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Anemia Prevention Strategy Through Early Detection And Utilization Of Local Foods In Pregnant Women And Adolescents

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Abstract. Maternal Mortality Rate (MMR) and Infant Mortality Rate (IMR) are key indicators of public health. The rise in MMR in Indonesia, including North Sumatra, highlights ongoing health challenges. Medan and Deli Serdang are among the regions with the highest maternal mortality rates, with hemorrhage, often associated with anemia, being the primary cause. Anemia is a global nutritional problem affecting all age groups. Pregnant women and adolescent girls are particularly vulnerable due to their crucial role in the survival of future generations. Lack of understanding and preventive practices related to anemia make early detection and health education crucial. The use of local iron-rich food sources can also be optimized to prevent and manage anemia. The aim of this activity is to conduct early detection and education on the use of local food to overcome anemia in pregnant women and adolescents in Sukaraya village. The community service methods used included health checks, hemoglobin screening, anemia education, and demonstrations of local food processing. Results achieved included increased knowledge, identification of anemic targets, and the utilization of local foods in daily diets. Follow-up plans include routine hemoglobin monitoring and programmed education. This program is expected to help reduce anemia rates and improve community health.
Keyword: anemia, community service, early detection, health education, local foods

Abstrak. Angka Kematian Ibu (AKI) dan Angka Kematian Bayi (AKB) merupakan indikator utama kesehatan masyarakat. Peningkatan KMA di Indonesia, termasuk Sumatera Utara, menyoroti tantangan kesehatan yang berkelanjutan. Medan dan Deli Serdang termasuk daerah dengan angka kematian ibu tertinggi, dengan perdarahan, yang sering dikaitkan dengan anemia, sebagai penyebab utama. Anemia merupakan masalah gizi global yang memengaruhi semua kelompok umur. Ibu hamil dan remaja putri sangat rentan karena peran penting mereka dalam kelangsungan hidup generasi mendatang. Kurangnya pemahaman dan praktik pencegahan terkait anemia membuat deteksi dini dan pendidikan kesehatan menjadi sangat penting. Penggunaan sumber makanan lokal yang kaya zat besi juga dapat dioptimalkan untuk mencegah dan mengatasi anemia. Tujuan kegiatan ini adalah untuk melakukan deteksi dini dan pendidikan tentang penggunaan makanan lokal untuk mengatasi anemia pada ibu hamil dan remaja putri di Desa Sukaraya. Metode pengabdian masyarakat yang digunakan meliputi pemeriksaan kesehatan, skrining hemoglobin, pendidikan anemia, dan demonstrasi pengolahan makanan lokal. Hasil yang dicapai meliputi peningkatan pengetahuan, identifikasi target anemia, dan pemanfaatan makanan lokal dalam diet sehari-hari. Rencana tindak lanjut meliputi pemantauan hemoglobin rutin dan pendidikan terprogram. Program ini diharapkan dapat membantu mengurangi angka anemia dan meningkatkan kesehatan masyarakat.
Kata kunci: anemia, pelayanan masyarakat, deteksi dini, pendidikan kesehatan, makanan lokal

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Introduction

Anemia is a widespread nutritional problem worldwide, occurring not only in developing countries but also in developed countries. Anemia affects all age groups, with adolescent girls and

pregnant women among the most vulnerable groups because it is directly related to the sustainability of generations (Aulya, Y, 2022; Hamidi F, dkk 2022).. Data released by the World Health Organization (WHO) in 2019 shows that the global anemia rate remains high at 41.8%, and the maternal mortality rate in developing countries is around 40%. Indonesia has a prevalence of anemia in pregnancy of 37.1% (Tarigan L, 2022). SKI 2023 data found that only 32.4% of pregnant women underwent Hb tests (Kemenkes, 2023). Anemia can be a cause of bleeding and maternal death (Mufti et al., 2023; Lasaha WA, 2022; Fasha NP et al., 2019) and the figures have increased from the previous year (Kemenkes 2022), in North Sumatra, Medan City and Deli Serdang Regency ranked third highest (Dinkes, 2021). Sukaraya Village is a village located in Deli Serdang Regency with a fairly large number of teenagers (23%). The distribution of Sukaraya Village's population can be seen in Figure 1. Based on educational level, the majority are at the elementary level, while the majority work as farmers and laborers.

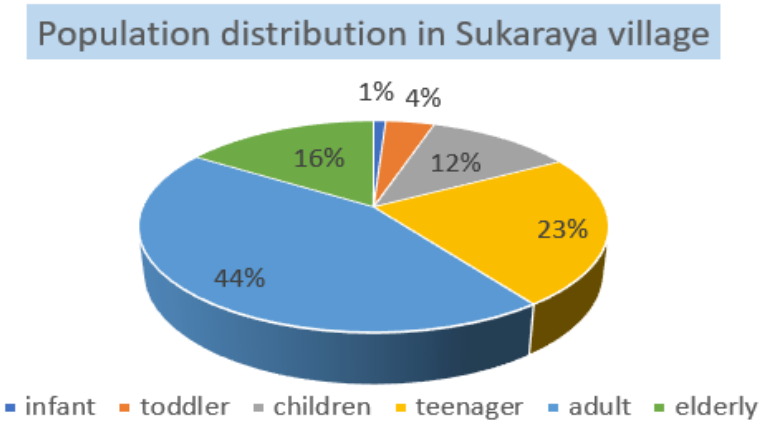


Figure 1. Diagram Population Distribution in Sukaraya Village

Data collected in 2024 found that 23.8% of pregnant women and 4% of adolescents suffered from anemia, with a Body Mass Index (BMI) below normal/thin. Anemia in adolescents that is not treated can continue into pregnancy. Anemia in adolescents and pregnant women must be properly managed because it has serious impacts on the health of the mother and child, such as the risk of death, premature birth, low birth weight (LBW), and impaired child development, including stunting (Hamidi F, dkk 2022).. Anemia management is part of the government program, which is included in the national anemia management program, which emphasizes nutrition education, iron supplementation, and iron fortification (Kemenkes, 2023; Perpres tahun 2021).

The underlying problem behind this community service activity is the low level of knowledge and awareness among pregnant women and adolescents about the need for health check-ups at the integrated health post (Posyandu), and their lack of adherence to iron tablet consumption. This stems from their lack of awareness of the importance of iron tablets and other iron-containing foods. Other reasons for reluctance to consume iron tablets include nausea and the unpleasant odor. Early detection of anemia has also not been fully implemented. The use of local foods high in iron, although abundant in villages, has not been optimally utilized. This is due to a lack of understanding and the limited availability of tools or media to provide information on the use of local foods as an alternative for preventing and treating anemia and other health problems.

The solution offered is educational counseling using leaflets and booklets explaining anemia, its causes, and how to treat it. It is important to emphasize that anemia can be fatal if not properly managed and can even lead to death. Prior to the counseling, a pre-test was administered to assess participants' understanding of anemia and the benefits of iron supplements or iron tablets. Following the counseling, participants were asked to answer questions as a form of post-test. The pre-test results were compared with the post-test to determine the effectiveness of the education provided. Another solution offered is early detection through Hb testing using a digital Hb meter,

which is quite easy to use and can be performed anytime and anywhere, regardless of time and space. This test is inexpensive and can be performed once a month. Participants can also be taught how to perform the test independently, while observing the principles of infection prevention. Testing using simple tools has begun to be encouraged to ensure the independence of each individual and improve their health. The next solution is education and demonstrations on how to use moringa leaves as a food ingredient that can be varied in daily menus. This educational resource uses a pocket booklet about the benefits of moringa leaves as a local food for treating anemia. The book explains moringa leaves and their nutritional content, as well as how to prepare various moringa leaf dishes.

The purpose of this community service is to detect anemia as early as possible, anemia detection activities can be carried out routinely, pregnant women and teenagers in Sukaraya village have increased understanding of the importance of iron and can utilize local food ingredients as an alternative to overcome anemia. The burden of partners as those responsible for the program in the village can be helped through good cooperation between the community, cadres and activity targets with the hope that this activity can be continued and programmed sustainably.

Methodology

Approach and Implementation Techniques

This community service program was carried out using a problem-based approach. The implementation techniques included health checks for early detection and education through counseling and demonstrations.

Activity Stages

The program was implemented through several stages, namely:

1. Preparation, Coordinating with midwives as representatives of Sukaraya village partners, conducting preliminary studies and analysis of target needs, creating materials and media needed for education, preparing examination equipment and a place for carrying out activities,
2. Implementation

   A. Conducting a pre-test and post-test

   The pre-test was conducted during the first face-to-face meeting before the counseling session. The post-test was conducted after the counseling session. The planned number of participants for this community service activity was all pregnant women in Sukaraya Village, Deli Serdang Regency, according to the agreed schedule. The adolescent participants were 67 teenagers attending the Yasim Private High School in Sukaraya Village, while the pregnant women were 10 pregnant women in Sukaraya Village who came to the village hall. The pre-test and post-test consisted of 20 multiple-choice questions for adolescent girls and 20 questions for pregnant women.

   B. Conducting Hb tests using a digital Hb meter. Participants diagnosed with anemia were given iron and vitamin supplements, as well as deworming medication.

   C. Conducting educational outreach

   The activity began with a socialization session introducing moringa leaf products, which can be used as a food ingredient and are quite effective in treating anemia. This was followed by an outreach session that instilled the principle that early detection of anemia is crucial given the potential impacts if left untreated. This session continued with an introduction to anemia, its causes, prevention, and treatment. The outreach session utilized audiovisual aids in the form of videos and images, as well as booklets and leaflets covering anemia and the use of local food ingredients to treat it. Following the outreach session, participants were given a questionnaire to serve as a post-test.

   D. A demonstration was conducted on how to make a simple dish using readily available ingredients in Sukaraya Village, including sweet potatoes, green beans, and moringa leaves.

3. Evaluation is carried out through post-tests and the activeness of the activity participants in following all the scheduled series of activities and the participants' desire to apply all the knowledge they have gained during the activity.
4. Follow-up, observing the sustainability of the activity program and the use of local food ingredients in addressing health problems, in this case anemia, which is applied in the daily menu, creating a programmed schedule for educational activities and routine health checks for teenagers and pregnant women.

Target, Location, and Time of Implementation

The target group of this program consists of teenagers (high school students) and pregnant women in Sukaraya village. This program was conducted at the Sukaraya village hall and at Yasim Sei Glugur High School during April-June 2025.

Activity Flow Diagram

To illustrate the process, the following flow diagram outlines the steps undertaken to address the partner's problems.

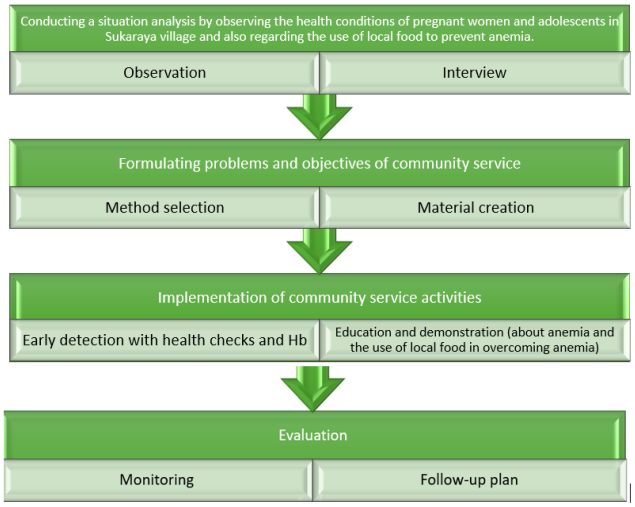


Figure 2. Flowchart of community service activities

Results and Discussion

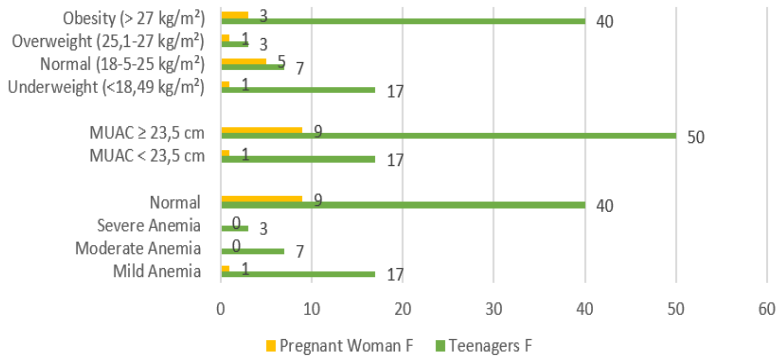
1. Hb, MUAC, and BMI Examination for Adolescents and Pregnant Women

Examination for adolescents is conducted at the high school in Sukaraya Village, while examinations for pregnant women are conducted during outreach activities at the village hall. These examinations are conducted in collaboration with and involve staff from the community health center (Puskesmas) that manage programs related to adolescents and pregnant women.

Anemia in adolescents is categorized as mild (10-11.9 g/dL), moderate (8-9.9 g/dL), severe (<8 g/dL), and normal (≥12 g/dL). For pregnant women, anemia is categorized as mild (9-10.9 g/dL), moderate (7-8.9 g/dL), severe (<7 g/dL), and normal (>11 g/dL).

BMI examination is conducted to determine a person's nutritional status. The MUAC examination is conducted as a support for evaluating nutritional status, particularly to detect the risk of Chronic Energy Deficiency (CED). The MUAC can be used as an easier and cheaper alternative for nutritional screening. By measuring the MUAC measurement in adolescent girls and pregnant women, it can also determine whether they are experiencing nutritional deficiencies, which can also contribute to anemia. The results of the participant examination are shown in the following table:

Table 1. Result of Hb measurement, Upper arm circumference (MUAC) and BMI

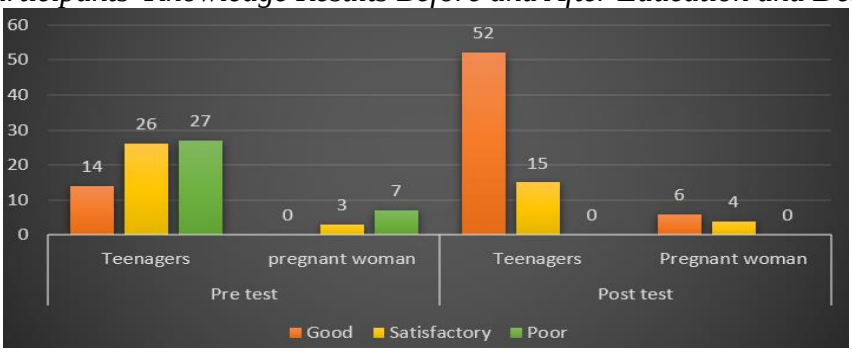


Based on Table 1, it is known that respondents, both adolescents and pregnant women, were still found to have anemia, even among adolescents, there were still those who experienced moderate and severe anemia. The number of adolescents who experienced anemia, if combined, was quite large, reaching 27 people (40.3%), which certainly requires more intensive attention and treatment. Respondents, both adolescents and pregnant women, were still found to have MUAC measurements below normal, even in adolescents, the percentage was quite large, indicating a condition of poor nutritional status and certainly requires serious attention and treatment. For BMI examinations, BMI measurement results were still found below normal, but BMI results that also require serious attention are BMI in the obesity category, which is quite high in adolescents, namely 40 people (59.7%).

2. Respondents' Knowledge Before and After Education and Demonstration

Participants' knowledge before and after the counseling and demonstration can be seen in Table 2.

Tables 2. Participants' Knowledge Results Before and After Education and Demonstration



Based on Table 2, it can be seen that respondents' knowledge about anemia in adolescents and how to overcome it increased before and after the education. This can be seen from the scores obtained during the pre-test and post-test, of all participants, 14 (20.9%) had good knowledge before the education, but after the education, this increased to 52 (77.6%). Meanwhile, 27 respondents (40.3%) had insufficient knowledge before the education, but after the education, there were no more respondents who had insufficient knowledge. Likewise, the knowledge of pregnant women increased. Of all participants, only 3 (30%) had sufficient knowledge before the education, but after the education, this increased to 6 (60%) who had good knowledge and 4 (40%) who had sufficient knowledge. Meanwhile, 7 respondents (70%) had insufficient knowledge before the education, but after the education, there were no more respondents who had insufficient knowledge. This shows that the education provided benefits in increasing respondents' knowledge.

After a demonstration was given to the participants of the activity regarding making food from local food ingredients to overcome anemia in pregnant women and teenagers, the demonstration was strengthened by using a video of making food that could be accessed by respondents obtained from YouTube. Respondents promised to implement the use of highly nutritious local food ingredients in their daily consumption to avoid anemia.

Figure 3. Documentation of activities and results of food processing using local food ingredients

Analysis and Discussion

This community service activity demonstrated the significant potential of local food ingredients, including moringa leaves, as a food-based intervention in preventing anemia in vulnerable groups. The education, hemoglobin (Hb) testing, and moringa leaf processing practices not only increased knowledge but also influenced participants' attitudes and consumption behaviors.

Globally, iron deficiency anemia is one of the most common public health problems. The WHO (2021) reports that more than 500 million women of childbearing age suffer from anemia. The impact is not only fatigue and reduced productivity but also increases the risk of childbirth complications, low birth weight, and even maternal death. In Indonesia, anemia is closely linked to stunting, as anemic pregnant women are more likely to give birth to babies with low nutritional status (Kemenkes, 2022).

Sukaraya Village possesses natural resources related to food ingredients that can be used to prevent anemia. One such source is moringa leaves, which are rich in iron. Moringa leaves are believed to increase hemoglobin levels (Hastuty YD et al., 2022; Fauziandari E, 2019; Nurhidayat T, 2019). Moringa leaves are a local plant known for centuries as a versatile, nutrient-rich, and medicinal plant. Research shows that Moringa leaves contain high levels of vitamin A, vitamin B, vitamin C, calcium, potassium, iron, and protein, all of which are easily digested by the human body. The high iron (Fe) content in dried Moringa leaves, even in processed Moringa leaf flour, is 25 times higher than the Fe content in spinach, making them a potential natural alternative for treating anemia in adolescents. Moringa leaves contain 28.2 mg of iron per 100 grams (Gopalakrishnan et al., 2016). The use of Moringa leaves has begun to be promoted in Sukaraya village, but the menu variations are still simple, making them less appealing to pregnant women and adolescents. However, education and demonstrations on how to prepare attractive dishes using local ingredients such as Moringa leaves have significantly increased respondents' knowledge and understanding, enabling them to meet their daily iron needs, allowing for varied menus.

In this community service activity, utilizing moringa leaves is an appropriate solution due to their abundant availability, affordability, and ease of cultivation. Moringa leaves contain higher levels of iron than some other green vegetables. Furthermore, the vitamin C content in moringa plays a role in increasing the absorption of non-heme iron. A literature study conducted by Satria et al. (2024) showed that regular consumption of moringa can significantly increase serum iron levels. In addition to iron, moringa also contains essential amino acids, vitamin A, and calcium. Vitamin A supports hematopoiesis, while calcium and antioxidants are important for maintaining the body's metabolism. Gopalakrishnan et al. (2016) referred to moringa as the "miracle tree" due to its nearly complete nutritional content.

Based on the results of Hb examinations on participants, moderate and severe anemia was still found in adolescents, with the majority having mild anemia (25.37%). This fact provides an important basis for the need to combine nutrition education with health screenings for greater impact. According to Hastuty et al. (2020), people are more motivated to change their behavior when they are directly aware of their health condition. Educational interventions and skills in local food processing have also proven effective. A study by Hidayatullah et al. (2025) reported that nutrition education based on local wisdom can increase understanding by up to 35% and influence long-term consumption practices. This activity aligns with these findings, where participants became interested in trying moringa after being given practical examples of processing it.

A challenge encountered is the persistent stigma that moringa is a "village" vegetable or "old people's plant." Therefore, product diversification is crucial. Ningsih et al. (2024) reported that innovative moringa products such as pudding, snacks, porridge, or soup are popular with various groups, including pregnant and breastfeeding women. They also increase their appeal and acceptance among children, who often find it difficult to eat foods considered "unappetizing" or "unappealing." Therefore, future community service activities should not be limited to processing simple vegetables and foods, but should also include modern products that are more in line with current consumption trends.

This activity also supports the achievement of the SDGs, particularly goals 2 (Zero Hunger) and 3 (Good Health and Well-being). By utilizing moringa, communities not only obtain a source of essential nutrients but are also encouraged to become self-sufficient in food security. The economic potential of processed moringa products can also support family empowerment.

Recent scientific evidence also strengthens the relevance of this intervention. Rahmawati et al. (2023) reported that supplementing moringa with the daily diet for one month in adolescent girls significantly increased hemoglobin. Basri et al. (2021) found that administering moringa leaves to pregnant women prevented stunting in children. Thus, moringa-based interventions have empirical support in both adolescents and pregnant women. The final outcome of this community service activity not only increased knowledge but also changed the participants' attitudes and consumption behaviors. If continued, this activity can contribute to reducing anemia rates, supporting the national stunting reduction program, and improving public health in Indonesia.

The types of outputs generated in this community service program are increased knowledge and participation of participants to conduct routine health checks, as well as the creation of appropriate media in increasing target knowledge about anemia in the form of leaflets/booklets. Another output that has been produced is an intellectual property rights certificate for educational media produced in the form of booklets and leaflets with certificate numbers EC002025040433 and EC002025120885. The video of the implementation of the activity has been uploaded to YouTube social media with the link https://youtu.be/KvdEXu5bUgM?si=qvsAbMx2qonT8DV2.

Conclusion and Recommendations

Conclusion

There was an increase in knowledge of adolescents and pregnant women after being given counseling about anemia and how to prevent and overcome it. Routine Hb checks can detect anemia early and this examination can be done independently. Counseling and demonstrations on the use of local food ingredients to overcome anemia in adolescents and pregnant women are useful for increasing the understanding and knowledge of pregnant women and adolescents in Sukaraya village, especially about the benefits of moringa leaves and other plants that are widely available around the house and the environment that have high nutritional sources for preventing anemia. The community also understands that healthy food does not always have to be expensive because simple ingredients can also increase nutrition if processed properly and are suitable for daily consumption, so they strive to apply this in their daily menu. The media used can help in

increasing respondents' knowledge and facilitate health workers in Sukaraya village in terms of health promotion..

Recommendations

The limitation of this activity is that it cannot reach all adolescents and pregnant women in Sukaraya village. Therefore, partners, in this case midwives and village officials, are encouraged to continue educational activities and scheduled health checks so that the community continues to receive up-to-date health services and information. Collaborating with various sectors will optimize health improvement efforts. Other activities can include monitoring maternal and infant health to prevent stunting, thus supporting government programs.

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