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EVALUATION OF THE IRON AND FOLIC ACID SUPPLEMENTATION PROGRAM AMONG ADOLESCENT GIRLS IN KARAWANG REGENCY, 2025

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Abstract

Brief background: Anemia remains a major public health issue among adolescent girls in Indonesia, including in Karawang Regency. To address this, the government implemented the Iron Supplementation Program (Tablet Tambah Darah/IFA) in schools through cross-sector collaboration between the Health Office and the Education Office. However, the rate of IFA consumption and reduction in anemia cases remain suboptimal. Research objectives: This study aims to evaluate the implementation of the IFA program for adolescent girls in Karawang based on the components of input, process, and output using SWOT (Strengths, Weaknesses, Opportunities, Threats) analysis. Methods used: This is a qualitative study with a descriptive evaluative approach. Informants consisted of representatives from the Health and Education Offices, health center heads, nutrition officers, school principals, and school health teachers (UKS). Data were collected through in-depth interviews, observation, and documentation, and analyzed thematically with SWOT analysis. Summary of results: The findings show that the strengths of the program include policy support, availability of nutrition officers, and integration into the school health program (UKS). Weaknesses include low adherence among students, limited UKS facilities, and inconsistent reporting. Opportunities include national policy support, potential for cross-sector collaboration, and technological advances. Conclusion: Threats include negative stigma toward IFA, dependency on health personnel, and lack of support from some school principals. In conclusion, the IFA program in Karawang is supported structurally, but still faces challenges in implementation and adolescent participation. Strengthening cross-sector coordination and behavior change communication strategies is needed to improve program effectiveness.

Keywords: Evaluation, Iron Supplement, Adolescent Girls, Anemia

Introduction

Anemia remains a major public health concern in many countries, including Indonesia. According to the World Health Organization (WHO), anemia affects approximately 25% of the global population, with a higher prevalence among women, particularly during adolescence [1]. In Indonesia, the prevalence of anemia among adolescent girls is relatively high, exceeding 20%, and poses significant risks to their health and quality of life. Anemia in adolescent girls not only disrupts physical growth but may also impair academic performance and complicate their preparedness for future pregnancy. One of the most common interventions to address anemia is the provision of iron and folic acid (IFA) supplements. Despite extensive government efforts through various health institutions to distribute these supplements, the prevalence of anemia among adolescent girls remains high. This indicates persistent challenges in the effectiveness of the program, including limited

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awareness of the importance of IFA consumption, economic barriers, and poor adherence to supplementation [2].

Based on the results of anemia screening among adolescent girls in Karawang Regency in 2023, a total of 27,452 adolescents were screened. Of these, 5,735 were identified with mild anemia, 4,396 with moderate anemia, and 311 with severe anemia [3]. Anemia in adolescent girls poses serious consequences for reproductive health, including maternal and child mortality as well as malnutrition in infants. The risk factors for morbidity and mortality during pregnancy are further exacerbated when anemia occurs during adolescence [4].

According to the 2023 West Java Provincial Health Profile, West Java reported the highest number of maternal deaths in Indonesia, with 792 cases, while Karawang Regency ranked among the top three contributors to maternal mortality in the province. In Karawang Regency alone, 49 maternal deaths were recorded in 2023, 13 of which were due to hemorrhage. Notably, hemorrhage was associated with maternal anemia. Despite numerous nutritional supplementation programs initiated by both the government and the World Health Organization (WHO) to address and prevent anemia, its prevalence continues to rise [5].

Based on the performance analysis of the iron and folic acid (IFA) supplementation program for adolescent girls in Karawang Regency in 2022 and 2023, several factors were identified as contributing to the high prevalence of anemia in this population. These include limited awareness of the importance of IFA consumption, poor economic conditions, low adherence to supplementation, and insufficient knowledge of nutrition among adolescent girls. These challenges remain a significant concern for the local Health Office in addressing and reducing the burden of anemia [3].

In an effort to reduce maternal mortality and stunting rates in Karawang Regency, one of the strategies implemented is the provision of iron and folic acid (IFA) supplementation for adolescent girls, particularly through school-based programs at the junior and senior high school levels [3]. This initiative aims to prevent the occurrence of anemia among adolescents. Findings from a previous study conducted by Ani Triana in 2023 indicated that the risk factors associated with anemia in adolescent girls include knowledge, duration of menstruation, and dietary patterns. Therefore, collaboration between schools and community health centers (Puskesmas) is essential to ensure regular health check-ups particularly hemoglobin (Hb) examinations and the provision of health education for adolescents [6].

Furthermore, the findings of Desi Fadia Syabani Ridwan (2023) reported that nutritional status has a strong correlation with anemia and may serve as an important consideration for therapeutic approaches as well as preventive measures in addressing anemia among adolescent girls [7]. Similarly, research by Widi Alifa Izzara (2023) highlighted that anemia in adolescent girls can be attributed to limited knowledge and understanding of anemia, poor dietary and nutritional patterns, and menstruation. To prevent and manage anemia in this population, it is essential to enhance awareness of anemia, promote healthier lifestyles, encourage the regular intake of iron and folic acid supplementation, and improve dietary practices that contribute to the prevention and control of anemia [8].

The objective of this study is to evaluate the implementation of the iron and folic acid (IFA) supplementation program for adolescent girls in Karawang Regency and to identify the factors influencing the success of the program. A systems approach is applied, encompassing input indicators (health human resources, budgetary support, implementation methods, facilities and infrastructure, and policy support), process indicators, and output indicators. The findings are expected to provide valuable insights and recommendations, presented in the form of a policy brief, for the Karawang District Health Office and the local government to guide further decision-making related to policies on anemia prevention among adolescent girls in Karawang Regency. Based on this background, the researcher was motivated to conduct an in-depth evaluation of the implementation of the IFA

supplementation program for adolescent girls in Karawang Regency, in order to generate evidence-based recommendations in the form of a policy brief.

Method

This study employed a qualitative research design with a descriptive-analytical approach to obtain an in-depth understanding of the evaluation of the implementation of the iron and folic acid (IFA) supplementation program for adolescent girls in Karawang Regency. The sampling technique used was purposive sampling, in which participants were selected based on specific criteria relevant to the research objectives. Qualitative sampling was conducted by selecting community health centers (Puskesmas) with the highest and lowest prevalence of anemia among adolescent girls in Karawang Regency. Data were collected through in-depth interviews with three groups of informants: key informants, main informants, and supporting informants. Key informants were those who possessed comprehensive knowledge and information regarding the issues addressed in this study.

In this study, the key informants were representatives from the Karawang District Health Office, including the Head of the Health Office, the Head of the Public Health Division, the Sub-Coordinator of Nutrition and Maternal-Child Health, and school principals. The main informants were individuals with technical and detailed knowledge of the issues being studied. These included the heads of community health centers (Puskesmas), health workers at the Puskesmas, representatives from the Karawang District Education Office, and the person in charge of pharmacy at the Karawang District Health Office. Supporting informants were those who could provide supplementary information to enrich the analysis and discussion in this qualitative study, namely adolescent girls. According to experts, this sampling technique is highly relevant in qualitative research, as it ensures the selection of participants who are considered most knowledgeable and able to provide information that aligns with the objectives of the study.

The selection of informants was carried out using purposive sampling. This technique involves selecting participants or resource persons based on specific objectives relevant to the research theme, as they are considered to possess the necessary information for the study. The interviews aimed to explore their perceptions regarding the challenges encountered, the factors influencing the implementation of the program, and possible strategies for improvement.

The data sources in this study consisted of both primary and secondary data. Primary data were obtained directly through in-depth interviews with informants, while secondary data were collected from records, reports, and annual evaluation documents from both the District Health Office and community health centers (Puskesmas). Data collection was conducted through in-depth interviews with a total of 16 informants. These comprised one key informant from the Nutrition and Maternal-Child Health Division of the District Health Office; main informants including one representative from the District Education Office, one person in charge of pharmacy at the District Health Office, two heads of Puskesmas, two persons responsible for nutrition programs at Puskesmas, two school principals, and two teachers in charge of school health units (UKS); and six adolescent girls as supporting informants, selected through random sampling. The research instrument used was an in-depth interview guide.

Data analysis was conducted using the Internal Factor Evaluation (IFE) and External Factor Evaluation (EFE) approaches. The results were further presented through a SWOT analysis (Strengths, Weaknesses, Opportunities, and Threats), which is a method used to assess factors influencing program sustainability and to support planning across various sectors. The study will be carried out in July 2025 at the District Health Office, Klari Community Health Center (Puskesmas Klari), Wadas Community Health Center (Puskesmas Wadas), and selected junior high schools (SLTP) located within the service areas of these two health centers. These locations were chosen

based on the criteria of having the highest and lowest prevalence of anemia among adolescent girls in Karawang Regency in 2023.

Results

At the District Health Office, the number of human resources was found to be sufficient, with one staff member whose qualifications meet the required criteria as a nutritionist. However, there remains a need for strengthened monitoring and evaluation of adherence to the program. As the program involves cross-sectoral collaboration, the synergy is generally adequate; nevertheless, coordination between the Education Office and schools has not yet been fully optimized. In addition, there are still three community health centers (Puskesmas) that lack nutritionists, with the expectation that these vacancies may be filled through the recruitment of new civil servants.

Table 1. Characteristics and Identification of Qualitative Research Informants

No	Informant	Gender	Age (years)	Education	Position	Remarks
1	IA	Female	42	Master's	Coordinator of Nutrition and Maternal-Child Health	Key Informant
2	IB	Female	46	Bachelor's	District Education	Main Informant
3	IC	Female	41	Bachelor's	Pharmacy, District Health	Main Informant
4	ID	Female	58	Professional	Head of Community Health Center	Main Informant
5	IE	Female	51	Bachelor's	Head of Community Health Center	Main Informant
6	IF	Female	46	Bachelor's	Health Officer at Puskesmas	Main Informant
7	IG	Male	37	Associate	Health Officer at Puskesmas	Main Informant
8	IH	Male	52	Bachelor's	School Principal	Main Informant
9	II	Male	45	Bachelor's	School Principal	Main Informant
10	IJ	Male	37	Bachelor's	Teacher	Main Informant
11	IK	Male	38	Bachelor's	Teacher	Main Informant
12	IL	Male	15	Junior High School	Adolescent Girl	Supporting Informant
13	IM	Female	16	Junior High School	Adolescent Girl	Supporting Informant
14	IN	Female	15	Junior High School	Adolescent Girl	Supporting Informant
15	IO	Female	15	Junior High School	Adolescent Girl	Supporting Informant
16	IP	Female	15	Junior High School	Adolescent Girl	Supporting Informant

Based on Table 1, the findings indicate that Due to the limited number of human resources, the Education Office involved schools through the Youth Health Cadres (KKR) in distributing iron and folic acid (IFA) tablets. This was expressed by one informant who stated:

"*In terms of human resources, we are actually lacking. Since we already have the KKR program, we also involve schoolchildren to assist us. They act as KKR peers similar to what used to be the Red Cross Youth (PMR)—so they help monitor their classmates as well. In addition, we also receive support from teachers because our human resources at the community health center are very limited*." (Informant Ig)

For the budget or funding sources, the IFA supplementation program was not specifically allocated as it was already included in the regional budget (APBD). This was supported by one informant's statement:

"For the IFA supplementation program, particularly for adolescent girls, we do not allocate funds from the APBD because the tablets are supplied directly from the central government. We may propose an allocation in the APBD for IFA tablets intended for toddlers, but for adolescent girls, all of the tablets are provided by the central government." (Informant Ia)

Regarding training for educators, a separate budget was not required as collaboration with other sectors was established, as described by the following informant:

"We do not have a specific program for this, but we collaborate across programs. For example, in the health promotion division, there is the Aksi Bergizi program. This program has an annual event at the district level, but in practice, it also includes routine activities such as weekly IFA tablet consumption, breakfast together, and physical activities." (Informant Ia)

There were also instances of external sponsorship to support the program, as illustrated in the following interview

"In 2023 or 2024, we received support from an organization called MCO NI. They provided training for UKS (school health unit) teachers as well as student representatives to strengthen their knowledge of the benefits of IFA tablets." (Informant Ia)

Meanwhile, the Education Office highlighted the limited budget for educational media and tools to support awareness of the IFA supplementation program in schools. This was reflected in the following statement:

"Perhaps what we need are media and educational tools for socialization and reminders. For example, posters—if they are displayed every day, students will be reminded, aware, and able to read them regularly." (Informant Ib)

The procurement of IFA tablets was managed by the pharmacy division, which received supplies from the West Java Provincial Health Office. The tablets were stored in the pharmacy warehouse and subsequently distributed to the Karawang District Health Office based on program allocation requests, in order to avoid stockpiling and expiration issues. This was reflected in the following interview statement:

"IFA tablets are part of the program medicines, so we receive shipments from the Provincial Health Office. Once they arrive at our warehouse, we store them until the distribution schedule is determined according to the program allocation."

"So, when shipments come from the province, the nutrition program staff are already aware because they have calculated the target population. We only receive and store the stock, but we

also need to consider the expiry date of the medicine. We must ensure that the tablets delivered are not too close to expiration before the activities are carried out." (Informant Ic)

In principle, the procurement of IFA stock should not pose any major challenges. However, at times, during distribution to community health centers (Puskesmas), stock accumulation may occur. This was illustrated in the following statement

"Ideally, there should not be any stockpiling. The program calculates the target population and the required number of tablets, so in practice, supplies should be sufficient and used up accordingly. The IFA tablets are distributed to adolescent girls either recorded at the Puskesmas or through schools, provided weekly or depending on Hb test results in each area of Karawang Regency. The program allocates the stock to each Puskesmas, and our task is to distribute it through regular delivery. When needed, the Puskesmas collects the supply from us, and we distribute it accordingly." (Informant Ic).

In the implementation of the Iron and Folic Acid (IFA) Supplementation Program for Adolescent Girls, both the District Health Office and Community Health Centers (Puskesmas) referred to the existing Standard Operating Procedures (SOPs) provided by the Health Office. However, at the school level, specific SOPs for the IFA supplementation program had not yet been developed. This was confirmed by the following statement:

"At the Puskesmas, we already have SOPs regarding the implementation of the IFA supplementation program for adolescent girls. As for those who have dropped out of school, how are they included? They are covered through the adolescent health post (Posyandu Remaja). Currently, the Posyandu has been integrated into the Family Health Post (ILP), where community health cadres record adolescent girls who are no longer in school but remain at home. They are then encouraged to participate in the Posyandu activities." (Informant If)

Meanwhile, other informants highlighted the absence of SOPs at the school level, as reflected in the following statements:

"Our school has not yet developed a specific SOP for the IFA supplementation program for adolescent girls." (Informants Ij and Ik).

Policies regulating the Iron and Folic Acid (IFA) Supplementation Program for Adolescent Girls in Karawang Regency are stipulated in Regional Regulation (Peraturan Daerah) of Karawang Regency No. 8 of 2024. Article 10, point (d), explicitly states that one of the specific interventions for adolescents includes the provision of iron–folic acid supplements or multivitamin tablets to adolescent girls. This was confirmed by an informant, as follows:

"There is already a policy that regulates the implementation of the IFA supplementation program for adolescent girls." (Informant Ia)

In addition, another informant emphasized the existence of complementary school-level policies that support the program's implementation:

"Apart from the policies issued by the local government and circular letters, our school has also established an internal policy. The distribution of IFA supplements for adolescent girls is carried out alongside physical exercise activities and the consumption of nutritious food." (Informant Ii)

Meanwhile, another informant highlighted that their school follows existing regional policies and government directives:

> *"Regarding the policy on the IFA supplementation program for adolescent girls, in our school we refer to the Regional Regulation and the Circular Letter concerning the implementation of this program."* (Informant Ih).

The Iron and Folic Acid (IFA) Supplementation Program for Adolescent Girls is included as part of the annual planning process. However, the planning stage has not yet been fully evidence-based, as it does not adequately incorporate data analysis and problem analysis from the previous year. As a result, program planning has not been optimized. This was confirmed by an informant who stated:

> *"The District Health Office has included the IFA supplementation program for adolescent girls in the annual work plan for adolescent health and community nutrition."* (Informant Ia)

In addition, another informant from the District Education Office emphasized their involvement in program planning:

> *"The District Education Office has also developed a plan for the implementation of the IFA supplementation program for adolescent girls."* (Informant Ib)

At the primary health care level, other informants reported that planning had also been conducted: *"The health center has developed its own planning related to the IFA supplementation program for adolescent girls."* (Informants Id and Ie). Meanwhile, at the school level, the program has already been integrated into the school's activity calendar, as expressed by the following informants:

> *"The planning at our school for the IFA supplementation program for adolescent girls has already been included in the school activity calendar."* (Informants Ih and Ii)

The division of roles among the institutions involved in the Iron and Folic Acid (IFA) Supplementation Program for Adolescent Girls has not yet been fully aligned with their respective main duties and functions. While the roles of the District Health Office, District Education Office, health centers, and schools are already clearly defined, the implementation remains suboptimal. This was emphasized by one informant from the District Health Office who stated:

> *"We at the District Health Office have assigned the nutrition and adolescent health division as the main coordinator for the implementation of the IFA program. A cross-sectoral team has already been established through the decree on the acceleration of anemia reduction among adolescents, but its functions have not been carried out optimally. The organizational structure has been formed at the district level, but its operational functions remain weak."* (Informant Ia)

Another informant also highlighted challenges in coordination, stating:

> *"There is already a nutrition program coordinator responsible for the IFA supplementation activities. The program is included in the cross-program and cross-sectoral activity schedule, but the involvement of cadres or school facilitators has not been utilized optimally."* (Informant Ia)

At the school level, weaknesses were also identified. As one informant expressed:

> *"Some schools still do not have a dedicated teacher or active UKS (School Health Unit) staff to manage IFA supplementation. Not all teachers are aware of their roles and responsibilities in this program. The organizational structure at the school level remains weak and lacks*

coordination. Schools need to establish and activate the UKS Team in collaboration with the health center." (Informant Ib)

The implementation of the Iron and Folic Acid (IFA) Supplementation Program for Adolescent Girls still encounters numerous barriers at the levels of the District Health Office, District Education Office, health centers, and schools, both in terms of quality and quantity. Based on an in-depth interview, one informant from the District Health Office explained:

"The implementation of the IFA program is carried out through collaboration with health centers and schools, following guidelines from the Ministry of Health. The distribution of IFA tablets is conducted gradually to health centers, due to the limited facilities and infrastructure of the health centers, particularly the pharmacy storage capacity, which cannot accommodate large quantities at once. The District Health Office has conducted direct monitoring in several schools regarding adherence to IFA consumption. However, implementation at the district level remains limited to distribution, delegation of tasks to health centers, and field supervision, which is still inadequate." (Informant Ia)

Another informant highlighted the weak role of the education sector:

"Regular monitoring from the District Education Office has not been active in assisting or supervising the program's implementation in schools, making their role seem more complementary rather than driving the program forward." (Informants Ij, Ik)

Challenges at the health center level were also reported. One informant stated:

"The health center routinely distributes IFA tablets to schools (usually once a month), but the weekly consumption of IFA is not always supervised. Education on the benefits of IFA remains limited and is only delivered during distribution. While the implementation at the health center has been running, it is inconsistent and lacks intensity. Supervision and education should be strengthened so that the program goes beyond just distributing the tablets." (Informants Ij, Ik)

At the school level, informants also acknowledged weaknesses in program execution

"Most schools distribute IFA tablets to students, but not always on the same day, and no proper recording is done to track which students consumed the tablets and which did not." (Informants Ij, Ij)

Monitoring and evaluation (M&E) of the Iron and Folic Acid (IFA) supplementation program for adolescent girls by the District Health Office has not been optimal. M&E activities are carried out only in several schools, not covering all schools, and the involvement of both the District Health Office and the District Education Office remains limited. One informant from the District Health Office explained:

"We conduct monitoring through monthly reports from health centers regarding target numbers, distribution figures, and IFA consumption coverage. However, there is still a lack of direct verification mechanisms to schools to check the accuracy of the data on the ground. Monitoring and evaluation from the District Health Office remain mostly administrative and rely heavily on health center reports, which creates a high potential for bias or invalid data." (Informant Ia)

Another informant highlighted the lack of tools and cross-sector involvement:

> *"There is no standardized reporting instrument that facilitates schools in recording and reporting for internal evaluation related to their involvement in the IFA program. The involvement of the District Education Office in monitoring and evaluation is also lacking, even though schools fall under their authority. This shows weak cross-sectoral integration."* (Informants Ih, Ii)

Informants from health centers also pointed out challenges:

> *"Health centers fill out the reporting format for IFA coverage and submit it to the District Health Office. The reports are quantitative in nature (number of tablets distributed, number of adolescent girls targeted), but the data are not regularly analyzed as a basis for planning for the following month. Not all health centers conduct direct and routine school visits for monitoring. There is also no mechanism to capture barriers or feedback from schools and students."* (Informants If, Ig)

At the school level, informants acknowledged similar weaknesses:

> *"Teachers do not always report the number of students who actually consumed the tablets or the barriers faced in implementation. Internal evaluation by schools regarding the program has not been carried out systematically. Schools have not yet fulfilled their monitoring and reporting functions, making it difficult for health centers or district authorities to track accurate data."* (Informants If, Ig)

Finally, some adolescent participants expressed the absence of a feedback mechanism:

> *"We do not have a forum or mechanism to share feedback about our experiences with IFA consumption. Complaints or challenges are rarely conveyed formally because there is no consultation medium."* (Informants In, Io, Ip)

Table 2. Results of SWOT Analysis – External Factor Evaluation (EFE)

NO	External Factors	Weight	Rating	Score
Opportunity				
1	National policy support on accelerating the reduction of adolescent anemia (Ministerial Regulation, RPJMN)	0.15	4 (Highly Responsive)	0.60
2	Healthy School and UKS (School Health Unit) programs from the Ministry of Education and Health	0.10	3 (Responsive)	0.30
3	Potential involvement of communities, cadres, and youth organizations in IFA (Iron-Folic Acid) education	0.10	3 (Responsive)	0.30
4	Advancement of information technology to support digital education (social media, adolescent health apps)	0.10	3 (Responsive)	0.30
5	Momentum of cross-sectoral collaboration through multi-agency programs (Bappeda, Kesra, Education Office)	0.05	2 (Less responsive)	0.10
	Subtotal Opportunities	**0.50**		**1.60**
Threat				
6	Persistent stigma and misconceptions among adolescents regarding IFA consumption	0.15	2 (Less Anticipated)	0.30
7	Schools' dependency on health workers for program implementation	0.10	2 (Less Anticipated)	0.20
8	High mobility of adolescents and irregular school schedules (holidays, exams)	0.10	2 (Less Anticipated)	0.20
9	Limited local government budget for counseling and training	0.10	2 (Less Anticipated)	0.20

10	Lack of commitment from some school principals in supporting health programs	0.05	1 (Not Anticipated)	0.05
Subtotal Threat		**0.50**		**0.95**
Total Skor EFE		**1.00**		**2.55**

The results of the External Factor Evaluation (EFE) analysis show that the total score of 2.55 reflects a fairly good capacity of the program in utilizing external opportunities, although some threats have not yet been fully anticipated. The most significant opportunities are derived from strong national policy support, such as the Ministry of Health Regulation No. 88 of 2014 and the 2020–2024 National Medium-Term Development Plan (RPJMN), as well as the potential use of digital technology and the involvement of multiple sectors. On the other hand, the main threats come from the low level of understanding among adolescents regarding the benefits of iron and folic acid (IFA) supplementation, limited resources at schools, and the lack of optimal synergy between institutions.

External opportunities can be maximized to reinforce education, distribution, and integration of the IFA supplementation program, especially through the support of central policies and the utilization of digital platforms. However, threats such as stigma, irregular school schedules, and limited local government budgets require careful anticipation through effective communication strategies, stronger school involvement, and innovative approaches to health promotion. With a score of 2.55 out of a maximum of 4, the program is in a moderately strong position to respond to external dynamics, but still requires further strengthening of cross-sectoral collaboration and behavior change communication.

Several external opportunities play a particularly important role in supporting the success of the program. First, national policies such as the Ministry of Health Regulation No. 88 of 2014 and the RPJMN target for reducing anemia among adolescent girls provide a solid foundation, clear direction, and strong government commitment. Second, cross-ministerial initiatives, such as the School Health Unit (UKS) and the Healthy School program, create opportunities for synergy between the health and education sectors to integrate IFA supplementation into routine school activities. Third, the involvement of communities, cadres, and youth organizations represents a social strength that can help increase awareness through peer education and health campaigns. Fourth, advancements in information technology, including social media, health applications, and digital learning platforms, can serve as engaging and accessible channels for adolescents. Lastly, cross-sectoral collaboration opportunities across local government agencies and development partners, although not yet fully optimized, present strategic potential for strengthening program implementation and monitoring systems.

The analysis of external factors in the IFA (Iron-Folic Acid) supplementation program for adolescent girls shows a mixed picture of opportunities and threats. The total score for external opportunities is 1.60, indicating that the potential to support the program is substantial. These opportunities can be leveraged to expand the program's coverage, enhance the effectiveness of educational activities, and strengthen cross-sectoral coordination between the health and education sectors. Strong national policies, such as Minister of Health Regulation No. 88 of 2014 and the RPJMN 2020–2024, along with initiatives like the School Health Unit (UKS) and Healthy School programs, provide a solid foundation for program implementation. In addition, advancements in digital technology and the involvement of communities, youth cadres, and organizations present significant potential to reinforce education and awareness among adolescents.

However, the total score for external threats is 0.95, highlighting several challenges that have not yet been fully addressed and which could reduce the program's effectiveness. Key threats include persistent stigma and misconceptions about IFA consumption, with some adolescents believing that the tablets cause excessive side effects, resulting in low adherence. Schools' dependency on health

personnel also limits program sustainability, as implementation often relies on the presence of staff from local health centers, reflecting insufficient internal initiative and autonomy within schools. Moreover, irregular school schedules due to exams, holidays, or extracurricular activities cause inconsistency in the distribution and monitoring of IFA consumption. Technical obstacles such as limited local government budgets for educational media and training further complicate program implementation. Finally, low commitment from some school principals leads to inadequate supervision and organization of program activities.

In summary, while external opportunities for the program are substantial and can be optimally utilized, these threats must be carefully managed. Effective strategies are needed to address misconceptions, increase school autonomy, stabilize program scheduling, improve resource allocation, and strengthen leadership commitment. By doing so, the IFA supplementation program can achieve greater coverage, higher adherence, and a stronger overall impact on adolescent girls' health in Karawang Regency.

Discussion

The study results indicate that, in general, the availability of human resources at both the Health Office and the Community Health Centers (Puskesmas) in Karawang is adequate. However, considering the total number of schools in the region, the current number of personnel is still considered insufficient. Specifically, the number of staff within the Education Office responsible for the IFA supplementation program for adolescent girls is limited relative to the large number of schools in the district. As a result, these personnel are unable to conduct regular monitoring and supervision across all schools in Karawang Regency.

In this context, a study by Hidayanty et al. (2025) revealed that non-compliance with iron and folic acid (IFA) supplementation is a significant contributor to the high prevalence of anemia among adolescent girls in Indonesia. The study identified the main barriers to regular IFA tablet consumption as a lack of knowledge, negative attitudes toward supplementation, and insufficient support from the surrounding environment [9].

Furthermore, a study by Alfiah et al. (2020) highlighted the low coverage and compliance with the Iron and Folic Acid (WIFA) supplementation program in Indonesia. In East Java, only 22% of adolescent girls received WIFA according to the recommended schedule, while in East Nusa Tenggara, less than 1% adhered to the prescribed regimen. These findings indicate that WIFA coverage remains substantially below the national targets [10].

To improve the effectiveness of the IFA supplementation program, a study by Sari et al. (2022) demonstrated that health education delivered through mobile applications can significantly influence the knowledge, attitudes, and practices (KAP) of adolescent girls regarding anemia. Mobile-based health education was shown to enhance adolescents' understanding and awareness of anemia, suggesting that technology can serve as an effective tool to increase both awareness and adherence to the IFA supplementation program [11].

The study results indicate that the IFA supplementation program for adolescent girls does not have a dedicated budget allocation from the local government, as most of the program is supplied through central government distribution via the Ministry of Health. Additionally, training and educational activities for school health unit (UKS) teachers and students are not regularly funded; instead, they are conducted through cross-sector coordination, such as collaboration with health promotion programs like Aksi Bergizi. Schools also do not allocate a specific budget for the IFA program, including for educational media or the provision of facilities and infrastructure, such as storage cabinets for IFA tablets in the UKS rooms.

A study by Susanti (2021) revealed that budget allocation for the implementation of IFA supplementation for adolescent girls remains limited, with available funds covering only 22 distributions of IFA tablets to 11 schools per year. The study suggested potential solutions, including submitting budget proposals to local government and schools to ensure the sustainability of the IFA supplementation program [12].

Furthermore, a study by Revia (2025) highlighted the importance of community involvement, particularly in providing support and motivation for adolescent girls to consume IFA tablets regularly. Active community engagement can enhance the success of the IFA supplementation program, emphasizing the need for synergy between the government, schools, and the community to support program implementation [13].

The study results indicate that the procurement of IFA tablets originates from the West Java Provincial Health Office and is subsequently sent to the Karawang District pharmaceutical warehouse. The tablets are temporarily stored in the warehouse before being allocated to each Community Health Center (Puskesmas) according to the nutrition program's planning and requests. This mechanism aims to prevent stockpiling and expiration of the tablets. Distribution is carried out through a regular dropping system, with allocations adjusted based on target population data and field needs. However, stockpiling at some Puskesmas still occurs, caused by suboptimal implementation of tablet administration or irregular distribution according to the planned schedule.

A study by Prasetyo et al. (2020) revealed that accurate planning of medication needs is crucial to ensure that the quantity and type of drugs align with actual requirements. Inadequate planning can result in stockouts, whereas excessive planning may lead to overstocking and drug expiration or damage. Therefore, precise planning is essential to improve the efficiency of drug utilization and prevent stockpiling [14].

Furthermore, a study by Yudina et al. (2024) indicated that the majority of IFA supplementation programs and their distribution methods were not conducted according to established standards. IFA tablets were not consistently administered weekly, nor were they consumed simultaneously in schools. Factors influencing IFA consumption among adolescent girls include knowledge, motivation, self-efficacy, attitudes, parental and peer support, policies, and school commitment. Positive factors facilitate IFA consumption, whereas negative factors impede it [15].

The study results indicate that the IFA supplementation program for adolescent girls at the Health Office and Community Health Centers (Puskesmas) already follows established Standard Operating Procedures (SOPs), which serve as guidelines for Puskesmas staff in implementing IFA distribution activities both in schools and outside schools, such as through adolescent posyandu (integrated health posts). However, schools themselves do not yet have specific SOPs regulating the implementation of the IFA program for their students.

This indicates a systematic effort to ensure that IFA tablet distribution follows health procedures and reaches the target population. However, schools themselves do not yet have specific SOPs governing the implementation of the IFA program for their students. This situation results in a less structured program implementation at the school level, potentially compromising the program's effectiveness in reducing the prevalence of anemia among adolescent girls [16].

Several international studies also emphasize the importance of having clear Standard Operating Procedures (SOPs) in the implementation of iron supplementation programs for adolescent girls. For example, a study by Patterson et al. (2020) highlighted that the success of iron supplementation programs is strongly influenced by adherence to SOPs, particularly regarding routine distribution, monitoring, and recording of supplement consumption in schools. Without clear SOPs, the risk of distribution errors, uncontrolled stock, and low compliance in supplement consumption increases [17].

Thus, although the Health Office and Community Health Centers (Puskesmas) have established SOPs, it is crucial for schools to develop internal SOPs that structure the implementation of the IFA

supplementation program. This will ensure that tablet administration activities proceed according to plan, optimize the use of IFA tablets, and support the reduction of anemia prevalence among adolescent girls.

The study results indicate that regional policies are already in place as a legal basis for implementing the IFA supplementation program in Karawang Regency. Regional Regulation No. 8 of 2024 explicitly stipulates the provision of IFA or multivitamin tablets to adolescent girls as part of a specific intervention to address anemia in adolescents (Article 10, Letter d). Additionally, implementation at the school level is supported by circular letters from the local government or relevant agencies. Some schools have even developed their own internal policies tailored to their specific conditions.

Internationally, a study by Nguyen et al. (2020) emphasized that support from local policies and internal institutional policies is crucial for the success of iron supplementation programs among adolescent girls. Such policies facilitate compliance and regularity in supplement administration, as well as ensure continuous monitoring and evaluation. Therefore, the combination of regional regulations and internal school policies is key to ensuring the successful implementation of the IFA supplementation program in Karawang Regency [18].

Furthermore, program implementation at the school level is supported by circular letters from the local government or relevant agencies, which provide technical guidance for teachers and school health staff. Some schools have even developed their own internal policies, tailored to the conditions and needs of each institution. This demonstrates local adaptation efforts that allow the IFA supplementation program to operate more flexibly and contextually, while also supporting program sustainability and effectiveness [19].

The study results indicate that the planning of the IFA supplementation program for adolescent girls in Karawang Regency has been conducted by the Health Office based on national policies. Community Health Centers (Puskesmas) have also developed schedules and target implementation plans for the program. However, this planning remains largely administrative and lacks optimal cross-sector coordination, particularly with the Education Office. Schools, as the primary sites of program implementation, do not yet have integrated activity plans specifically aligned with the IFA program. Furthermore, adolescent girls, as the main program beneficiaries, have not been directly involved in the planning process, whether through consultation forums, promotive activities, or as change agents. This reflects a low level of participatory approaches and insufficient synergy among sectors. The weak integration between the Health Office, Education Office, schools, and adolescent girls indicates that program planning has not fully engaged relevant stakeholders in an active and meaningful manner.

A study by Putri et al. (2023) indicated that IFA consumption among adolescents is influenced by various factors, including a lack of interest in taking iron supplementation tablets [20]. Furthermore, research by Dwistika et al. (2023) demonstrated significant differences in IFA compliance between groups of adolescent girls who were actively involved in the program and those who were not. Involving adolescent girls in the planning and implementation of the program can enhance their motivation and adherence to IFA consumption [21].

Furthermore, a study by Yudina and Fayasari (2020) revealed that active participation of adolescent girls in the IFA program is crucial for enhancing program effectiveness. However, in the Pasar Rebo Health Center, the participation of female students in the IFA program only reached 16% of the 25% target. This indicates that the involvement of adolescent girls in the program remains low and needs to be increased through a more participatory approach, actively engaging them in every stage of program planning and implementation [22].

To enhance the effectiveness of the IFA program in Karawang Regency, a more integrative and participatory approach is required. This can be achieved by actively involving the Department of

Education and schools in the planning and implementation of the program, as well as ensuring that adolescent girls participate meaningfully at every stage. Such an approach would enable the IFA program to operate more effectively and achieve its objective of reducing the prevalence of anemia among adolescent girls.

The study indicates that the organizational structure for the IFA program for adolescent girls has been established at the Health Department and Puskesmas levels. The Puskesmas have assigned the Nutrition Program as the main responsible entity; however, they face challenges due to limited human resources and have not developed supporting networks, such as school cadres, to assist with program implementation in schools. The roles of teachers remain unclear, and the School Health Unit (UKS) teams, responsible for technical implementation, appear passive and, in some schools, have not yet been formed. Moreover, there is no formal support from the Department of Education to appoint technical implementers for the IFA program in schools. Adolescent girls, as the primary program targets, have not been actively involved and are positioned merely as beneficiaries rather than as agents of behavioral change. Active participation of students is crucial for improving adherence to IFA consumption and fostering collective awareness among adolescents.

A study by Hasanah (2024) found that positive attitudes and support from teachers significantly influence adolescent girls' adherence to IFA consumption, whereas family support does not show a significant impact. This highlights the crucial role of teachers in supporting the implementation of the IFA program in schools [23]. Additionally, research by Listiawati et al. (2020) revealed that the intake of iron-enhancing and iron-inhibiting foods also affects anemia status among adolescent girls, indicating the need for enhanced nutritional education related to IFA consumption [24].

The study indicates that the IFA program has been implemented in several schools in Karawang Regency. However, its execution has not fully adhered to the technical guidelines set by the Ministry of Health, particularly regarding the distribution schedule, supervision mechanisms, and educational components. IFA administration is still carried out inconsistently and often without direct supervision from teachers or the School Health Unit (UKS) team. Education on the importance of IFA is also not conducted systematically; information is provided only at the time of tablet distribution, without regular follow-up or reinforcement. As a result, many adolescent girls lack understanding of the benefits of IFA consumption and show low adherence to the program. Additionally, Puskesmas face limitations in human resources and time, preventing them from visiting all schools regularly, while the schools themselves have limited involvement in recording and actively monitoring program implementation.

The study shows that the monitoring of the TTD program for adolescent girls in Karawang Regency is primarily based on quantitative data received by the Health Office from Puskesmas, such as the number of students receiving TTD. However, these reports do not include qualitative indicators, such as adherence levels, actual TTD consumption, side effects experienced, or discussions regarding anemia status. Validation conducted by the Health Office is still limited and therefore may not fully represent the overall implementation conditions in the field.

The involvement of the Education Office in program supervision remains suboptimal. Schools have not established an internal reporting system, and teachers do not routinely or systematically track which students consume TTD. Consequently, program implementation is not supported by accurate data. Evaluation processes are generally not conducted periodically or across sectors, and feedback from the field particularly from students receiving TTD has not yet been integrated into the evaluation system, limiting program improvements.

According to the Systemic Evaluation Theory by Rossi, Lipsey, and Freeman (2004), a program should be evaluated not only in terms of output (such as the number of TTD distributions) but also in terms of outcomes (impact on behavior or health status) and feedback mechanisms that

allow data-driven improvements. The absence of comprehensive evaluation and the limited indicators used in reporting indicate a gap between theoretical principles and actual practice on the ground.

Conclusion

Based on the results of the study conducted through interviews with the Health Office, Education Office, Puskesmas, junior high schools, and adolescent girls, as well as SWOT analysis, the following conclusions can be drawn:

1. Planning of the Iron-Folic Acid Supplementation (TTD) Program has not been fully optimized. Planning is still sectoral and has not actively involved cross-sector collaboration. Schools and adolescent girls, as the main implementers and targets of the program, have not been engaged in preparing the activity plan. This has resulted in low ownership of the program at the implementation level.
2. Organization of the TTD Program is not yet structured and functional. Although program managers exist at the Health Office and Puskesmas levels, schools lack active teams, and there are no specific staff or teachers assigned to manage the TTD program. Peer-led involvement of students has also not been established.
3. Implementation of the TTD Program does not fully adhere to national guidelines. The program is not consistently scheduled, many activities are conducted without direct supervision, and integration into regular school routines is limited. Education on the benefits of TTD has not been provided comprehensively or sustainably.
4. Monitoring and evaluation of the TTD Program are not systematic or participatory. Program monitoring is carried out administratively by Puskesmas and the Health Office based on distribution reports, without field data validation or reporting from schools. Program performance evaluation does not actively involve the Education Office or the adolescent girls as beneficiaries.
5. SWOT analysis indicates that the TTD Program has strengths in policy support and the implementation structure at Puskesmas, as well as opportunities from synergy with stunting programs and advances in information technology. However, the program still faces various weaknesses and threats, including TTD-related stigma, weak coordination, low participation from schools and students, and limitations in implementation and reporting that affect the program’s effectiveness.

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