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ANEMIA PREVENTION EDUCATION AND DEMONSTRATION OF MAKING TIBU CHEESE STICKS FOR TEENAGE GIRLS AT MAN 1 DELI SERDANG

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Abstract

Anemia remains a serious problem for adolescent girls in Indonesia. Data from the World Health Organization (2019) shows that the prevalence of anemia in women of childbearing age is quite high, and in Indonesia, according to the 2018 Basic Health Research, the figure reached 48.9%. Adolescent girls are vulnerable to anemia because iron requirements increase during growth. As a solution, TIBU cheese sticks (Chicken Liver Flour and Purple Sweet Potato Flour) were developed as an iron-rich snack. The program was implemented at MAN 1 Deli Serdang through anemia education and product-making demonstrations, accompanied by pre-tests and post-tests to assess improvements in knowledge and attitudes. The method used was quantitative with a pre-post test design approach. The sample consisted of adolescent girls at MAN 1 Deli Serdang. Analysis was conducted by comparing knowledge and attitude scores before and after the intervention. The intervention included anemia education using booklets and training on making TIBU cheese sticks (chicken liver flour and purple sweet potato flour). The results of the activity showed an increase in knowledge and attitude scores after education, with a target increase of >30% from the initial score. In conclusion, education and training are effective in improving adolescent girls' understanding and skills in anemia prevention.

Keywords: Anemia, anemia education, local food, adolescent girls.

INTRODUCTION

According to the World Health Organization (WHO) 2019, the prevalence of anemia worldwide was recorded at 29.9% in women of childbearing age, equivalent to more than half a billion women aged 15-49 years. In Southeast Asia in particular, the prevalence of anemia in women of childbearing age reached 46.6% in 2019. Based on data from the 2018 Basic Health Research (Riskesdas), the prevalence of anemia in Indonesia was recorded as quite high at 48.9%, in the age range of 5 to 24 years at 84.6%, while the age range of 25 to 34 years was 33.7%, and the age of 35 to 44 years was 33.6% and anemia sufferers aged 45 to 54 years was 84.6%.

Low work productivity. 6 One of the government's efforts to address anemia in adolescents is through the provision of iron supplement tablets (TTD). The government's program to reduce the prevalence of anemia has been insignificant due to the prevalence remaining quite high. The prevention and management program for iron deficiency anemia is considered ineffective because the prevalence of anemia in some regions has not decreased significantly. Therefore, providing snacks for anemic adolescents using local foods high in protein and iron can help reduce anemia (9).

Partner Priority Issues

Based on the results of the situation analysis, the problems faced by partners can be identified as follows:
1. Low knowledge of adolescent girls about anemia and its prevention
2. Lack of positive attitudes towards consuming foods high in iron.
3. Lack of skills among young women in processing local food into nutritious snacks.
4. There is a perception that healthy food requires high costs.
5. There is no innovation in local food-based snacks that are specifically aimed as an alternative for preventing anemia in the school environment.

Based on the agreement between the community service team and the school, the priority problem to be solved is increasing the knowledge and skills of young women in preventing anemia through education and demonstrations of making TIBU Cheese Sticks.

Objective

This community service activity aims to improve the knowledge, attitudes, and skills of young women in preventing anemia through educational activities and demonstrations of making TIBU Cheese Sticks from chicken liver flour and purple sweet potato flour at MAN 1 Deli Serdang. This activity is expected to provide a correct understanding of the causes, impacts, and efforts to prevent anemia, while also training young women's abilities in processing local nutritious foods high in iron as an alternative healthy snack.

Program Benefits

This activity is expected to increase awareness and behavior in consuming nutritious foods among adolescent girls, particularly in preventing anemia. Furthermore, this activity can serve as a model for practice-based nutrition education in schools and support the School Health Program (UKS). For implementing institutions, this program demonstrates the implementation of the Tri Dharma of Higher Education through community service and the development of innovative local food products with the potential for further development.

LITERATURE REVIEW

The transition from childhood to adulthood is the adolescence stage. This period is marked by a number of biological, cognitive, and emotional changes. Cognitive changes can occur with increased abstract, idealistic, and logical thinking. Socio-emotional changes include the demand for independence, conflict with parents, and the desire to spend time with peers (7).

Anemia is a condition in which the number of red blood cells or hemoglobin (Hb) levels in the blood is lower than normal for a given age and gender. In healthy individuals, red blood cells contain hemoglobin, a blood cell that carries oxygen and other nutrients such as vitamins and minerals to the brain and body tissues. Normal Hb levels vary between men and women. Anemic men have an Hb level of less than 13.5 g/dl, while women have an Hb level of less than 12 g/dl (2).

Some of the direct impacts that occur in young women who suffer from anemia are frequent complaints of dizziness and seeing stars, eyelids, lips, tongue, skin and palms of the hands becoming pale, lethargic, weak, tired, exhausted and limp and also long-term impacts because women will later become pregnant and have children, during pregnancy, teenagers who already suffer from anemia will have more severe anemia during pregnancy because pregnancy requires more nutrition if it is not treated then it will have a bad impact on the mother and baby (8).

Snacks are light meals consumed between main meals and are recommended for teenagers because the body's nutrient intake decreases 1 to 3 hours after eating due to reduced activity. Therefore, snacks serve as a source of nutrients lacking during main meals, with a calorie count of 150-200 kcal and cannot replace main meals due to their low calorie count. Diversification of snacks involves seeking alternative foods containing protein and other nutrients to meet the nutritional needs of adolescent girls. These include local foods that are easy to find and relatively inexpensive. Snacks come in various forms, such as macaroni and cheese, egg rolls, pineapple tarts, sticks, shredded meat, and various chips (5).

Chicken liver is an internal organ that offers advantages over livers from other livestock, as it is cheaper and more readily available. However, chicken liver processing is still lacking in variety and its potential utilization is not maximized (Annisa & Suryaalamsah, 2023). The nutritional content of 100 grams of chicken liver contains 27.4 g of protein; 1.6 g of iron; 15.8 mg of iron; 118 mg of calcium; and 4.3 mg of zinc (Ministry of Health, 2018).

Chicken liver flour is processed chicken liver into flour. Processing into flour is one of the recommended alternative semi-finished product processes because it has a longer shelf life, is easy to mix (made into a composite), is enriched with nutrients (fortified), and is more practical and flexible because it can be used as a raw material or mixture (composite flour) in the manufacture of various food products. Reducing the water content in chicken liver can be done by drying it using an oven and grinding it into granules. Chicken liver flour is one alternative to extend the shelf life of chicken liver (5).

Purple sweet potato (Ipomoea batatas L) has a characteristic deep purple color like black and has a high anthocyanin content that is water soluble. Purple sweet potato (Ipomoea batatas L) is included in the type of tubers that have advantages over other tubers because it contains the lowest glycemic index of 44 and its main carbohydrate is starch. The anthocyanin content in purple sweet potato is around 3-61 g / 100 g. This is in accordance with research conducted by Dodik in 2012 concluded that there was an increase in Hb levels of teenage students after being given Purple Sweet Potato cookies. Sweet potato (Ipomoea Batatas) is one of the herbal plants that grows creeping in the ground and produces tubers. Sweet potatoes contain 4 mg of iron in 100 grams, so the use of sweet potatoes can be

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consumed by anemic teenagers, namely it can increase hemoglobin levels in red blood cells, can prevent and treat anemia because it is rich in iron (10).

Purple sweet potato flour can be used as a substitute for wheat flour, which can increase local food consumption and production, and reduce the use of wheat flour or imported wheat flour. Another advantage of purple sweet potato flour is its distinctive color, potential as a functional food, and increased competitiveness, which has positive health benefits due to its anthocyanin content (4).

Anemia is a major threat to the quality of life in Indonesia. Anemia is a government priority that must be addressed and is a shared concern. Therefore, through this activity, we want to encourage the community, especially young women at risk of developing anemia, to pay greater attention to nutritional aspects. To reduce the incidence of anemia, the Ministry of Health has implemented various specific interventions.

Based on the situation analysis conducted by the partners, through in-depth interviews with the principal, teachers, and students, the following problems were identified: students' lack of knowledge about nutrition in preventing anemia. Lack of knowledge and skills in utilizing local foods for adolescent girls' menus. Lack of skills among adolescent girls in preparing good menus to prevent anemia. Many families still have misunderstandings about nutritious diets. They assume that nutritious food is expensive. In addition to economic factors, boredom with the repeated use of local foods is a contributing factor to nutritional problems among adolescent girls at the Community Service Location.

METHOD

Program Implementation

This community service program was implemented at the State Islamic Senior High School (MAN) 1 Deli Serdang, located at Jalan Limau Manis No. Pasar 15, Medan Sinembah, Tanjung Morawa District, Deli Serdang Regency, North Sumatra. The program was systematically designed to address the lack of knowledge and skills among young women regarding anemia prevention through optimizing local food.
The main series of activities in implementing this program include:

1. Preparation and Coordination Stage

The community service team carried out initial coordination with MAN 1 Deli Serdang school to determine the time, permits, preparation of infrastructure, and determination of the target audience, namely female adolescent students.

2. Initial Evaluation (Pre-test)

Before the intervention was given, participants first filled out a pre-test questionnaire to measure their initial level of knowledge regarding anemia, iron, and balanced nutrition.

3. Anemia Counseling and Education

The team provided in-depth education to the students on the definition of anemia, normal hemoglobin (Hb) levels, causes, short- and long-term effects, and the importance of consuming iron- rich foods and iron-fortified iron tablets (TTD). This education was supported by the use of booklets to make the material easier for participants to understand and review.

4. Demonstration and Training on Making TIBU Cheese Sticks

The event continued with a demonstration of making a functional snack, TIBU cheese sticks (Chicken Liver Flour and Purple Sweet Potato Flour). Participants were given an understanding of how to process local ingredients high in protein and iron into an attractive, economical, and popular snack for teenagers. Participants were also directly involved in practicing the processing process.

5. Final Evaluation (Post-test and Observation)

At the end of the program, participants completed a post-test to evaluate their knowledge gains, and observations were made on their skills and level of preference for TIBU cheese stick products. The evaluation results showed a statistically significant increase in the average knowledge score from ( ).

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Partner Participation Forms

The partners in this community service activity are MAN 1 Deli Serdang, which involves the Principal (Drs. Sucipto Gito Siswanto, MM), health and safety teachers, subject teachers, and female students as active participants. The partners' participation and concrete contributions include:

1. Granting of Permits and Assignment of Participants

The school gave official permission and assigned female students in the MAN 1 Deli Serdang environment to participate in the entire series of anemia prevention education activities and TIBU cheese stick making training from start to finish.

2. Provision of Facilities and Places

The partner provides representative classrooms or school halls along with the supporting facilities and infrastructure needed during the implementation of food processing counseling and demonstrations.

3. Active Assistance

The principal, UKS teachers, and accompanying teachers participated in coordinating the students and assisted in ensuring the smooth running of the event so that the intervention between the community service team and participants could proceed in an orderly, interactive manner and achieve the program's success targets.

Team Expertise and Duties

This community service program involves a team of lecturers from the Nutrition Department of the Medan Ministry of Health Polytechnic, who have linear competencies in public health and culinary arts, and is supported by students as field assistants. The team's tasks and expertise are detailed as follows:

Erlina Nasution, S.Pd, M.Kes (Head of the Proposing Team)
Expertise: Culinary and Nutrition Education / Local Wisdom Culinary.
Duties: Responsible as the chief executive who leads the overall management of the community service project, starting from program planning, coordination with MAN 1 Deli Serdang partners, designing the TIBU cheese stick product formulation (Chicken Liver Flour and Purple Sweet Potato Flour), leading the product manufacturing demonstration process, to compiling the final report and publication of scientific outputs.

Dr. Ratna Zahra, M.Kes (Member of the Lecturer Team)
Expertise: Public Health Nutrition and Epidemiology.
Duties: Responsible for preparing health and medical education materials related to the prevention of anemia in adolescent girls, preparing knowledge questionnaire instruments, implementing counseling/delivering materials to female students, and analyzing data from evaluation results (pre-test and post-test) of participants' knowledge levels.

Students of the Diploma IV Nutrition Study Program (Atikah Norida, Mutyara Adinda Fadillah, and Sepira Saharani)
Expertise: Final year student majoring in Nutrition with competency in supporting community nutrition.
Duties: Assisting with the smooth running of technical implementation in the field, accompanying student participants during the TIBU cheese stick making practice, assisting with the data collection process (filling out questionnaires), and preparing equipment and consumption for the activity.

Time and Location of Activities

This community service activity will be carried out at MAN 1 Deli Serdang, located at Jalan Limau Manis No. Pasar 15, Medan Sinembah, Tanjung Morawa District, Deli Serdang Regency, North Sumatra. The activity is planned to be carried out in a classroom or school hall that allows for educational and food processing demonstrations. The implementation time is planned for 2026 according to the community service activity schedule.

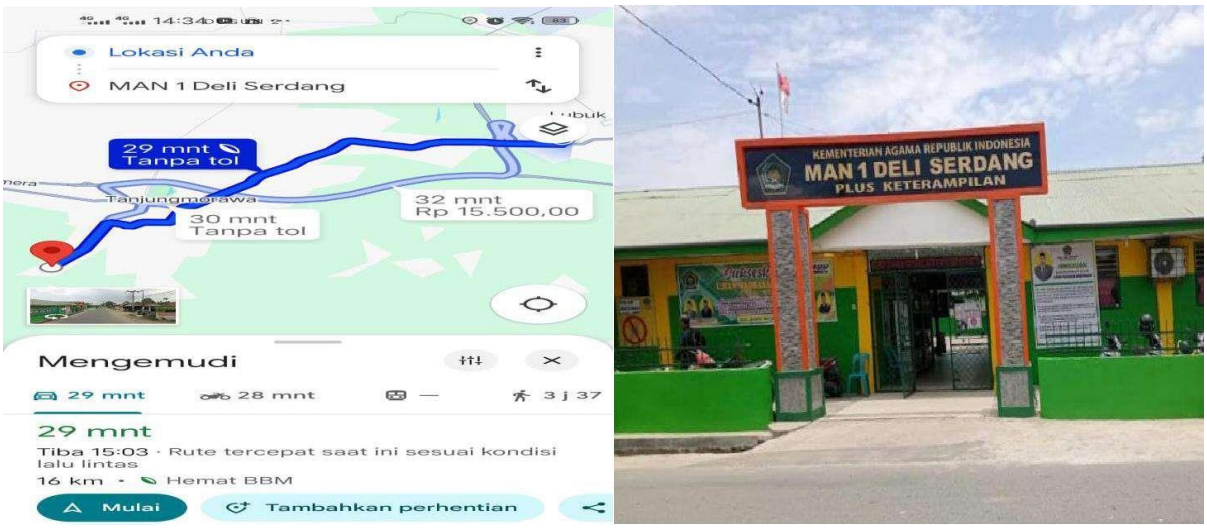


Image 1. Target Partner Location Map

The location of the PKM activity is MAN 1 Deli Serdang, located at Jalan Limau Manis No. Pasar 15, Medan Sinembah, Tanjung Morawa District, Deli Serdang Regency, North Sumatra.

Target Audience

The target audience for this community service activity is high school-aged female students at MAN 1 Deli Serdang. This target group was chosen because female students are vulnerable to anemia due to increased iron requirements during growth and the menstrual cycle. Furthermore, the activity involved school health unit (UKS) teachers and school officials as facilitators.

Form of Activity

Scope of Community Service

- Counseling or education about anemia, its causes, impacts, and how to prevent it using booklets.
- Explain to participants about the use of local food ingredients as nutritious snacks, especially making cheese sticks from chicken liver flour and purple sweet potato flour (TIBU Cheese Sticks) as a healthy snack alternative for teenage girls.
- Conducting a demonstration of making TIBU cheese sticks, starting from preparing the ingredients, processing, to presenting the product.
- Conducting activity evaluations, namely by providing pre-tests and post-tests to determine the increase in participants' knowledge regarding anemia and observing participants' skills in the process of making TIBU cheese sticks.

The activity stages begin with coordination and preparation of activities, followed by target identification, providing education about anemia, demonstrations of making TIBU cheese sticks, direct practice by participants, and activity evaluation.

Relatedness

This community service activity involves several related parties, namely the Medan Ministry of Health Polytechnic of Health, Nutrition Department as the activity implementer, MAN 1 Deli Serdang as the activity target partner, and young women as activity participants.

Evaluation Design

Activity evaluations were conducted at the beginning, during, and at the end of the community service program to determine the extent to which the program's objectives were achieved. The evaluations included pre-tests and post-tests to assess participants' knowledge of anemia and to observe their skills in making TIBU cheese sticks. The indicators used in the activity evaluation are as follows.

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Table 1. Evaluation Design

No	Activity	Success Indicators
1	Counseling on preventing anemia in adolescent girls	- Participants participated in the counseling activities from beginning to end ≥ 90% - Participants were able to answer questions verbally at the end of the activity ≥ 80% - There was an increase in participants' knowledge about anemia based on the results of the pre-test and post-test
2	Demonstration of making TIBU cheese sticks (chicken liver flour and purple sweet potato flour)	- Participants follow the demonstration activities until completion ≥ 90% - Participants are able to practice making TIBU cheese sticks correctly ≥ 80% - Participants like TIBU cheese stick products and are willing to try making them again independently

TIBU Cheese Stick Making Procedure

Material

1. 100 grams of chicken liver flour
2. 50 grams of purple sweet potato flour
3. 120 grams of wheat flour
4. 100 grams of eggs
5. 50 grams of margarine
6. 150 grams of cheese
7. 20 ml water
8. 15 grams of cooking oil

Procedure for Making Purple Sweet Potato Flour

1. First, prepare the purple sweet potato that has been peeled.
2. After that, slice the purple sweet potato thinly.
3. Then dry it using a cabinet dryer at a temperature of 80°C for ±7 hours.
4. Once dry, grind it with a flour mill until smooth.

Procedure for Making Chicken Liver Flour

1. First prepare the chicken liver.
2. Clean the chicken livers in running water.
3. Once clean, boil the chicken liver for 5 minutes and add the crushed garlic to remove the fishy smell from the chicken liver.
4. Drain the chicken liver and cool it at room temperature. Once cool, slice the chicken liver.
5. Then dry it using a cabinet dryer at a temperature of 60°C for ±7 hours.
6. Once dry, grind with a flour mill until smooth.

TIBU Cheese Stick Making Procedure

1. The research materials prepared include chicken liver flour, purple sweet potato flour, wheat flour, eggs, margarine, cheese, water, salt, sugar, and cooking oil.
2. Next, make the dough by mixing all the ingredients that have been weighed until you get a smooth dough.
3. Shape the dough using a rolling pin.
4. Heat the oil over low heat.
5. Fry the formed TIBU cheese sticks until golden brown. The cheese sticks are now cooked and ready to serve.



Image 2. Purple sweet potato flour, chicken liver flour, and TIBU Cheese Stick products

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RESULTS AND DISCUSSION

Results

The location of the PKM activity is MAN 1 Deli Serdang, located at Jalan Limau Manis No. Pasar 15, Medan Sinembah, Tanjung Morawa District, Deli Serdang Regency, North Sumatra.

Table 2. Pre Test & Post Test Results

Variables	Pre-Test	Pre-Test	Post Test	Post Test
Variables	**N**	**%**	**N**	**%**
Knowledge				
Good	3	6.3	7	14.6
Enough	44	91.7	41	85.4
Not enough	1	2.1	-	
Amount	48	100	48	100

Table 3. Knowledge Variables Before & After

Variables	Mean ± SD	Mean Change ± SD	P value *
Knowledge		-16.67±14.25	0.001
Before	73.33 ± 18.58	-16.67±14.25	0.001
After	90.99 ± 11.49	-16.67±14.25	0.001

The evaluation results showed an increase in the knowledge of young women after being given anemia prevention education and a demonstration of making TIBU Cheese Sticks. Before the intervention, most participants had a level of knowledge in the sufficient category, namely 44 people (91.7%), the good category was only 3 people (6.3%), and there was still 1 person (2.1%) in the poor category. After the education and demonstration activities were carried out, the number of participants with good knowledge increased to 7 people (14.6%), while the sufficient category became 41 people (85.4%), and there were no more participants in the poor knowledge category. In addition to these category changes, the average knowledge score increased from 73.33 ± 18.58 at the pre-test to 90.99 ± 11.49 at the post-test, with an average increase of 16.67 ± 14.25 and a p-value = 0.001, which indicates that the increase is statistically significant.

Activity Documentation



Image 3. Students of MAN 1 Deli Serdang and Counseling Activities

Discussion

Anemia is a condition in which the number of red blood cells or hemoglobin (Hb) levels in the blood is lower than normal for a given age and gender. In healthy individuals, red blood cells contain hemoglobin, a blood cell that carries oxygen and other nutrients such as vitamins and minerals to the brain and body tissues. Normal Hb levels vary between men and women. Anemic men have an Hb level of less than 13.5 g/dl, while women have an Hb level of less than 12 g/dl (2).

According to the World Health Organization (WHO) in 2019, the prevalence of anemia worldwide was recorded at 29.9% in women of childbearing age, equivalent to more than half a billion women aged 15-49 years. In Southeast Asia in particular, the prevalence of anemia in women of childbearing age reached 46.6% in 2019. Based on data from the 2018 Basic Health Research (Riskesdas), the prevalence of anemia in Indonesia was quite high at 48.9%, in the age range of 5 to 24 years at 84.6%, while the age range of 25 to 34 years was 33.7%, and the age of 35 to 44 years was 33.6% and anemia sufferers aged 45 to 54 years was 84.6%.

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One of the health efforts to prevent anemia in adolescent girls can be done through various educational approaches and environmental support, several efforts to increase knowledge are carried out continuously and are expected to shape positive attitudes and behaviors by providing education on anemia prevention and demonstrations of making TIBU cheese sticks for adolescent girls. With this education, there is an increase in knowledge influenced by the educational delivery method which not only uses lectures, but is also supported by booklet media containing information on the definition of anemia, causes, symptoms, impacts, prevention, sources of iron-rich foods, and the benefits of TIBU Cheese Sticks as a nutritious snack. The booklet allows participants to reread the material after the activity is completed, thereby helping to improve memory of the information that has been obtained. In addition, the use of visual media makes the delivery of information more interesting and easier for adolescents to understand.

The TIBU Cheese Stick-making demonstration also provided a more meaningful learning experience because participants not only learned theory but also directly witnessed the process of processing local food ingredients into nutritious food. The demonstration method increased participant engagement throughout the activity, making the information easier to understand and remember. Learning that involves hands-on experience is known to be more effective than passive presentation of material because participants can connect the concepts learned with real-world practice.

Overall, the pre-test and post-test results demonstrated that the anemia prevention education activity and TIBU Cheese Stick making demonstration were effective in increasing adolescent girls' knowledge about anemia. This success demonstrates that the use of engaging educational media and demonstrations of local food processing can be an alternative health promotion method in schools to support anemia prevention in adolescent girls. This discussion also aligns with the objectives of the community service activity, which is to improve adolescent girls' knowledge, attitudes, and skills in preventing anemia through education and the use of local food.

External

1. Scientific articles in the Community Service journal
2. Publication on social media
3. IPR

Target

1. Young women are expected to be able to understand the importance of preventing anemia through consuming nutritious foods and sources of iron.
2. Young women are expected to be able to process TIBU cheese sticks (chicken liver flour and purple sweet potato flour) as a nutritious snack to help prevent anemia.
3. Young women are expected to be able to apply and disseminate knowledge and skills in making TIBU cheese sticks to their peers and family.

Obstacles and Follow-up Plans

The main obstacles encountered in implementing this activity relate to the target group's initial understanding and mindset regarding health and nutrition. Based on an analysis of the situation in the field, adolescent girls' limited knowledge about anemia and its long-term impacts leads them to pay less attention to healthy eating patterns. Furthermore, there is a common misconception among the community and among adolescents that nutritious food is always synonymous with high costs, as well as boredom with the use of local food ingredients that are processed monotonously. Furthermore, although the government program through Iron Supplement Tablets (TTD) has been running, its effectiveness is still hampered by compliance and adolescent reluctance due to certain tastes or side effects, so alternative interventions through snacks are needed.

As a solution and program sustainability measure, the follow-up plan to be implemented includes several important aspects. First, the school, along with the school health teacher, is expected to regularly integrate anemia prevention education materials into extracurricular activities or school health programs, utilizing distributed booklets so that nutritional messages can still be read and understood by students. Second, because the TIBU Cheese Stick (Chicken Liver Flour and Purple Sweet Potato Flour) production training has proven effective in significantly improving participants' skills and knowledge scores, this local food processing practice needs to be turned into an entrepreneurship or school skills (craft) program so that students can produce and consume it independently at home. Third, to ensure long-term impact, regular monitoring by the community service team and the school is needed to monitor the nutritional status and consumption habits of iron-rich foods in adolescent girls, as well as expanding the dissemination of product innovations through scientific publications and social media so that they can be replicated by other schools or regions.

CONCLUSION

In conclusion, education and training effectively improve adolescent girls' understanding and skills in preventing anemia. As a solution and to ensure program sustainability, the follow-up plan will encompass several key aspects. First, schools, along with school health and health teachers, are expected to regularly integrate anemia prevention education into extracurricular activities and school health programs. This will utilize distributed booklets to ensure students can continue to read and understand nutrition messages.

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