

A NUTRITION EDUCATION CAMPAIGN THROUGH THE PREPARATION OF IRON-RICH NUGGETS AMONG FEMALE TEENAGERS AT DHARMA KARYA MIDDLE SCHOOL, BERINGIN SUBDISTRICT, DELI SERDANG REGENCY, IN 2026

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Abstract

This community service activity, titled “Nutrition Education Campaign Through the Preparation of Iron-Rich Nuggets for Adolescent Girls at Dharma Karya Junior High School in Beringin Subdistrict, Deli Serdang Regency, in 2026,” was carried out as an effort to address the issues of low nutritional knowledge and high risk of anemia among adolescent girls due to low iron intake and an unbalanced diet. The activity was carried out in two main phases: an outreach/education phase covering the definition, benefits, and nutritional content of iron-rich food sources (oyster mushrooms, beets, and catfish); and a training and demonstration phase on making nuggets using a combination of these three ingredients as an iron-rich food product that is easily accepted by adolescents. The activity began with a pre-test and concluded with a post-test to measure the participants’ knowledge gain. The results showed an increase in the students’ knowledge of anemia, iron, and food processing skills when comparing the pre-test and post-test results. Participants were also able to independently practice the steps for making nuggets combining beets, oyster mushrooms, and catfish flour in the work groups that had been formed.

Keywords: Nutrition Education Campaign Through, Iron-Rich Nuggets Among Female Teenagers, Dharma Karya Middle School, Beringin Subdistrict

INTRODUCTION

Adolescent girls are a population group undergoing a transitional phase from childhood to adulthood, characterized by rapid physical growth, psychological development, and maturation of the reproductive organs. During this period, nutritional requirements increase, including the need for iron, which plays an essential role in hemoglobin formation, oxygen transport, growth, and development. Iron requirements among adolescent girls become particularly important after the onset of menstruation because regular blood loss may increase the risk of iron deficiency and anemia. Therefore, adequate iron intake during adolescence is an important component in supporting health and improving the quality of human resources in the future (WHO, 2016; Juffrie et al., 2020).

One of the major nutritional problems affecting adolescent girls is anemia. Adolescent girls are at a higher risk of developing anemia because of regular menstrual blood loss, combined with increased iron requirements during periods of rapid growth. This condition may be exacerbated when daily dietary intake does not adequately meet the requirements for iron and other essential nutrients. In Indonesia, anemia remains an important nutritional problem among adolescents, with UNICEF reporting that approximately one in four adolescent girls experiences anemia. Anemia among adolescents may be associated with fatigue, reduced concentration, and impaired cognitive and learning performance. A systematic review by Samson et al. (2022) indicated that iron status and anemia among adolescents may be associated with several aspects of cognitive performance, attention, concentration, and academic performance, although the strength of evidence varies among studies.

Based on observations conducted at Dharma Karya Junior High School, Beringin District, most female students have limited understanding of anemia, its risk factors, and strategies for prevention. Some adolescent girls also face potential health risks associated with inadequate iron intake, unbalanced dietary patterns, and low consumption of iron-rich foods, particularly animal-source foods. This condition requires attention because dietary patterns characterized by limited food diversity and frequent consumption of snacks that are relatively low in essential micronutrients may increase the risk of inadequate nutrient intake. The Aksi Bergizi program developed by

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UNICEF in Indonesia also emphasizes nutrition education and the promotion of healthy dietary practices as important strategies for preventing anemia among adolescent girls in school settings (UNICEF Indonesia, 2019; UNICEF Indonesia, 2021).

Dharma Karya Junior High School in Beringin District is one of the junior high schools with a relatively large number of female students in the adolescent age group. Based on field observations, female students have limited knowledge regarding anemia, iron nutrition, and the preparation of nutritious foods as part of anemia prevention efforts at school. Their daily food consumption is still largely dominated by school snacks, which tend to provide limited micronutrient diversity, while the consumption of balanced and nutritious foods, particularly protein- and iron-rich foods, remains relatively low. This situation indicates the need for school-based interventions through nutrition education combined with practical food-processing activities. Evidence from the Aksi Bergizi program in Indonesia demonstrates that school-based nutrition education combined with anemia-prevention interventions can improve adolescents' nutrition-related knowledge, attitudes, and practices (UNICEF Indonesia, 2019; UNICEF Indonesia, 2021).

Based on this situation analysis, this community service program will be implemented through nutrition education and practical training in the preparation of nuggets made from beetroot, oyster mushrooms, and catfish as an innovative and nutritious food product that may be appealing to adolescents. The use of catfish as an animal-source food is expected to contribute to protein and iron intake, while the addition of beetroot and oyster mushrooms may increase the diversity of ingredients and the nutritional value of the product. The development of a practical, attractive, and adolescent-friendly food product is expected to serve as both an educational medium and an applicable skill for female students in selecting and preparing nutritious foods. This activity is also consistent with school-based anemia prevention approaches that emphasize nutrition education, improvement of nutritional knowledge, dietary behavior change, and utilization of locally available food resources as part of efforts to improve adolescent nutritional status (UNICEF Indonesia, 2019; UNICEF Indonesia, 2021).

LITERATURE REVIEW

Based on the priority issues identified by the partners, the Community Service (PKM) team formulated a solution in the form of a program titled “Training to Enhance Adolescent Girls’ Knowledge and the Preparation of Nuggets Combining Beets, Oyster Mushrooms, and Catfish as a Source of Iron to Prevent Anemia at Dharma Karya Junior High School in Beringin Subdistrict, Deli Serdang Regency.” This activity was designed as an educational and practical initiative so that adolescent girls would not only gain knowledge but also practical skills in processing iron-rich foods.

This solution was developed based on the results of a consultation between the PKM team and Dharma Karya Junior High School in Beringin Subdistrict, Deli Serdang Regency, with the following steps:

- Identifying participants for the “Training Program to Enhance Adolescent Girls’ Knowledge and the Preparation of Nuggets Combining Beets, Oyster Mushrooms, and Catfish as Iron Sources to Prevent Anemia” at Dharma Karya Junior High School, Beringin Subdistrict, Deli Serdang Regency.
- Determining the training schedule, namely August 6 and 7, 2026, at Dharma Karya Junior High School in Beringin Subdistrict, Deli Serdang Regency.
- Conducting the training activities, which include a pre-test, educational session, demonstration, nugget processing training, and a post-test, as well as an evaluation of the participants’ knowledge and skills.

Through this solution, it is hoped that the adolescent girls at Dharma Karya Junior High School will understand the importance of preventing anemia and be able to independently and sustainably prepare iron-rich foods.

METHOD

A. Program Implementation

The community service program was implemented through the following three stages:

The first stage involved administering a pre-test to participants prior to the “Training on Knowledge Enhancement for Adolescent Girls and the Preparation of Nuggets Combining Oyster Mushrooms, Beet Flour, and Catfish Flour as a Source of Iron to Prevent Anemia” at Dharma Karya Junior High School in Beringin Subdistrict, Deli Serdang Regency.

The second stage involved imparting knowledge through lectures, question-and-answer sessions, and discussions on:

- a. The characteristics of oyster mushrooms, beets, and catfish.

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- b. The benefits of oyster mushrooms, beets, and catfish for preventing anemia.
- c. The nutritional content of oyster mushrooms, beets, and catfish.
- d. Processed products made from oyster mushrooms, beets, and catfish.

The third phase involved providing training and demonstrations on how to make processed products, including:

- a. How to select fresh beets, fresh oyster mushrooms, and fresh catfish.
- b. How to process beets into beet flour.
- c. How to process catfish into catfish flour.
- d. Preparing the ingredients and tools used to make nuggets.
- e. The procedure for making nuggets.
- f. The benefits of nuggets as a source of iron.

B. Forms of Partner Participation

Partner participation consists of a group of adolescent girls who are students at Dharma Karya Junior High School and reside in Beringin Subdistrict, Deli Serdang Regency. Participants were selected (screened) based on predetermined criteria, namely:

1. Students must be willing to participate in the agreed-upon activities.
2. Students must be physically healthy and not currently ill.

In addition to being training participants, the partners also play an active role in providing the venue for the activities, facilitating participant coordination, and participating in pre-tests, educational sessions, cooking demonstrations, and post-tests.

C. Team Expertise and Responsibilities

1. Pre-test

The pre-test is the initial stage before the start of the training program designed to enhance adolescent girls' knowledge of making nuggets made from a combination of oyster mushrooms, beet flour, and catfish flour. Participants who meet the criteria are given a questionnaire containing questions about the definition, benefits, nutritional content, and processed products of oyster mushrooms, beets, and catfish. The purpose is to assess participants' initial understanding before they receive the training material.

2. Educational Session

The educational session was conducted by the PKM team, who presented material on the definitions, benefits, nutritional content, and processed products of oyster mushrooms, beets, and catfish. The methods used included lectures, Q&A sessions, and discussions, supported by an LCD projector and handouts containing information on the definitions, benefits, nutritional content, ingredients, equipment, procedures, and recipes for making the nuggets.

3. Education and Training

Education and training were conducted by the PKM team together with the enumerators through nugget-making demonstrations. Participants were divided into several working groups, and each group was provided with the necessary ingredients and tools. The PKM team guided each group in making nuggets by mixing pureed oyster mushrooms with beet flour and catfish flour, followed by shaping, steaming, coating with breadcrumbs, and frying.

4. Post-test

A post-test was administered after the community service activities concluded, aimed at measuring participants' increased knowledge and understanding of the material presented, using the same questionnaire as the pre-test.

5. Knowledge and Skills Assessment

The final activity provided the group of female students with the opportunity to independently process oyster mushrooms, beet flour, and catfish flour into nuggets as a means of evaluating the skills they acquired during the training.

RESULTS AND DISCUSSION

This project applies food science and technology in the field of nutrition, specifically the processing technology for functional foods rich in iron. The product developed is a nugget made from a combination of three local food ingredients: oyster mushrooms (a source of fiber and plant-based protein), beets (a source of iron and natural coloring), and catfish (a source of animal protein and iron). These ingredients are processed into flours (beet flour and catfish flour) before being mixed into the nugget batter, resulting in a food product that is convenient, nutritious, and appealing to teenagers.

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This simple food processing technology is designed to be easily replicated by students and school staff without requiring special equipment, making it suitable for sustainable implementation as a nutritious addition to school menus, including in support of healthy cafeteria programs and school health units (UKS).

1. Opening and Pre-test

- a. The Community Service Training began with an opening ceremony and welcoming remarks delivered by the researcher



Figure 1. Opening and Welcome Remarks Delivered by the Researcher

- b. On Friday, August 7, 2026, at 9:00 a.m., the adolescent girls had gathered in the classroom. Before the event began, participants were asked to complete a 60-minute pre-test on their knowledge of local food product development to improve the health of adolescent girls at Dharma Karya Junior High School in Beringin Subdistrict, Deli Serdang Regency.



Figure 2. Filling Out the Attendance Sheet and Taking the Pre-Test

2. Providing Nutrition Education Through the Preparation of Iron-Rich Nuggets for Adolescent Girls

The Community Service Team delivered a 60-minute presentation on the development of local food products to improve the health of adolescent girls at YP Dharma Karya Junior High School in Beringin Subdistrict, Deli Serdang Regency. The adolescent girls were also given time to ask questions; one of the questions was about how to prepare iron-rich nuggets.

The community service team explained how to process catfish, beets, and oyster mushrooms into iron-rich, high-protein nuggets.

Figure 3. Presenting the Material and Conducting a Q&A Session



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4. Cooking Demonstration

The community service training continued with a cooking demonstration of catfish nuggets, made with the addition of beets and oyster mushrooms. The activity aimed to teach skills and introduce local foods rich in iron. The

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process of turning these ingredients into nuggets was led by teenage girls from grades 7, 8, and 9, who were divided into three groups. The girls enthusiastically participated in preparing and making the nuggets. The results showed that the nuggets prepared by the girls demonstrated their ability to follow the processes and procedures that had been explained.

5. Post-Test and Closing Ceremony

After the cooking demonstration, a 30-minute post-test was administered to the teenage girls. At the end of the event, the community service program concluded with a closing ceremony led by the school principal and concluded with a prayer.

Figure 4. Taking the Post-Test and Closing the Session



a. Pretest and Posttest Knowledge Results

The results of the pretest and posttest showed an increase in the respondents' average scores based on their answers to the knowledge questions, as presented in Table 1.

Table 1. Pretest and Posttest Knowledge Results

Knowledge	N	Mean	Min	Max
Before Training	17	7.88	3	13
After Training	17	12.35	7	15

The pretest results from the community service activity showed that before the training, the average knowledge score of the female adolescents was 7.88, with the lowest score being 3 and the highest being 13. The posttest results, after the participants received the training, showed that the average knowledge score increased to 12.35, with the lowest score being 7 and the highest being 15. The educational activity was conducted for female adolescents regarding the processing of local food products. This was indicated at the beginning of the community service activity, when the pretest results showed that the respondents' average level of knowledge was relatively low.

The categories of the female adolescents' knowledge scores in the pretest and posttest are presented in Table 2.

Table 2. Categories of Pretest and Posttest Knowledge Scores

Knowledge	Category	n	%
Before Training	Poor	9	52.9
	Fair	3	17.6
	Good	5	29.4
	Total	17	100
After Training	Poor	2	11.8
	Fair	5	29.4
	Good	10	58.8
	Total	17	100

Based on Table 2, the knowledge score categories of the female adolescents showed a change before and after the educational counseling. Before the counseling, 29.4% of the respondents were in the good knowledge category, while after the counseling, the proportion in the good knowledge category increased to 58.8%. Knowledge is the result of a person's awareness or understanding of an object through the senses and is influenced by attention and perception of the object.

b. Effect of Nutrition Education on Respondents' Knowledge

In this community service activity, the development of local food products was carried out to improve the health of female adolescents at SMP YP Dharma Karya, Beringin District, Deli Serdang Regency. The development of local food products demonstrated an effort to improve knowledge and attitudes, as presented in Table 3.

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Table 3. Effect of Counseling and Training on Respondents' Knowledge

Variable	N	SD	P Value
Knowledge Before Counseling	17	4.029	0.000
Knowledge After Counseling	17	2.621	

Based on Table 3, the level of knowledge before and after the educational counseling was analyzed statistically using a dependent t-test. The analysis obtained a p-value of 0.000, indicating an effect of the counseling on the respondents' knowledge levels before and after the counseling. This is consistent with the statistical test conclusion, where the condition $p > 0.05$ indicates that H_a is accepted.

CONCLUSION

The community service activity entitled "Nutrition Education Movement through the Processing of Iron-Rich Nuggets for Adolescent Girls at Dharma Karya Junior High School, Beringin District, Deli Serdang Regency" was successfully implemented on August 6–7, 2026, and was attended by female adolescent students of Dharma Karya Junior High School who met the participant criteria. The nutrition education and training activities, including the processing of nuggets made from beetroot, oyster mushrooms, and catfish, were able to increase the participants' knowledge regarding anemia, iron, and iron-rich food sources, as indicated by the comparison of the pre-test and post-test results. In addition, the participants demonstrated improved skills in independently processing iron-rich nuggets through their respective group activities.

Overall, this activity made a meaningful contribution to promotive and preventive efforts to reduce the risk of anemia among adolescent girls through a nutrition education approach based on locally available food resources. In the future, the program can be developed through continuous nutrition education, periodic monitoring of participants' knowledge and practices, and broader training on the utilization and diversification of local food sources rich in iron to support sustainable anemia prevention among adolescent girls.

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