out health maintenance and improvement efforts for themselves, their friends, their families, and their communities (Rahmawati et al., 2015).

The findings can also be interpreted through Social Cognitive Theory, which emphasizes reciprocal influences among personal factors, behavior, and the social environment, as well as the importance of observational learning and self-efficacy (Bandura, 2004). In this activity, Tiwisada cadres first received knowledge and role clarification, then observed and practiced the required tasks in small groups, and subsequently led peer iron-tablet consumption under supervision. This sequence provided opportunities for behavioral rehearsal and mastery experiences, while peer leadership created a proximal social model for other adolescent girls. Such mechanisms may help explain why peer education can influence knowledge, attitudes, self-efficacy, practices, and health behaviors (Ghasemi et al., 2019). Related studies have likewise shown that peer-group support and cadre involvement can improve adherence-related outcomes (Andini & Agestika, 2022; Raharjo & Indrayanti, 2021). Importantly, Social Cognitive Theory also indicates that individual capability alone is insufficient when environmental reinforcement is weak. For Tiwisada cadres, continued supervision, regular opportunities to lead activities, clear recording procedures, and school support are therefore important conditions for maintaining the desired behavior.

Evidence from other cadre-based anemia programs further suggests that empowerment is strengthened when cadres are given a defined role, opportunities to practice, and organizational support. Training of Yuk Jaim cadres has been associated with improved cadre knowledge and role performance, alongside increased knowledge and iron-tablet consumption among adolescent girls (Rakhmawati et al., 2025). Similarly, empowerment activities at an Islamic boarding school improved cadres' knowledge and attitudes and highlighted the importance of independence, routine iron-tablet distribution, and institutional supervision for follow-up (Amalia et al., 2025). These findings are consistent with the present activity: cadre empowerment appears to require a progression from knowledge acquisition to supervised practice and, ultimately, supported autonomy. The present project reached the first two stages, but longer follow-up is needed to determine whether Tiwisada cadres can independently sustain "Aksi Bergizi" activities and whether peer iron-tablet adherence is maintained over time.

Taken together, the engagement process suggests that strengthening Tiwisada cadres is most meaningful when they are treated as an existing school health asset rather than merely as recipients of health education. The practical contribution of the activity was the integration of role clarification, peer-based skills practice, and supervised implementation within the existing UKS system. The experience also identified three conditions that are likely to be important for sustainability: institutional support from the school and community health center, routine opportunities for cadres to perform and transfer their roles, and continued monitoring of both program implementation and iron-tablet adherence. Future community engagement should therefore include longitudinal indicators, such as regularity of distribution, completeness of consumption records, sustained weekly tablet intake, and the cadres' ability to manage activities with progressively less external assistance.

### *Inhibiting and Supporting Factors*

This community service activity was influenced by both supporting and inhibiting factors. Coordination and communication with partners were key to the success of the activity. Inhibiting factors can also be used as evaluation material for subsequent activities. An inhibiting factor for this activity was that determining and coordinating the activity schedule took almost a month because it coincided with the new school year, the introduction period for the school environment, and the change in school leadership.

A supporting factor for this community service activity was that it had obtained a permit from the Lamongan Regency Investment and One-Stop Integrated Service Office, Number 070/054/SKP/413.111/2024. The positive response and enthusiasm from the principal, teachers, school health unit supervisors, cadres, and all students contributed to the smooth running of the

activity. The school provided contributions and support in the form of preparing and conditioning students, as well as providing infrastructure, including rooms and other necessary equipment. The Lamongan Community Health Center also provided permits and a speaker for the activity.

## Conclusion

This activity demonstrated that a participatory, school-based approach can strengthen Tiwisada cadres by combining knowledge development with supervised practice of their peer-health roles. Cadres showed a significant improvement in knowledge of anemia prevention ($p = 0.000$) and were able, during the project period, to participate in distributing iron tablets, facilitate collective consumption, and record intake under school supervision. The main lesson from the engagement process is that cadre empowerment requires more than a single educational session: role clarity, opportunities for practice, supportive supervision, and integration into an existing school program are necessary to move from knowledge acquisition toward functional peer leadership.

For sustainability, Tiwisada cadres should be given regular opportunities to lead anemia-prevention activities within the "Aksi Bergizi" program and to transfer knowledge and skills to junior cadres. Continued material and organizational support, monitoring, and evaluation by the school and Lamongan Community Health Centre are also required. Because this activity assessed immediate knowledge and supervised role performance only, it cannot establish sustained behavioral change, long-term adherence to iron-tablet consumption, or independent cadre management after the university team withdrew. Future programs should incorporate longitudinal follow-up to evaluate these outcomes and to determine whether cadre-led implementation can be maintained with progressively reduced external support.

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## Conflicts of Interest

The authors declare no conflict of interest.

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