

Health Education and Training on the Preparation of NABIT Juice Based on Local Food Resources to Promote Pregnant Women's Self-Reliance in Preventing Anemia in Batam City, Indonesia

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Abstrak

Anemia pada ibu hamil masih menjadi masalah kesehatan yang sering ditemukan dan dapat meningkatkan risiko komplikasi selama kehamilan maupun persalinan. Prevalensi anemia pada ibu hamil di Indonesia masih cukup tinggi yaitu 27,7% (SKI, 2023), sementara di Kota Batam anemia masih ditemukan pada berbagai wilayah kerja puskesmas, termasuk Puskesmas Lubuk Baja. Salah satu upaya inovatif yang dapat dilakukan adalah pemanfaatan pangan lokal melalui Jus NABIT (Naga-Bit) sebagai sumber zat besi, asam folat, dan vitamin C untuk mendukung peningkatan hemoglobin. Jus NABIT (Naga-Bit) mengombinasikan buah naga merah dan buah bit sebagai sumber zat gizi pendukung pembentukan hemoglobin. Kegiatan pengabdian kepada masyarakat ini bertujuan meningkatkan pengetahuan dan keterampilan ibu hamil dalam pembuatan Jus NABIT sebagai upaya kemandirian mengatasi anemia. Metode kegiatan pengabdian masyarakat ini menggunakan pendekatan edukasi, demonstrasi, pelatihan pembuatan jus, serta evaluasi melalui pre-test dan post-test. Sampel kegiatan terdiri dari 32 ibu hamil trimester II–III dan 5 kader posyandu di wilayah kerja Puskesmas Lubuk Baja Kota Batam. Hasil kegiatan menunjukkan adanya peningkatan pengetahuan ibu hamil tentang anemia dari 45% menjadi 92%, manfaat zat besi dari 20% menjadi 88%, serta keterampilan pembuatan Jus NABIT dari 5% menjadi 100%. Sebanyak 96% peserta menyatakan menyukai Jus NABIT dan bersedia mengonsumsinya secara rutin sebagai pendamping TTD. Kegiatan ini berhasil meningkatkan pengetahuan, keterampilan, dan kemandirian ibu hamil dalam memanfaatkan pangan lokal untuk membantu pencegahan dan penanganan anemia selama kehamilan.

Kata kunci: anemia, ibu hamil, jus NABIT, buah naga merah, buah bit.

Abstract

Anemia in pregnancy remains a significant global public health concern and is associated with increased risks of maternal and neonatal complications, including preterm birth, low birth weight, and elevated maternal and perinatal morbidity. In Indonesia, the prevalence of anemia among pregnant women remains high at 27.7% (SKI, 2023), and cases are still reported across primary healthcare settings, including the Lubuk Baja Community Health Center in Batam City. This highlights the need for innovative, community-based nutritional interventions. This community-based intervention study aimed to enhance the knowledge and skills of pregnant women in preparing NABIT Juice (dragon fruit–beetroot blend) as a local food-based strategy to support anemia prevention. NABIT Juice was developed as a functional beverage combining red dragon fruit and beetroot, both of which are sources of iron, folate, and vitamin C that contribute to hemoglobin synthesis and iron bioavailability. The intervention employed health education sessions, hands-on demonstrations, and practical training in juice preparation, followed by evaluation using pre-test

and post-test assessments. The participants included 32 pregnant women in their second and third trimesters and 5 community health cadres from the Lubuk Baja Community Health Center, Batam City. The results demonstrated substantial improvements in knowledge and skills, with awareness of anemia increasing from 45% to 92%, understanding of iron benefits from 20% to 88%, and competence in NABIT Juice preparation from 5% to 100%. Additionally, 96% of participants reported acceptance of NABIT Juice and expressed willingness to consume it regularly as a complement to iron supplementation. This intervention effectively enhanced participants' knowledge, practical skills, and acceptance of locally based nutritional strategies, suggesting its potential as a sustainable community-level approach for anemia prevention in pregnancy.

Keywords: *anemia; pregnant women; NABIT juice; red dragon fruit; beetroot.*

INTRODUCTION

Anemia in pregnancy remains a significant global public health concern. It is one of the major risk factors associated with adverse pregnancy outcomes, including preterm birth, low birth weight, and increased maternal and neonatal morbidity and mortality. The World Health Organization (WHO) reported that the global prevalence of anemia among pregnant women was 34.5%, with projections indicating a slight increase to 35.5% by 2030. This trend demonstrates that anemia continues to pose a major challenge to maternal and child health improvement across countries.

The prevalence of anemia among pregnant women in Indonesia was reported at 48.9% based on the 2018 National Basic Health Research (Riskesdas, 2018), and subsequently decreased to 27.7% according to the 2023 Indonesia Health Survey (SKI, 2023). However, this reduction remains insufficient to meet the national target set under the 2020–2030 National Medium-Term Development Plan (RPJMN). These findings indicate that anemia in pregnancy remains a persistent public health issue that requires sustained preventive efforts, particularly at the primary healthcare level.

Various government programs have been implemented to address anemia in pregnancy, including the provision of Iron and Folic Acid Supplementation (IFAS) tablets for pregnant women. However, adherence to IFAS consumption remains a challenge, as some pregnant women experience side effects such as nausea, vomiting, constipation, and general gastrointestinal discomfort after intake. These conditions often lead to suboptimal compliance, thereby limiting the effectiveness of supplementation programs. Consequently, there is an increasing need to develop alternative or complementary strategies based on locally available food resources that are safe, accessible, and acceptable to the community (Rostanty and Suparman, 2025).

The working area of Lubuk Baja Community Health Center in Batam City is characterized by high population density and significant population mobility. Based on preliminary identification conducted in collaboration with local healthcare workers, cases of anemia among pregnant women are still present, along with limited knowledge regarding the utilization of local food resources as dietary sources supporting hemoglobin synthesis. The participants of this program consisted of 32 pregnant women in their second and third trimesters and 5 community health cadres who served as supporting partners to ensure program sustainability. Most pregnant women still rely primarily on iron and folic acid supplementation (IFAS) as the sole preventive strategy for anemia and have limited skills in processing local food ingredients into nutritionally beneficial products with potential to support anemia prevention.

Batam City and the Riau Islands Province have abundant local food resources, including red dragon fruit and beetroot. Both are plant-based food sources that contain essential nutrients relevant to anemia prevention. According to USDA FoodData Central, per 100 g of dragon fruit contains approximately 3–9 mg of vitamin C (5–10% of the recommended dietary allowance), 0.3–0.7 mg of iron (2–4% RDA), 10–18 mg of magnesium (3–5% RDA), and 6–10 mg of calcium (approximately 1% RDA). The vitamin C content in dragon fruit plays an important role in enhancing non-heme iron absorption by reducing ferric iron (Fe^{3+}) to ferrous iron (Fe^{2+}), thereby improving iron bioavailability. In addition, dragon fruit contains bioactive antioxidants such as betalains, which contribute to cellular protection and overall hematological health (Almatsier, 2016).

Meanwhile, beetroot (*Beta vulgaris*) contains approximately 109 µg of folate per 100 g (about 27% of the recommended dietary allowance), 0.8 mg of iron (approximately 4% RDA), 4–5 mg of vitamin C (5–6% RDA), and 300–325 mg of potassium (6–7% RDA) (USDA FoodData Central, 2024). Folate plays a crucial role in erythropoiesis, particularly in the formation of red blood cells, while iron is essential for hemoglobin synthesis. The combination of these nutrients makes beetroot a potential dietary component in the prevention of anemia, particularly iron-deficiency anemia (Kemenkes RI, 2020). The combination of red dragon fruit and beetroot in the form of NABIT Juice (Dragon fruit–Beetroot) has the potential to serve as a functional beverage that supports maternal nutritional requirements and contributes to anemia prevention during pregnancy (Faridi et al., 2022).

Several studies have demonstrated that the consumption of foods rich in iron and vitamin C can contribute to increased hemoglobin levels. However, the translation of these findings into community-based empowerment activities that emphasize practical skill development among pregnant women remains limited. Most existing programs primarily focus on health education and iron supplementation, while training on the processing of local food resources to promote household self-reliance is still relatively scarce (Teresia et al., 2025). Therefore, community engagement activities are needed to bridge the gap between research findings and practical applications that are easily adopted by the community.

Based on this context, the main problems identified among the target group include limited knowledge among pregnant women regarding the benefits of beetroot in anemia prevention, insufficient skills in processing both ingredients into acceptable and nutritious beverages, and high dependence on iron supplementation. Accordingly, this community service program aims to improve the knowledge and skills of pregnant women in preparing

NABIT Juice based on local food resources as an effort to enhance maternal self-reliance in preventing and managing anemia during pregnancy.

METHODS

This community service activity applied a Community Development approach focusing on empowering pregnant women through the enhancement of knowledge and skills in utilizing local food resources to support the prevention and management of anemia during pregnancy.

The program was conducted on May 20, 2026, in the working area of Lubuk Baja Community Health Center, Batam City. The participants consisted of 32 pregnant women in their second and third trimesters and 5 community health cadres who served as supporting partners. The stakeholders involved in this activity included the community service team as facilitators and providers of educational materials, primary healthcare staff from the community health center as technical support and coordinators, and community health cadres who played a key role in assisting program implementation and ensuring its sustainability at the community level.

The implementation of the program was carried out in three stages, namely preparation, implementation, and evaluation.

Table 1.

Preparation	Implementation	Evaluation
Permission and coordination with stakeholders	Pre-test and health education session	Pre-test and health education session
Distribution of invitations to participants	Demonstration of NABIT juice preparation	Monitoring based on Standard Operating Procedure (SOP)
Monitoring based on Standard Operating Procedure (SOP)	Group practice and consumption session	Group practice and consumption session

In the preparation phase, coordination was conducted with the community health center and community health cadres, followed by the development of educational materials, preparation of tools and materials, and design of evaluation instruments. This stage ensured that all logistical and methodological requirements were adequately prepared prior to implementation.

The implementation phase began with a pre-test to assess participants' baseline knowledge regarding anemia in pregnancy and the utilization of local food resources. This was followed by health education sessions covering anemia in pregnancy, the nutritional

benefits of red dragon fruit and beetroot, and a hands-on demonstration of NABIT Juice (dragon fruit–beetroot) preparation.

The evaluation phase was conducted over a 7-day period through a post-test to measure changes in participants knowledge after the intervention. In addition, participants practical skills were assessed through direct observation during the NABIT (dragon fruit–beetroot) Juice preparation process using a structured skills assessment checklist. The success of the program was determined based on improvements in knowledge scores, participants ability to independently prepare NABIT (dragon fruit–beetroot) Juice, and their acceptance of the product. The collected data were analyzed descriptively and presented in percentage form to describe the level of achievement of the program objectives.

RESULTS AND DISCUSSION

Health education and training on the preparation of NABIT Juice (dragon fruit–beetroot) based on local food resources were conducted for 32 pregnant women in their second and third trimesters and 5 community health cadres in the working area of Lubuk Baja Community Health Center, Batam City. This activity aimed to improve the knowledge and skills of pregnant women in utilizing local food resources as a supportive strategy for the prevention and management of anemia during pregnancy.

Participants knowledge was assessed using structured questionnaires administered as pre-test and post-test before and after the educational intervention. The evaluation results indicated an improvement in participants' knowledge across all assessed domains.

Table 2.

Evaluation Component	Before Education	After Education	Increase (%)
Risk of Anemia in Pregnancy	45%	92%	+ 47%
Benefits of dietary (organic) iron	20%	88%	+ 68%
NABIT Juice Preparation Method	5%	100%	+ 95%

Based on the evaluation results using pre-test and post-test methods, there was an improvement in participants' knowledge across all assessed domains following the educational intervention.

1. Evaluation of Anemia in Pregnancy

There was an increase in knowledge from 45% at pre-test to 92% at post-test (+47%) regarding the risks of anemia in pregnancy. This indicates that the educational intervention effectively improved participants' understanding of anemia-related risks

during pregnancy. Clinically, anemia in pregnancy is associated with an increased risk of complications such as postpartum hemorrhage, preterm birth, low birth weight (LBW), and higher maternal and neonatal morbidity due to reduced oxygen-carrying capacity in the blood (WHO, 2023; USPSTF, 2024). The low pre-test scores suggest that prior to the intervention, participants had limited understanding of these risks. However, the significant improvement after the intervention demonstrates that structured health education effectively enhances maternal health literacy.

2. Evaluation of the Benefits Dietary Iron

In the aspect of dietary iron benefits, knowledge increased from 20% to 88% (+68%). This finding reflects improved participants' understanding of the role of iron in hemoglobin synthesis and the prevention of iron-deficiency anemia. Physiologically, iron requirements increase during pregnancy to support maternal blood volume expansion and fetal growth. Iron plays a key role in erythropoiesis, while vitamin C enhances non-heme iron absorption by reducing ferric iron (Fe^{3+}) to ferrous iron (Fe^{2+}), thereby improving bioavailability (WHO, 2024; NIH, 2024). This improvement indicates that nutrition education effectively strengthens pregnant women's understanding of the importance of iron intake through both dietary sources and nutrient synergism.

3. Evaluation of NABIT Juice Preparation

The highest increase was observed in the skill of NABIT Juice (dragon fruit–beetroot) preparation, rising from 5% at pre-test to 100% at post-test (+95%). This result indicates that prior to the intervention, almost all participants lacked knowledge and practical skills in preparing the juice. After receiving education combined with hands-on demonstration, all participants were able to correctly understand and independently practice the preparation of NABIT Juice. This finding suggests that practice-based learning methods are more effective in enhancing psychomotor skills compared to purely verbal instruction. Demonstration and experiential learning approaches improve procedural understanding and skill retention by actively engaging participants in the learning process (WHO, 2023; MDPI, 2023).

Based on the evaluation results, this community service program was effective in improving pregnant women's knowledge, skills, and awareness regarding anemia prevention. Community health cadres also gained additional knowledge to support and assist pregnant women during integrated health service posts (Posyandu) and maternal health classes. This program has the potential to enhance household self-reliance in meeting

nutritional needs during pregnancy through the utilization of locally available and affordable food resources. Furthermore, this intervention may serve as an alternative educational media for healthcare institutions in supporting anemia prevention programs among pregnant women.

The program also presents opportunities for further development through the integration of NABIT Juice (dragon fruit–beetroot) educational materials into antenatal classes and Posyandu activities. Follow-up interventions may include longer-term monitoring of NABIT Juice consumption and assessment of hemoglobin levels before and after the intervention to obtain more objective clinical outcomes. Additionally, the development of supporting materials such as recipe guides and digital educational media may improve the sustainability and scalability of the program within the community.

CONCLUSION AND RECOMMENDATIONS

This community service program successfully improved pregnant women's knowledge and skills in preparing NABIT Juice (dragon fruit–beetroot) as a local food-based strategy for anemia prevention. All participants were able to independently practice the juice preparation, thereby supporting increased household self-reliance in maintaining maternal health during pregnancy.

For program sustainability, it is recommended that the Community Health Center (Puskesmas) incorporate NABIT Juice as part of educational materials in antenatal classes. In addition, community health cadres (Posyandu cadres) are expected to provide continuous support and periodic monitoring to encourage the utilization of local food resources in anemia prevention among pregnant women.

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