

ENHANCING THE INDEPENDENCE OF PREGNANT WOMEN IN PREVENTING ANEMIA USING THE ANVENT APPLICATION IN TANJUNG ANOM VILLAGE, DELI SERDANG REGENCY

Edy Marjuang Purba^{1*}, Laurena Ginting¹, Saut Purba¹, Dermawan¹,
Anna Waris Nainggolan²

¹Universitas Negeri Medan, Medan, Indonesia

²Sekolah Tinggi Ilmu Kesehatan Mitra Husada Medan, Medan, Indonesia

*edymarjuangp@gmail.com

Abstrak: Prevalensi anemia pada ibu hamil di Desa Tanjung Anom cukup tinggi (38,5%). Pemerintah melalui puskesmas telah berupaya menurunkan prevalensi anemia dengan memberikan tablet Fe kepada setiap ibu hamil dan diwajibkan untuk mengonsumsi sebanyak minimal 90 tablet selama kehamilan. Namun sebagian besar ibu hamil di Desa Tanjung Anom tidak memiliki kemandirian dalam mencegah anemia dan mengonsumsi Tablet Fe yang telah diberikan oleh Puskesmas. Kegiatan pengabdian ini bertujuan untuk meningkatkan kemandirian ibu hamil untuk mencegah anemia dengan aplikasi Anvent (Anemia Prevention) di Desa Tanjung Anom Kabupaten Deli Serdang. Metode kegiatan dilakukan dengan tahapan persiapan, sosialisasi, edukasi pencegahan anemia pada ibu hamil, pelatihan penggunaan aplikasi Anvent, evaluasi pengetahuan dan keterampilan ibu hamil. Kegiatan dilakukan di Balai Desa Tanjung Anom pada bulan September sampai Oktober 2024 dan diikuti oleh sebanyak 96 orang ibu hamil. Aplikasi Anvent dibuat dengan tampilan yang menarik dan informatif dan memiliki 5 menu yaitu : Home, Menu Pangan Lokal, Pantau, Bagan Koordinasi, dan Chat. Hasil kegiatan menunjukkan adanya peningkatan yang signifikan pengetahuan ibu hamil tentang anemia dan pencegahannya setelah mengikuti kegiatan pengabdian kepada masyarakat. Keterampilan ibu hamil dalam menggunakan aplikasi Anvent menunjukkan sebagian besar memiliki kemampuan yang baik. Sebagian besar ibu hamil juga dapat melihat tingkat kepatuhan mereka dalam mengonsumsi tablet Fe pada aplikasi Anvent. Aplikasi ini dapat menjadi solusi yang dapat dimanfaatkan oleh setiap ibu hamil untuk meningkatkan pengetahuan tentang pencegahan anemia dan menjadi alat pemantau dalam tablet Fe.

Kata Kunci: anemia, aplikasi Anvent, ibu hamil, pantau, tablet Fe

Abstract: The prevalence of anemia among pregnant women in Tanjung Anom Village is relatively high at 38.5%. Through the health center, the government has implemented efforts to reduce this prevalence by providing pregnant women with iron tablets (Fe), requiring them to consume at least 90 tablets during pregnancy. However, most pregnant women in the village lack independence in preventing anemia and are inconsistent in consuming the Fe tablets provided. This community service program aims to improve the independence of pregnant women in preventing anemia by using the Anvent (Anemia Prevention) application in Tanjung Anom Village, Deli Serdang Regency. The program was carried out through several stages, including preparation, socialization, education on anemia prevention, training on using the Anvent application, and evaluation of participants' knowledge and skills. The program was conducted at the Tanjung Anom Village Hall from September to October 2024 and involved 96 pregnant women. The Anvent application was designed to be informative and user-friendly, featuring five menus: Home, Local Food Menu, Monitor, Coordination Chart, and Chat. The program showed a significant increase in the knowledge of pregnant women regarding anemia prevention after their participation. Most participants demonstrated good skills in using the application and were able to monitor their compliance with consuming Fe tablets through Anvent. This application presents a practical and innovative solution for pregnant women to enhance their knowledge of anemia prevention and serves as an effective tool for monitoring Fe tablet consumption.

Keywords: anemia, Anvent application, pregnant women, monitor, Fe tablets

Introduction

Tanjung Anom Village is located in Pancur Batu Subdistrict, Deli Serdang Regency, North Sumatra Province, Indonesia. The village covers an area of 578.9 hectares, consisting of residential areas, offices, schools, places of worship, agricultural land/rice fields, and other facilities. The demographic profile indicates a population of 10,117 people, with the village situated at an elevation of 45 meters above sea level and an average temperature of 25 degrees Celsius. It is located 5 kilometers from the subdistrict capital and 57 kilometers from the regency capital (Pemerintah Desa Tanjung Anom, 2022). Tanjung Anom Village falls under the jurisdiction of the Gunung Tinggi Health Center (Puskesmas), making maternal health, including the prevention of anemia during pregnancy, part of the health center's responsibility. Maternal health is closely linked to anemia during pregnancy, which poses severe risks for both mothers and their babies (Pinho-Pompeu et al., 2017).

One of the Sustainable Development Goals (SDGs) goals is to ensure healthy lives and promote well-being, as indicated by the target of reducing the maternal mortality rate (MMR) to 70 per 100,000 live births. However, Indonesia's current MMR of 305 per 100,000 live births is still far from this target. One of the primary causes of maternal mortality is hemorrhage due to anemia during pregnancy (Kementerian Kesehatan RI, 2019). Anemia during pregnancy increases the risk of premature births, maternal and infant mortality, and infections, making it critical to address. Iron deficiency anemia in pregnant women can also impact fetal and infant growth and development during and after pregnancy. According to the 2022 Indonesia Health Profile, the prevalence of anemia among pregnant women is 48.9%, with an exceptionally high prevalence of 84.6% in the 15–24 age group. In North Sumatra Province, anemia prevalence ranges from 15% to 39% (Kementerian Kesehatan RI, 2023).

Previous studies related to anemia in pregnant women revealed that high anemia rates among pregnant women are influenced by low knowledge levels, irregular consumption of iron tablets or Fe tablets (Sitanggang et al., 2022), inadequate dietary intake, and young maternal age (Purba et al., 2023; Ariawan et al., 2021). Government efforts to reduce anemia prevalence among pregnant women include providing a minimum of 90 iron tablets during pregnancy. However, some pregnant women either do not receive these tablets or fail to consume them regularly due to inadequate monitoring systems. Monitoring is typically conducted during antenatal care visits at the health center, leaving women who do not visit the center unmonitored. Women who do not consume iron tablets or do so irregularly are often those who rarely attend antenatal care visits (Handayani & Budiman, 2022; Kenang et al., 2019)

Data collected from posyandu (integrated health posts) show 96 pregnant women in Tanjung Anom Village. Interviews with Gunung Tinggi Health Center staff revealed a high anemia prevalence of 38.5%, making Tanjung Anom the village with the highest anemia prevalence in the health center's jurisdiction. Discussions with five pregnant women indicated that three had undergone hemoglobin (Hb) tests, although Hb testing is mandatory for all pregnant women. Two of the three women tested had Hb levels below 11 g/dL, indicating

anemia. Furthermore, only two out of the five women regularly consumed iron tablets. Discussions with the village head and health center staff identified that the key issues contributing to the high prevalence of anemia are a lack of knowledge about anemia prevention and poor adherence to iron tablet consumption.

The community service team proposed an intervention involving education and training on using the Anvent application to address these challenges. The Anvent application is designed to be engaging and user-friendly for pregnant women. The development team collaborated with application designers for its interface and senior midwives from the health center to evaluate maternal adherence to iron tablet consumption. The application features five main menus: Home, Pangan Lokal, Pantau, Bagan, and Chat. It provides information on anemia prevention for pregnant women and is a reminder tool for iron tablet consumption, promoting regular intake and reducing anemia risk.

Based on the problem description and the importance of addressing anemia among pregnant women in Tanjung Anom Village, this community service program aims to enhance the independence of pregnant women in preventing anemia using the Anvent (Anemia Prevention) application in Tanjung Anom Village, Deli Serdang Regency.

Methods

The community service activities were conducted at the Tanjung Anom Village Hall from September to October 2024. The village government provided the venue and equipment as a contribution to the program. The primary participants targeted in this program were 96 pregnant women, along with health cadres and public health center staff responsible for assisting them. This target group was selected due to the significant risk of anemia, which poses a considerable threat to the health of both the mothers and their fetus (Cappellini et al., 2022; Moisis-Tesch & Shulman, 2022).

Activity Stages

The Village Head and the Head of the Health Center also supported this activity. Figure 1 illustrates the stages of in this program.

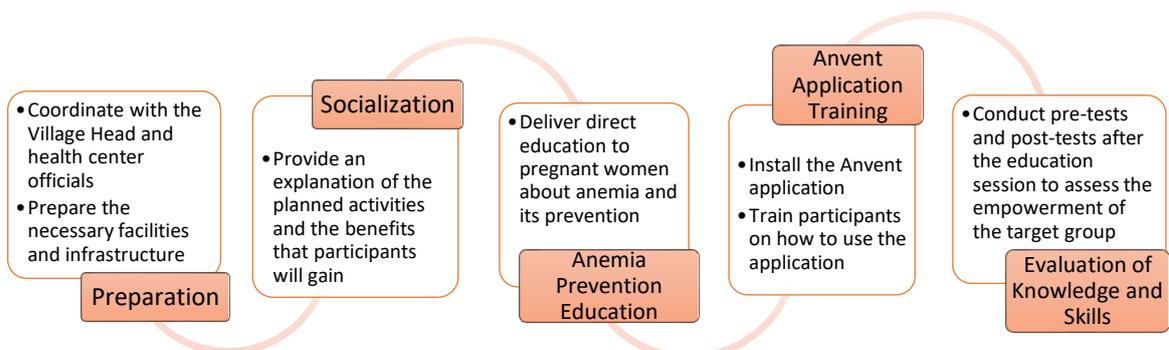


Figure 1. Workflow of Community Service Activity

Preparation Stage

At this stage, the team coordinates with the Village Head, the Head of the Health Center, health cadres, and pregnant women. The team also collaborates with the village government to prepare the necessary facilities and infrastructure, such as the agreed venue at the partner's location, tables, chairs, sound system, and other required equipment.

Socialization Stage

During this stage, the participants are provided with an explanation of the planned activities and the benefits they will gain. Additionally, a field survey is conducted to collect supporting data for the community service activities, ensuring efficient and targeted resource utilization. This activity involves discussions, counseling, interviews, and on-site observations.

Education on Anemia Prevention for Pregnant Women

As part of the community service, pregnant women receive direct education about anemia, including its signs, symptoms, impacts, and prevention methods tailored for them.

Training on Using the Anvent Application

The training begins with a detailed explanation of the Anvent application for all participants, followed by installing the app on each participant's mobile phone. Once the application is installed, participants are guided step-by-step by the resource person. Participants are encouraged to ask questions about the app until they can use it independently.

Evaluation of Pregnant Women's Knowledge and Skills in Using the Anvent Application

To assess the empowerment level of the target group, the community service implementation team evaluates the increase in knowledge about anemia prevention through pre-tests and post-tests collected after the educational sessions (Evani et al., 2022). The questionnaire used for both the pre-test and post-test consists of 10 questions, with indicators outlined in [Table 1](#).

Table1. Grid of Pre and Post-Test Questionnaire Knowledge about Anemia

Question Indicator	Question Number	Number of Questions
Definition of Anemia	1	1
Symptoms of Anemia	2,3	2
Impact of Anemia on Mothers and Fetuses	4,5	2
Anemia Prevention	6,7	2
Fe Tablets	8,9,10	3

Empowerment is also assessed based on the participants' skills in using the Anvent application, which is measured through a questionnaire. Participants' skills are evaluated only once after the Anvent application training. The skill assessment indicators include the level of understanding of the application's usage, the ability to access information within the application, the speed of adapting to its features, satisfaction with ease of use, satisfaction with the completeness of information, and satisfaction with the application's design and navigation. After evaluating the participants' knowledge and skills, the activity continues with testimonials from the partners or parties involved, followed by a closing ceremony.

Anvent Application

The Anvent application was developed and introduced to pregnant women, cadres, and health center staff. The interface is designed to be engaging, as the information is presented in text form and through images and videos (see Figure 2). All users install the application on Android smartphones. It provides information about anemia prevention and monitors adherence to iron tablet consumption provided by healthcare centers for pregnant women. Additionally, the app includes a Q&A feature to assist mothers in addressing any questions.

The application offers five main menus, the first of which is Home. It contains information on anemia prevention efforts for pregnant women, the impacts of anemia during pregnancy, signs and symptoms of anemia, the definition of anemia, and its prevalence. The second menu is Pangan Lokal, which guides local food processing as a solution in case pregnant women forget the steps for preparing local dishes. The application includes recipes for several dishes made from local ingredients, such as Corn Cookies, Yellow Sweet Potato Cookies, Steamed Pumpkin Cake, and Guava Nastar.

The third menu is Pantau, which can be used by three parties: the health center staff, community health workers, and pregnant women. The health center staff acts as the server and manages the display and information in the Anvent application. They can also view summaries of the number of iron or Fe tablets consumed by each pregnant woman, enabling them to identify compliant and non-compliant individuals. The application is programmed to send daily reminders for users to take iron tablets. The role of health center staff is to manage the application content and to monitor adherence to iron tablet consumption. The role of cadres is to monitor pregnant women's iron tablet intake and to respond to questions submitted through the application. Pregnant women are primary users; they can access educational information about anemia, view local food recipes, and log their iron tablet consumption, including the time, day, and intake date. The fourth menu is Bagan, which displays the coordination framework among health centers, cadres, and pregnant women. It outlines the roles and responsibilities of each party in preventing anemia in Tanjung Anom village. The fifth menu is Chat, which enables pregnant women to ask questions, while cadres or health center staff can respond to queries directly through the application.

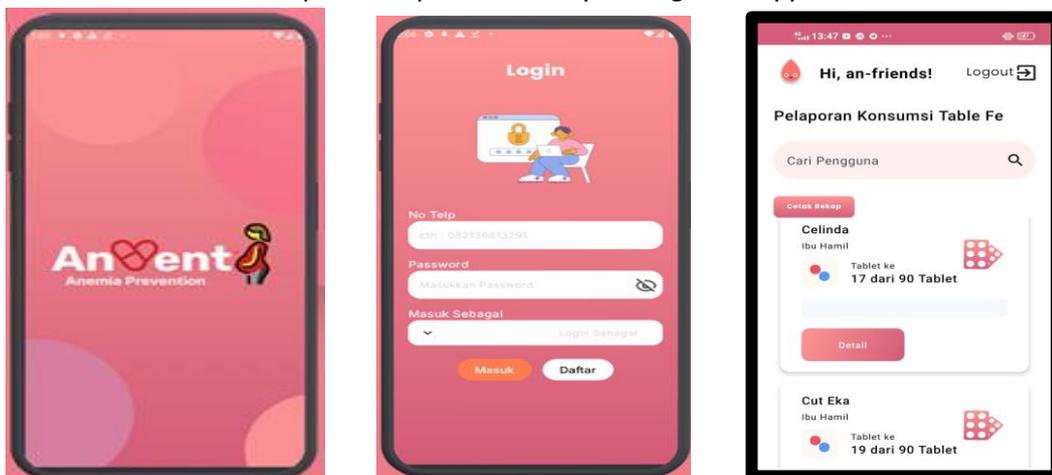


Figure 2. Anvent Application Interface (Homepage, Account Registration, Iron Tablet Monitoring Page)

Results and Discussion

The participants of this community service program consisted of 96 pregnant women. Figure 3 presents the distribution of participants based on age groups.

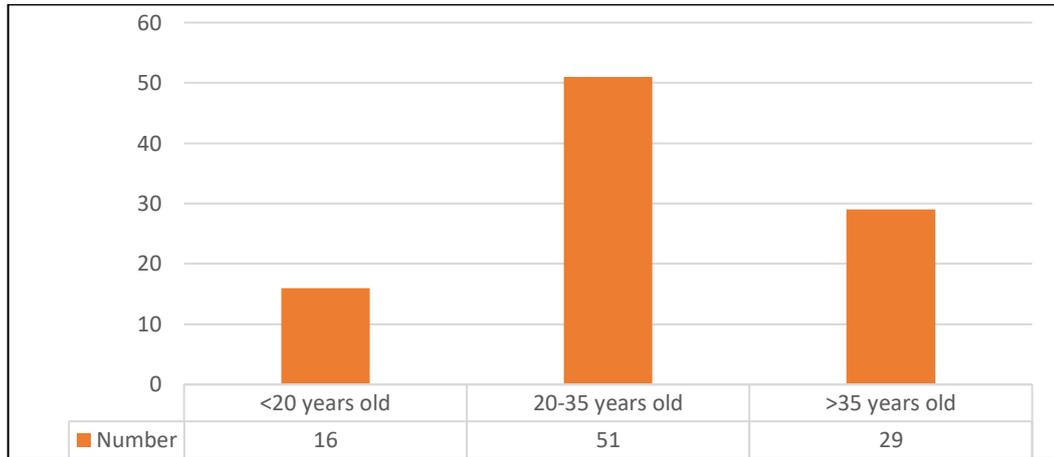


Figure 3. Frequency Distribution of Pregnant Women by Age

Figure 3 shows that most pregnant women involved in this community service activity were between 20 and 35 years old, totaling 51 people (53.12%). The age of pregnant women is closely related to physiological conditions and the varying risk factors for anemia across different age groups, as well as their physical condition during menstruation prior to pregnancy (Supiyani & Sukmawati, 2023). Pregnant women who are too young (under 20 years old) tend to be at a higher risk of developing anemia because their bodies may not be fully mature enough to handle the physiological demands of pregnancy, such as increased blood volume and more significant iron requirements (World Health Organization, 2021). Additionally, poor nutritional habits during adolescence can exacerbate the risk of anemia. Conversely, pregnant women of advanced maternal age (over 35 years) are also at a higher risk of anemia due to an increased likelihood of chronic illnesses, impaired iron absorption, and more frequent pregnancy complications associated with this age group (Sari et al., 2021).

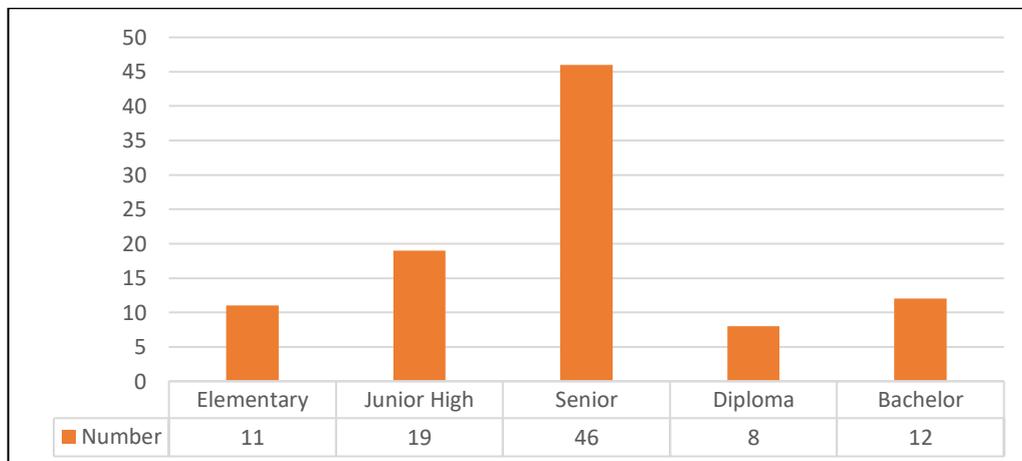


Figure 4. Frequency Distribution of Pregnant Women by Education Level

Figure 4 depicts that the most pregnant women involved in this community service activity had a high school education, totaling 46 people (47.91%). Education plays a crucial role in everyone's life, especially because it influences a mother's knowledge about health and nutrition during pregnancy. Pregnant women with lower education levels tend to have a limited understanding of the importance of adequate nutritional intake, including the need for iron, folic acid, and other micronutrients to prevent anemia. Studies show that women with lower education levels often have less diverse diets and fail to meet their nutritional needs during pregnancy, increasing their risk of anemia (Rahman et al., 2016). Moreover, women with higher education levels are generally more aware of the importance of regular antenatal check-ups, enabling early detection and prevention of anemia through iron supplementation and other medical interventions (Sunuwar et al., 2019).

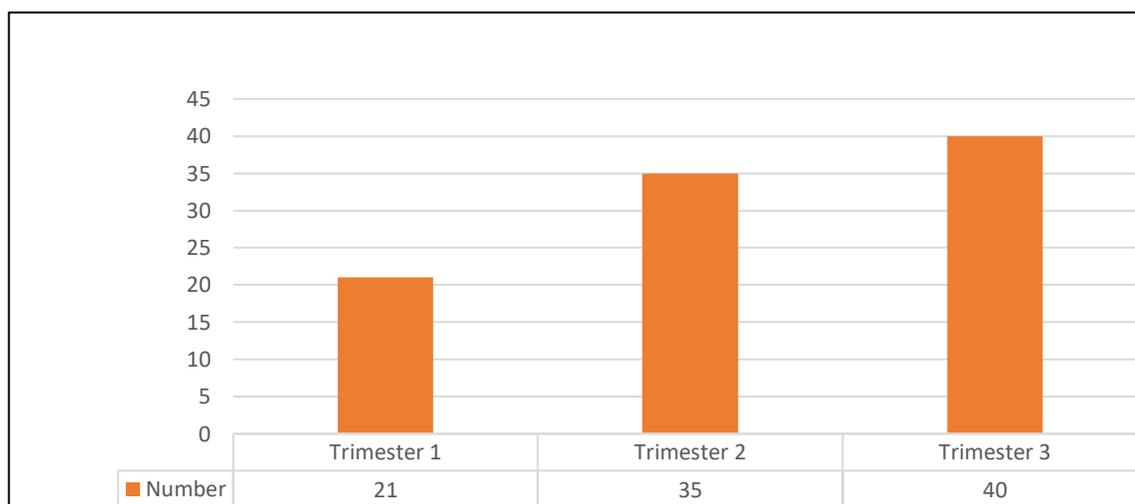


Figure 5. Frequency Distribution of Pregnant Women by Pregnancy Age

From the Figure 5, it can be observed that most pregnant women involved in this community service activity were in the third trimester of pregnancy (>28 weeks), totaling 40 people (41.67%). Pregnancy or gestational age affects physiological changes and increased nutritional needs during each trimester (Ismiati, 2024). In the first trimester, anemia often goes unnoticed due to relatively low iron requirements but may occur in women with pre-existing iron deficiency. During the second trimester, iron needs increase significantly as the mother's body produces more blood to support fetal and placental growth, increasing the risk of anemia if iron intake is insufficient. In the third trimester, the risk of anemia remains high as iron requirements peak to support fetal maturation and preparation for delivery. If anemia is not adequately managed, it can increase the risk of complications such as preterm birth and low birth weight. Therefore, iron supplementation and a nutritious diet throughout pregnancy are essential to prevent anemia (Aksari & Imanah, 2022).

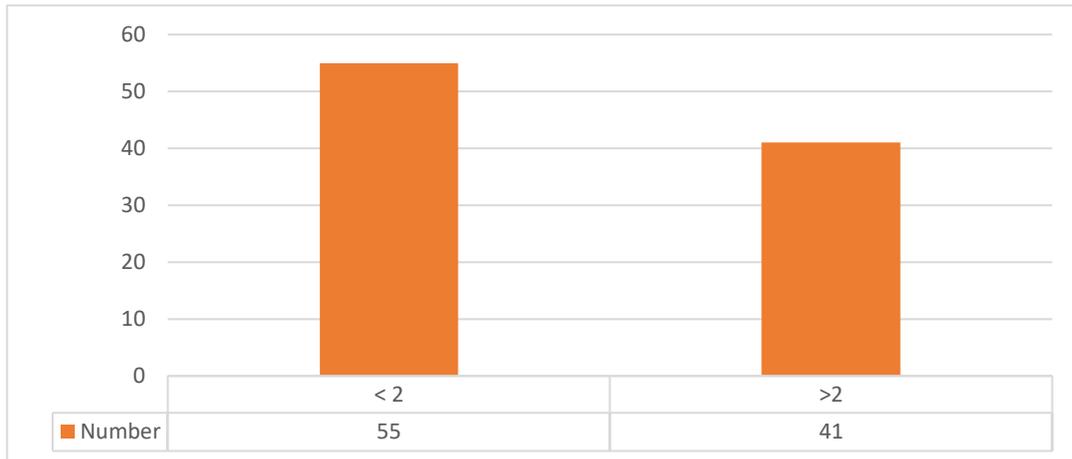


Figure 6. Frequency Distribution of Pregnant Women by Parity

Figure 6 shows that most pregnant women involved in this community service activity had a parity < 2, totaling 55 people (57.29%). Parity (the number of previous births) is an important factor to consider in anemia among pregnant women, as high parity tends to increase the risk of anemia. Women with high parity often have depleted iron stores due to previous pregnancies and deliveries, especially if the intervals between pregnancies are too short, leaving insufficient time for the body to recover its reserves. Additionally, higher nutritional demands during repeated pregnancies can exacerbate iron deficiency if dietary intake is inadequate. Research shows that the risk of anemia increases significantly in women with parity of more than three, as their bodies are more vulnerable to complications such as postpartum hemorrhage and iron metabolism disorders (Hidayati & Andyarini, 2018).

The Anvent application that has been developed has been handed over to the local health centers, community health volunteers, and pregnant women. The health centers, volunteers, and pregnant women have installed the Anvent app and utilized it to access information about anemia, view local food recipes, and monitor the consumption of iron tablets.



Figure 7. Provision of the Anvent Application and Installation by Pregnant Women

To enhance pregnant women's knowledge about anemia, the community service team conducted educational sessions using direct counseling and digital education through the Anvent application. These two approaches were designed to complement each other in increasing

awareness among pregnant women about the importance of preventing and managing anemia, particularly in vulnerable groups such as pregnant women. During direct counseling, interactive discussions allowed participants to ask questions or share anemia-related experiences. Additionally, the team utilized the Anvent application for digital education (see Figure 7). This app was designed to provide interactive information that can be easily accessed anytime. Users can learn about anemia through the articles available within the Anvent application.



Figure 8. Education on Anemia and Questionnaire Completion by Pregnant Women

Table 2. Improvement in Pregnant Women's Knowledge about Anemia Prevention

Variable	Mean ±SD	Mean Difference	p-value
Knowledge			
Before	4.88±1.32	3.41	0.001
After	8.29±1.40		

Based on the Table 2, it can be observed that this community service activity significantly improved pregnant women's knowledge about anemia, which is one of the major health issues during pregnancy. The impact of this activity was measured through pre-test and post-test questionnaires. The pre-test was conducted on September 21, 2024, and the post-test was conducted two weeks later, on October 5, 2024 (see Figure 8). The results, as shown in the table, indicate a positive change in the knowledge of pregnant women about anemia. This achievement is evident from the increase in the mean score from the pre-test (4.88) to the post-test (8.29), with a difference of 3.41. Statistical analysis showed that the education provided effectively increased the mothers' knowledge about anemia prevention ($p < 0.05$).

Education on anemia prevention for pregnant women is crucial to enhancing their knowledge and awareness, as pregnant women are at a higher risk of anemia. With proper education, pregnant women are expected to understand risk factors, symptoms, and preventive measures, such as consuming nutritious foods, taking iron supplements, and attending regular check-ups. This education aims to reduce the negative impacts of anemia on maternal and fetal health and promote healthy behaviors that support safer and healthier pregnancies (Agustina et al., 2020). Education designed with appropriate methods, such as direct counseling and interactive media, can increase awareness and individual understanding of the importance of iron intake and healthy eating habits in preventing anemia. With better knowledge, pregnant

women can take a more proactive role in maintaining their health and minimizing the risk of complications during pregnancy (Elmika et al., 2018).

Education about anemia, particularly involving participatory approaches and visual aids, significantly enhances public knowledge. For instance, educational programs utilizing media such as posters, videos, and digital applications have been proven to positively impact participants' understanding of anemia prevention, including the importance of consuming iron-rich foods such as red meat, spinach, and legumes (Wulandari et al., 2023). Education also promotes healthy behaviors, such as taking iron supplements and attending regular antenatal check-ups, which are crucial steps in preventing anemia in pregnant women (Abas et al., 2021).

Furthermore, digital application-based education is becoming increasingly relevant in the modern context. Applications like Anvent, which provide interactive and easily accessible information about anemia, have the potential to reach a wider audience. Studies show this digital approach enhances public understanding engagingly and practically, especially among younger generations. Thus, structured and technology-based education not only increases public knowledge about anemia prevention but also encourages sustainable behavioral changes to reduce anemia prevalence (Krismawati et al., 2022).

In addition to improving pregnant women's knowledge about anemia, their skills in using the Anvent application also improved. The results of the evaluation of pregnant women's skills in using the Anvent application in Tanjung Anom Village are shown in Table 3.

Table 3. Frequency Distribution of Pregnant Women's Skills in Using the Anvent Application

No.	Indicator	n	%
1	Understanding the Use of the Application		
	Very Easy		
	Easy	20	20.8
	Fairly Difficult	60	62.5
	Difficult	11	11.5
		5	5.2
2	Ability to Access Information in the Application		
	Very Good	32	33.3
	Good	51	53.2
	Fair	13	13.5
	Poor	0	0
3	Adaptation Speed to Features		
	Less than ½ hour	15	15.6
	1 hour	42	43.8
	2 hours	21	21.9
	>2 hours	18	18.7
4	Satisfaction with Ease of Use		
	Very Satisfied	28	29.2
	Satisfied	53	55.2
	Fairly Satisfied	12	12.5
	Not Satisfied	3	3.1
5	Satisfaction with Information Completeness		
	Very Satisfied	58	60.8
	Satisfied	31	32.3
	Fairly Satisfied	7	7.3
	Not Satisfied	0	0

No.	Indicator	n	%
6	Satisfaction with Application Design and Navigation		
	Very Satisfied	31	32.3
	Satisfied	50	52.1
	Fairly Satisfied	13	13.5
	Not Satisfied	2	2.1
	Total	96	100.0

Based on the table above, it can be observed that most pregnant women found the Anvent application easy to understand, with 60 people (62.5%) indicating this. Additionally, 51 people (53.1%) rated the ability to access information in the Anvent application as good, and 42 people (43.8%) adapted to the application features within approximately one hour. A total of 53 people (55.2%) expressed satisfaction with the application's ease of use, while 58 people (60.4%) were very satisfied with the completeness of the information provided. Furthermore, 50 people (60.4%) rated their satisfaction with the app's design and navigation. Based on this evaluation, participants' skills in using the Anvent application were deemed capable and proficient.

The Anvent application was designed to assist pregnant women in preventing and managing anemia through education and digital monitoring. To fully utilize this application, pregnant women need to develop certain skills. Technical skills are essential, particularly for downloading the app, registering, logging in, and using basic features such as menu navigation, entering daily iron consumption data, and utilizing the chat menu for questions and answers. Additional education on technology usage is often necessary, especially for women less familiar with digital devices (Wang et al., 2019).

The long-term impact of this community service activity will be followed up by the Gunung Tinggi Health Center, the institution responsible for maternal health, particularly in reducing the prevalence of anemia in Tanjung Anom Village. Through the Anvent application, the health center staff can monitor iron or Fe tablet consumption and send reminders to pregnant women who fail to take their tablets regularly, thereby optimizing anemia prevention efforts. A limitation of the Anvent application is that it can only be used if the user's mobile phone has a stable internet connection. However, the Tanjung Anom area generally has reliable internet connectivity due to its proximity to urban areas.

Conclusion

The community service activity conducted in Tanjung Anom Village was successfully implemented with support from the local government and the health center. After the educational sessions, this activity significantly improved pregnant women's knowledge about anemia prevention. The pregnant women's skills in using the Anvent application were also assessed as good, with most participants understanding and being able to access information about anemia, quickly adapting to the application, finding it easy to use, rating the information provided as complete, and expressing satisfaction with the app's features. Pregnant women are encouraged to use the application regularly so that community health volunteers and the health center can monitor their consumption of iron tablets. It is recommended that the health center

continue to utilize the Anvent application for every newly registered pregnant woman. This application can be a practical solution to enhance pregnant women's knowledge about anemia prevention and as a monitoring tool for iron tablet consumption.

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