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Determinants of Adolescent Female Behavior for Consumption of Fe Tablets on the Working Area of the Nan Balimo Public Health Center

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Abstract

Anemia remains a significant public health issue among female adolescents, particularly due to iron deficiency. The consumption of iron (Fe) tablets is a primary government-recommended intervention, yet adherence levels remain low. This study aimed to analyze the factors influencing Fe tablet consumption behavior among female adolescents in the working area of Nan Balimo Public Health Center, Solok City. A mixed methods approach with an explanatory sequential design was employed. A total of 293 female adolescents were selected using proportional random sampling and analyzed using chi-square tests and multiple logistic regression. Qualitative data were obtained through in-depth interviews with 11 informants. Multivariate analysis revealed four variables significantly associated with Fe tablet consumption behavior: knowledge, attitude, role of health workers, and media exposure ($p \leq 0.05$), with the role of health workers emerging as the dominant factor ($p = 0.002$; POR = 2.655; 95% CI: 1.429–4.935). The qualitative findings supported these results, highlighting challenges such as irregular tablet distribution, monotonous education, weak monitoring, and suboptimal coordination, all contributing to a stagnation in consumption rates, which declined from 96.6 % to 83.06 % over three consecutive quarters. Enhancing the role of health workers is a strategic key to improving Fe tablet adherence among female adolescents. Therefore, it is essential for health centers and health authorities to strengthen communication skills, counseling, and health worker support capacity, while also ensuring the availability of engaging educational media and intensive monitoring.

Introduction

Adolescent girls are at high risk of developing anemia because during this period, iron requirements increase due to growth and menstruation. The development of anemia varies widely, depending on the underlying cause. Among the main factors causing anemia are nutritional deficiencies and inadequate nutrient absorption (WHO, 2023; Kiani et al., 2022; Aspuru et al., 2011; Allen et al., 2001; Carmel, 2008; Chaparro & Suchdev, 2019; Zimmermann & Hurrell, 2007; Clark, 2008). In addition to nutritional intake, iron deficiency also occurs due to increased iron requirements, blood loss, and impaired absorption. Iron deficiency anemia accounts for 50% of all cases of anemia, with rates higher in developing countries. Iron deficiency is seen in children, women of childbearing age, and pregnant women (Mentari & Nugraha, 2023;).

According to WHO (2023), anemia is a decrease in Hb levels to less than 12 g/dL in women and less than 13 g/dL in men. Normal Hb distribution can vary due to gender, physiological status, ethnicity, and age (Mentari & Nugraha, 2023). Anemia in adolescent girls is a condition in which the number of red blood cells or hemoglobin (Hb) levels in the body is lower than the normal limit. The normal limit for hemoglobin (Hb) levels in adolescent girls is 12 g/dL. Therefore, if the Hb level is <12 g/dL, the adolescent girl is anemic (Kumar et al., 2018; Kulkarni et al., 2012; Gebreyesus et al., 2019; Bagni et al., 2013).

Excessive school activities can lead to irregular eating patterns, and the habit of consuming beverages that inhibit iron absorption can affect a person's hemoglobin levels. In Pakistan, dietary composition and dietary habits containing iron-inhibiting substances (e.g., polyphenols in tea, phylates in plant foods, and tannins) can be a major cause of iron deficiency anemia (Akhter et al., 2005; Bates et al., 2024).

Based on (Ministry of Health of the Republic of Indonesia, 2021) The prevalence of anemia among adolescent girls in Indonesia is 22.7%. Women are at the highest risk of developing anemia, especially adolescent girls, which is a public health problem because the prevalence is more than 32% (Ministry of Health of the Republic of Indonesia, 2019) According to WHO standards, if the prevalence of anemia in a population exceeds 20%, it constitutes a public health problem. Some people ignore this and consider it not a public health issue. However, if it persists until the young woman marries, it can have life-threatening consequences. The worst impact is that it can lead to maternal and infant mortality, even resulting in low birth weight babies (Proverawati, 2019; Friede et al., 1987; Sharma & Mishra, 2013; Negrato & Gomes, 2013; Lau et al., 2013).

Anemia in adolescents can cause symptoms commonly known as the 5Ls: fatigue, lethargy, weakness, tiredness, and listlessness (Ministry of Health of the Republic of Indonesia, 2019; Claud, 2018;). Preventing anemia during school age and puberty is important to prevent growth disorders, reproductive development disorders, and brain development disorders. Long-term prevention can be achieved by administering iron supplements (Fe Tablets) (Oliveira et al., 2014). According to the Ministry of Health of the Republic of Indonesia (2023), iron (Fe) tablets are mineral tablets needed by the body to produce red blood cells or hemoglobin. Fe tablets, also called iron supplements, are round or oval in shape and are dark red in color. Fe tablets contain iron equivalent to 60 mg of elemental iron and 0.4 mg of folic acid. The benefits of iron supplementation tablets according to Arisman (2014) are: 1) preventing anemia, 2) supporting the growth and development phase, 3) maintaining thinking ability, 4) fulfilling iron requirements, 5) maintaining body resistance and 6) long-term health investment.

Based on (Ministry of Health of the Republic of Indonesia, 2021)In West Sumatra, the proportion of adolescent girls aged 10-19 who had ever consumed iron tablets was 45.2%. Meanwhile, in West Sumatra, the proportion of adolescent girls aged 10-19 who had ever consumed iron tablets was 46.6% (the target of the Indonesian Ministry of Health is 90%) (Indonesian Ministry of Health, 2023).

(Ministry of Health of the Republic of Indonesia, 2023) In Indonesia, the main reasons for not taking/finishing Fe tablets from health facilities were not knowing (51.4%) and not being given by the staff (23.5%), because they felt they did not need to take them (12.8%), only taking them during menstruation (7.6%), forgetting (29.2%), considering them as medicine (3.3%), not having the time yet (1%) and being bored (4.1%), not being given by the staff (23.5%), empty supply of Fe tablets (1.2%), feeling they were unnecessary/not useful (12.4%), unpleasant taste and smell (2.5%), side effects (0.9%), considering them as medicine (2.0%), lack of money (0.2%). The highest reasons for not taking/finishing Fe tablets in West Sumatra are in line with the phenomenon that occurs in Indonesia, namely the main reasons for not taking Fe tablets among adolescent girls were not knowing (41.9%) and not being given by the staff (29.3%),

then empty supply of Fe tablets (1%), feeling they were unnecessary/not useful (12.3%), unpleasant taste and smell (3%), side effects (2%), considering them as medicine (3.4%), not having money (0.2%). there is money (0.7%) (Ministry of Health of the Republic of Indonesia, 2023).

The West Sumatra Provincial Health Office (2024) reported that in 2023, the number of female adolescents was 339,183, with 196,174 (57.84%) consuming iron tablets, with 14,472 (20.30%) experiencing anemia in 7th and 10th grade female adolescents. Meanwhile, for January – June 2024, the number of female adolescents was 293,308, with 181,585 (61.84%) consuming iron tablets, with 8,296 (14.37%) experiencing anemia in 7th and 10th grade female adolescents.

ReportSolok City Health Office (2024)In 2023, the coverage of providing Fe tablets to adolescent girls with a target number of 7,013 people reached 79.58% (5,581 people) and adolescent girls consumed Fe tablets, namely 76.1% (5,3337 people). In January - July 2024, the coverage of providing Fe tablets with a target number of 7,013 was 64.69% (4,558 people) and adolescent girls who consumed Fe tablets amounted to 61.51% (4,314 people) with the incidence of anemia in adolescents, namely mild anemia (11-11.9 g / dl) as many as 554 people, moderate anemia (8-10.9 g / dl) as many as 206 people and severe anemia (<8 g / dl) as many as 94 people.

The program of providing Fe tablets to adolescent girls is a government program that has existed since 2014, however, this program has only been routinely provided with Fe tablets to schools every month since April 2024. The reason for the program of providing Fe tablets to adolescent girls has only been implemented routinely starting in April 2024 is due to the policy of the Solok City Government regarding the Putri Tamia program (adolescent girls without anemia) which is to address the problem of anemia in adolescent girls and is one of the specific interventions in efforts to reduce stunting. With this policy, the program of providing Fe tablets to adolescent girls has begun to be implemented routinely in every Community Health Center in Solok City and another cause of this problem is also because PKPR officers have difficulty in providing Fe tablets routinely to schools, this occurs because of the many tasks and responsibilities of PKPR officers in carrying out several programs at the Community Health Center and the lack of cooperation between PKPR officers with school guidance officers and Community Health Center nutrition officers for the distribution of Fe tablets to schools.

The Community Health Center officers involved in the program of providing Fe tablets to adolescent girls are: PKPR officers (1 midwife) and Puskesmas nutrition officers. Since April 2024, Puskesmas officers have been conducting regular visits to schools to provide Fe tablets once a month on the 3rd week on Friday during the cultum activity in the school field. Providing 4 Fe tablets for 1 teenager, with a consumption dose of 1 tablet/week, to distribute the Fe tablets, Puskesmas officers are assisted by teachers. Another thing done by the Puskesmas when providing Fe tablets is providing education regarding the consumption of Fe tablets and the prevention of anemia in adolescent girls.

ReportSolok City Health Office (2024) In 2023, the prevalence of iron supplement tablet consumption among adolescent girls at the Nan Balimo Health Center in Solok City was 80.06%. In January - June 2024, the prevalence of iron supplement tablet consumption among adolescent girls at the Nan Balimo Health Center in Solok City was 59% with the incidence of anemia in adolescents being mild anemia (11-11.9 g/dl) in 294 people, moderate anemia (8-10.9 g/dl) in 126 people and severe anemia (<8 g/dl) in 94 people.

One factor influencing iron tablet consumption in adolescents is knowledge. Knowledge is an individual or population characteristic that influences behavior before and during the behavior (Murti, 2018). According to Septiana et al. (2025) Adolescents' knowledge about iron supplementation is crucial in determining their consumption behavior. This knowledge will

influence their attitudes and behaviors regarding food choices at school and at home, as well as their understanding of the benefits of iron tablets, which will influence their consumption.

Another factor that can influence iron tablet consumption is attitude. Attitude is the readiness to react to objects in a particular environment as a form of appreciation for the object (Notoatmodjo, 2018; Lestari et al., 2021; Rakhmadiningrum et al., 2021). The formation of attitudes that influence adolescent girls' iron tablet consumption can be influenced by a cognitive component, such as individual knowledge or beliefs regarding the perceived health benefits of iron tablets (Andani, 2020; Salim et al., 2025; Nurhaera et al., 2023; Rakhshani et al., 2025).

The role of health workers can also influence the consumption of iron tablets among adolescents. Health workers are a motivating factor for individuals to adopt healthy behaviors. The role of health workers in providing education about iron tablets, which were initially unknown to the general public, especially adolescents, is crucial. Through socialization and communication about iron tablets, adolescents become aware of the importance of consuming iron tablets, thus encouraging them to take them. Successful communication and interaction between health workers and adolescents can be interpreted as a form of support from health workers for adolescent girls (Tirthawati et al., 2020). Study Tirthawati et al. (2020), research results showed that support from health workers was positively correlated with compliance with iron tablet consumption in adolescent girls. Another study by Nurjanah & Azinar (2023), the results of the study were that there was support from health workers with the consumption of iron tablets among junior high school students.

Family support also influences adolescent iron tablet consumption. Strong family support can foster normative beliefs, and adolescent girls tend to develop positive perceptions about iron tablet consumption, leading to a strong intention to take them to avoid the risk of anemia. Family support can include reminders about iron tablet intake and providing iron-rich foods. Adolescent girls' adherence to iron tablet consumption is influenced by others, such as their parents (Samputri & Herdiani, 2022; Silitonga et al., 2023; Helmyati et al., 2023; Feriyanti & Rahayu, 2024; Maheswari et al., 2024; Raihani et al., 2024).

Family support from father and mother, such as emotional support, namely reminders, and physical support for accompanying when taking iron tablets (Samputri & Herdiani, 2022; Awaliyah & Yuriah, 2025). Other research by Nurjanah & Azinar (2023), research results on the relationship between family support and iron tablet consumption in junior high school adolescents. Nisa et al.'s (2023) research on factors influencing iron tablet consumption in female adolescents in Bukittinggi City found that there was no effect of family support on iron tablet consumption in female adolescents.

Methods

This research uses a Mixed Methods Study approach (mixed method research) Explanatory - sequential case study is a type of combination research whose initial stage aims to prove the hypothesis of the relationship (correlation) or differences between variables and in the next stage aims to reveal in more depth about one or several cases related to the relationship or differences between these variables (Della Porta, 2008).

This study began with a quantitative approach using a cross-sectional study design conducted on adolescent girls regarding the behavior of consuming Fe tablets. This study measured the variables only once at one time using a questionnaire to see the relationship of each independent variable, namely knowledge, attitudes, the role of health workers, mass media exposure and family support with the dependent variable, namely the behavior of consuming Fe tablets in adolescents. The next stage was a qualitative study with a case study design to dig in-depth information about the behavior of adolescents for consuming tablets in the Nan Balimo Health Center area of Solok City. Qualitative data collection was carried out through in-depth

interviews and Focus Group Discussions (FGDs) using instruments in the form of interview guidelines and document reviews.

The population of the study was all female adolescents of junior high and high school level whose schools are located in the working area of the Nan Balimo Health Center in Solok City, with 293 quantitative samples and 11 qualitative informants. The research instrument for examining the variables of knowledge, attitudes, the role of health workers, exposure to mass media, and family support used a questionnaire that had been validated and had reliability in previous studies, namely for knowledge and attitudes ofAryanti et al., (2023)research on the analysis of factors related to compliance with Fe tablet consumption in adolescent girls.The data obtained was recorded in a research form, followed by data processing through editing, coding, and tabulation. The data was then processed and analyzed using computerized techniques.After the data collection activity, data processing is carried out through several stages, including: Data Editing, Coding, Data Entry. Entry is the activity of entering the results of the answers into the data processing program. Entering the answers on the checklist sheet into the master table, data processing is done manually. Data Cleaning. AnalysisData were analyzed univariately, bivariately and multivariately.

Result and Discussion

Table 1. Triangulation Matrix of Qualitative Analysis of Dominant Variables

Aspects Studied	Focus Group Discussion	In-depth Interview	Document Review	Conclusion
Distribution and Management of Fe Tablets	Iron tablet distribution varies in frequency (monthly, quarterly, or six months) depending on the school and the presence of staff. Students who are absent often do not receive tablets due to a lack of follow-up. Distribution is carried out through health workers, teachers, the school health unit, or class leaders.	Iron distribution varied in frequency due to budget constraints and a policy change from monthly (2024) to quarterly (2025). Nutrition officers, community service workers (PKPR), and school counselors played a role in distribution through joint teams during cultum (religious lectures) at schools.	-	Iron tablet distribution has been inconsistent in both frequency and implementation mechanisms. Budget constraints and coordination challenges have led to suboptimal distribution, particularly for absent female students. Regular evaluation and improvements to the distribution mechanism are needed.
Education and Counseling	Education was dominated by oral lectures in front of the class, which were considered monotonous and unengaging. Only	Education was conducted through verbal instruction using PowerPoint if a projector was available.	-	Iron tablet education remains limited to oral counseling without adequate supporting

	a few informants reported limited use of videos. Female students reported boredom and difficulty understanding information, particularly about the risks of anemia.	Leaflets or banners were not used due to budget constraints. The last video was used in 2023. Student responses were passive and unenthusiastic.		media. Budgetary constraints are a major obstacle to procuring promotional media. More engaging and interactive educational strategies are needed to increase adolescent understanding.
Monitoring and Evaluation	Monitoring of consumption was very limited, with staff simply standing at the front of the class without ensuring students took the tablets. No pressure was applied to students who refused. Side effects were not reported because students were embarrassed or the staff had already left. Blood tests were conducted quarterly without communication of results.	Monitoring was conducted during distribution without direct supervision due to limited staff. Consumption questions were asked in general terms in the classroom, not individually. Blood test results were only reported to the Health Office, not to the students.	The e-PPGBM data shows the distribution and consumption of Fe tablets, namely: In Quarters 1-4, all female students received Fe tablets, namely 100%. Consumption decreased, namely in Quarter 1 reaching 96.6%, in Quarters 2-4 only 83.06%.	Monitoring and evaluation of iron tablet consumption are very weak due to a lack of direct supervision and unclear test results. Data shows stagnant performance without significant improvement. A more rigorous monitoring system and communication of results to students are needed.
Recording and Reporting	-	Recording is done by teachers at school and then submitted to staff every month. The data is input into the E-PPGBM application every three months. The simple report format only lists	-	The recording and reporting system is already operating routinely, but it suffers from limitations in data completeness and accuracy. Reporting remains quantitative,

		the amount given, without attendance data or guaranteed consumption.		lacking aspects of distribution quality. A more integrated and detailed reporting system is needed.
Constraints and Improvement Strategies	Main constraints: inconsistent distribution for absent female students, monotonous education without visual media, weak monitoring, individual factors (embarrassment, bitter/fishy taste of tablets, preference for non-pill medications).	Barriers: lack of interest among adolescents, perception of tablets as medicine rather than supplements, taste and odor issues, difficulty coordinating with Islamic boarding schools, limited educational media. Strategies: staff training, material and media refinement, comprehensive evaluation.	-	Multifactorial constraints include distribution, education, monitoring, and individual factors. A comprehensive approach is needed, including officer training, improved educational media, strengthened coordination, and ongoing evaluation to enhance program effectiveness.

Table 2. Triangulation Matrix of Qualitative Analysis of Low-Value Variables

Aspects Studied	FGD Results	In-depth Interview Results	Conclusion
Knowledge			
Understanding the benefits of Fe tablets	- Most respondents have limited knowledge regarding the benefits of Fe tablets. - Information is only general in nature and is conveyed verbally - it is important to know the benefits and side effects, but they	We have explained to them about Fe tablets, their benefits in preventing anemia, and their side effects, but sometimes they are indifferent when told. - Many people probably don't know about that. They only know the general details, but children don't really know the more detailed benefits and effects.	Low knowledge is caused by: - The educational approach is less interactive - Monotonous information delivery - Lack of variety in health promotion media - Attractive visual media and a dialogic approach are required.

	are rarely explained		
Understanding side effects	- Some informants have received explanations about side effects such as nausea. - Information is not in-depth and is less memorable because the delivery is monotonous. - Yes, occasionally an officer comes to explain the side effects of iron tablets, such as nausea. But sometimes I don't remember because I get bored watching the instructions in front of the class.	- There are also some children who refuse to consume Fe because it is bitter, smelly and nauseous. - "We provide education to consume it at night, but if the students find it bitter, we cannot force them. - Coping strategies: evening consumption, family involvement	
Attitude			
Awareness of the dangers of anemia	- Most people have heard about anemia from various sources. - Understanding of the serious impact of anemia is still low - Know the symptoms	We've explained that anemia can be dangerous, disrupting concentration in school and even impacting future pregnancies. But children sometimes don't listen and remain silent. - Teenagers' responses tend to be	Teenagers' attitudes are still passive and reactive because: - The educational approach is less interesting - Low two-way communication - Minimal involvement of family and school

	(dizziness, weakness) but are not aware of the long-term dangers	negative, some understand but some are not focused or not very interested.	- Communicative and contextual strategies are required
Response to education	- Responses are often passive and lack focus - We know that anemia makes you dizzy and tired, but we keep quiet and don't tell the teachers or the people at home.	These teenagers often believe that anemia isn't dangerous because they haven't experienced its effects. They receive education, but it's not focused and they don't care about their health.	
Media Exposure			
Access to information through mass media	- Most of them never actively accessed information about Fe tablets through TV, radio or books. - A small part has seen it on the internet/social media (TikTok) - Exposure is sporadic and not deep - Never seen it on TV or radio. I've seen it on TikTok, but not often.	- The content is sparse, and even if there is, they're not interested. When there are videos, they only see the people in the video, not the content. - We previously made a video in 2023, but now we're relying on the Health Department. Unfortunately, videos from the department are also rare.	Low media exposure due to: Limited quantity and quality of content, Media approach does not match teenagers' preferences, Low internal motivation to seek information, Need for collaboration with social media and content that involves teenagers
Quality of available content	- Attention is drawn more to the figure/influencer in the video, not to the message. - I've never looked it up in books or on TV, I'm just too lazy to look for it. - Sometimes I can't focus because I'm	Promotional media like books and videos are limited. Budget efficiency also impacts this, so we only use materials from the Department. But unfortunately, even those rarely appear and aren't relevant to today's youth.	

	looking at the person, not the content.		

Iron Tablet Consumption Behavior

Based on the results of univariate analysis, the majority of adolescent girls in the Nan Balimo Community Health Center (Puskesmas) in Solok City have good iron tablet consumption behavior, namely 71.0% (208 of 293 respondents). Meanwhile, 29.0% of respondents still show behavior of not consuming iron tablets regularly. These results reflect that most adolescents have followed the recommendation to consume iron tablets, which is an important component of the anemia prevention program for adolescent girls. However, the proportion of those who do not consume remains a challenge to the program's success.

Although the results of this study show positive results, researchers assess that there are still structural weaknesses that need to be addressed. Some adolescents did not consume iron tablets not because they were unwilling, but because they did not receive them due to absences during distribution and the lack of a re-distribution mechanism. Furthermore, not all schools carried out distribution routinely and comprehensively, and there was no direct monitoring of consumption by health workers. This suggests that successful consumption behavior is influenced not only by the individual but also by a suboptimal support system.(Sari et al., 2021).

Based on the findings and analysis, it can be concluded that although the majority of adolescent girls have demonstrated good iron tablet consumption behavior, challenges remain in the implementation of the program in the field. Strengthening distribution structures, increasing the role of officers in education and monitoring, and active involvement of families and schools are needed to ensure consistent and sustainable consumption behavior.

Knowledge

The results of the univariate analysis showed that the majority of adolescent girls in the Nan Balimo Community Health Center work area had a good level of knowledge regarding the consumption of iron tablets, namely 76.1% (223 of 293 respondents), while 23.9% of respondents still had insufficient knowledge. This finding indicates that although the majority of respondents had received information about the importance of iron tablets, there was still a significant proportion who did not have adequate understanding. The results of the qualitative analysis revealed that the low level of knowledge in some respondents was caused by a less interactive educational approach, monotonous information delivery, and a lack of variety of interesting health promotion media.

Although the study results indicate a relatively good level of knowledge, several aspects require criticism. First, the high proportion of respondents with insufficient knowledge (23.9%), indicating that current educational programs have not been optimal in reaching all target audiences. Second, the monotonous and less interactive educational approach indicates the need for innovation in health communication strategies. Third, the lack of variety in health promotion media indicates that existing programs have not maximized the use of available communication channels, particularly digital media, which is more familiar to adolescents. This presents a challenge, given the characteristics of adolescents who are more responsive to dynamic and engaging communication approaches.

From an in-depth analysis of the research findings and comparison with previous studies, it was found that the level of knowledge of young women about iron tablets is significantly influenced by the quality and method of health information delivery. Factors that consistently influence the level of knowledge include: accessibility of information, educational methods used, demographic characteristics of the region, and the intensity of health promotion programs. This study strengthens the argument that health education approaches must be tailored to the characteristics of the target audience, in this case young women who require more interactive and varied communication methods. The findings regarding the importance of engaging visual media and a dialogic approach are in line with modern health communication theory that emphasizes active audience participation in the learning process.

Based on the research results and discussion above, it can be concluded that the level of knowledge of adolescent girls regarding the consumption of iron tablets in the Nan Balimo Community Health Center working area is relatively good (76.1%), but still needs to be improved to achieve optimal coverage. The low level of knowledge among some respondents indicates the need to revitalize health education strategies with a more interactive, dialogic approach and utilize visual media that is attractive to adolescents. Future health promotion programs need to integrate various communication methods that are appropriate to the preferences and characteristics of adolescent girls, so as to increase their understanding of the importance of consuming iron tablets and ultimately increase compliance with consumption to prevent iron deficiency anemia in the adolescent female population.

Attitude

This study revealed quite interesting findings regarding adolescent girls' attitudes toward consuming iron tablets. Of the 293 respondents, 152 (51.9%) expressed a positive attitude, while 141 (48.1%) still held a negative attitude. Although the percentage of positive attitudes was slightly higher, this relatively narrow gap reflects a worrying situation where nearly half of the adolescent girls are not fully aware of the importance of iron supplementation. Further qualitative findings identified the root causes of the low participation among some respondents, including an unappealing educational approach, the predominance of one-way communication, and the lack of active involvement from families and educational institutions in supporting the program.

Analyzing the findings of this study in a broader context, it appears that the problematic attitudes of adolescent girls toward consuming iron tablets are a manifestation of systemic failures in public health communication approaches. The underlying principle is that iron supplementation programs cannot rely solely on tablet distribution and one-way information delivery, but rather require a paradigm shift toward a more holistic and participatory approach. Factors such as unattractive educational methods, minimal two-way communication, and low involvement of key stakeholders (families and schools) reflect fundamental weaknesses in program design. This suggests the need for a strategic reorientation from a top-down approach to a bottom-up approach that better accommodates the needs, preferences, and sociocultural context of adolescent girls.

This study confirms that although a small majority of adolescent girls (51.9%) expressed a positive attitude toward consuming iron tablets, the narrow gap with those with negative attitudes indicates an urgent need for improvements to program strategies. These findings emphasize the need for a more communicative, contextual, and multi-stakeholder approach to health communication. Future iron supplementation programs must adopt more engaging and interactive educational strategies, strengthen two-way communication between health workers and adolescents, and optimize the role of families and educational institutions as support systems. Without this fundamental transformation, the target of preventing iron deficiency

anemia in adolescent girls will be difficult to achieve optimally, considering that attitudes are important predictors of long-term health behaviors.

The Role of Health Workers

The results of the univariate analysis in this study showed that 158 respondents (53.9%) stated that health workers did not play a role in the iron tablet program, while only 135 respondents (46.1%) stated the opposite. This means that more than half of the adolescent girls felt that health workers were not actively involved in distributing, monitoring, and providing education regarding iron tablet consumption. These results indicate a weak presence and role of health workers in assisting adolescents in undergoing the designed supplementation program.

Researchers believe that the low perception of the role of health workers is due to the low frequency of visits, irregular distribution schedules, and lack of direct supervision during tablet consumption. Qualitative data supports this, with most respondents stating they were not supervised while taking the tablets and were not provided with further explanations for absences. Health workers tended to visit only occasionally, distribute tablets, and lacked a follow-up mechanism for absent students. In some cases, the health workers were replaced by teachers or even class leaders, who are clearly not comparable in terms of competence and educational capacity.

It can be concluded that the weak role of health workers is a key factor hampering the success of the iron tablet consumption program. Therefore, capacity building and the active role of health workers are needed through training, the development of clear standard operating procedures (SOPs), and cross-sectoral integration with schools and families. Without the active involvement of health workers, the program will struggle to achieve optimal results, even if it is administratively well-organized.

Mass Media Exposure

The results of the univariate analysis showed that most adolescent girls in the Nan Balimo Community Health Center work area have not been optimally exposed to mass media in the context of information about Fe tablets. As many as 58.4% of respondents (171 people) admitted to not being exposed to information from mass media, while only 41.6% (122 people) stated the opposite. These results indicate that health information channels through media still do not reach the majority of program targets effectively, even though mass media is an important tool in behavior change campaigns. The results of the qualitative analysis revealed that low media exposure is due to limited quantity and quality of content, media approaches that do not match adolescent preferences, low internal motivation to seek information, the need for collaboration with social media and content that involves adolescents.

Analyzing the findings of this study, we can identify a common thread connecting various aspects of mass media exposure among adolescent girls. The core problem lies in the misalignment between health communication strategies, which still use conventional approaches, and the characteristics and preferences of the digital native generation. Today's adolescents have different media consumption patterns, tending to be more interactive, visual, and personal. The limited content and quality of information reflect policymakers' lack of understanding of the characteristics of the target audience, while low internal motivation indicates the need for a more engaging and relevant approach to adolescents' daily lives. Collaboration with social media is not simply a shift in platform, but also a shift in communication paradigm from one-way communication to interactive engagement involving adolescents as content co-creators.

This study concludes that mass media exposure related to Fe tablet information among adolescent girls in the Nan Balimo Community Health Center (Puskesmas Nan Balimo) is still very low and requires comprehensive strategic intervention. The low exposure rate (41.6%)

indicates the failure of the health communication system to effectively reach the target population. To address this issue, a transformation of health communication strategies is needed that integrates social media, develops content that suits adolescent preferences, and creates a participatory approach that involves adolescents as agents of change. Furthermore, further research is needed to explore the effectiveness of various media platforms in improving adolescent knowledge and behavior regarding Fe tablet consumption, as well as developing health communication models that are more responsive to the characteristics of the digital generation.

Family Support

Based on the results of the univariate analysis, it was found that 58.0% of respondents (170 of 293 adolescent girls) reported receiving support from their families, while 42.0% (123) reported not receiving such support. This figure indicates that although more than half of adolescents receive family support in taking iron tablets, the proportion who do not receive sufficient attention from their parents is still relatively high. This lack of support may contribute to non-compliance with the iron supplementation program.

The study concluded that weak family support in this context is not only related to a lack of direct involvement, but also due to the lack of a systemic approach within the program to actively engage families. Socialization about iron tablets is mostly focused on students in schools, while parents often lack adequate information. Qualitative data revealed that most adolescents are not directly supervised while taking iron tablets at home, and parents rarely ask or confirm whether their children are taking the tablets regularly. This indicates low family literacy regarding the importance of their involvement in shaping children's healthy habits.

Family support is a crucial pillar in shaping healthy behaviors in adolescents. Parents play a significant role as sources of information, reminders, and motivators in shaping adolescent compliance. However, this role has not been optimized by programs, both in terms of socialization and strategic involvement. Effective support involves more than simply granting permission or allowing children to participate in programs, but also actively asking questions, monitoring, and even providing examples or verbal reinforcement that builds adolescents' self-confidence. Therefore, the program's approach must be expanded to directly involve families through home-based educational media and two-way communication.

From the above description, it can be concluded that family support, particularly from parents, plays a crucial role in increasing adolescent compliance in taking iron tablets. The iron tablet program needs to be redesigned to better target families through parent-led counseling, home leaflet distribution, and social media-based campaigns also aimed at parents. Integrating a family approach into educational strategies will create a supportive home environment, strengthen iron tablet consumption behavior, and ultimately contribute to the success of the overall anemia prevention program.

The Relationship Between Knowledge and Iron Tablet Consumption Behavior

The results of the analysis of the relationship between knowledge and iron supplement tablet consumption behavior showed that 172 (77.1%) respondents with good knowledge had good consumption behavior. Conversely, among respondents with poor knowledge, only 36 (51.4%) had good consumption behavior. The results of the statistical test obtained a p value <0.0001, so it can be concluded that there is a significant relationship between knowledge and iron supplement tablet consumption behavior. From the results of the analysis, the Prevalence Odds Ratio (POR) value was also obtained = 3.185 and a 95% confidence interval: 1.813-5.595, meaning that respondents with poor knowledge have a 3.185 times chance of having irregular consumption behavior.

Researchers assessed that although there is a strong statistical relationship between knowledge and behavior, the quality of knowledge possessed by some adolescents is uneven. This is evident in the high number of incorrect answers to key questions in the questionnaire, such as question 10, which concerns the side effects of consuming iron tablets, which was answered incorrectly by 82.9% of respondents.

The importance of a holistic approach in improving iron supplement consumption behavior. Knowledge has been shown to be a significant factor, but it does not stand alone. The Health Belief Model theory explains that health behavior is influenced by individual perceptions of susceptibility, severity, benefits, and barriers. In this context, good knowledge can increase perceptions of the benefits of iron supplement consumption and reduce perceived barriers. However, other factors such as social support, accessibility, and perceived side effects also need to be considered to provide a more comprehensive picture of the determinants of iron supplement consumption behavior.

It can be concluded that good knowledge is a significant factor influencing iron tablet consumption behavior, but its effectiveness depends heavily on the method of information delivery and other supporting contexts. Therefore, educational programs must be designed not only to increase the quantity of information but also the quality of understanding. Participatory, visual, and digital approaches should be developed to ensure that the knowledge adolescents acquire truly builds awareness and encourages consistent adherence to iron tablet consumption.

The Relationship Between Attitude and Iron Tablet Consumption Behavior

The results of the bivariate analysis showed a significant relationship between the attitudes of adolescent girls and the behavior of consuming iron tablets. Respondents with positive attitudes had a higher level of compliance, namely 80.9%, compared to those with negative attitudes at 60.3%. The statistical test produced a p value <0.0001 with a Prevalence Odds Ratio (POR) of 2.794 and a 95% confidence interval of 1.650–4.732. This means that adolescents with positive attitudes have a 2.79 times greater chance of good consumption behavior than adolescents with negative attitudes.

Researchers observed that despite a significant relationship between attitudes and behavior, adolescents' attitudes toward iron tablets were still formed passively and not fully internalized. Some respondents expressed normatively positive attitudes, but these attitudes were not strong enough to overcome real barriers, such as the tablets' bitter taste, disinterest in monotonous education, or peer influence. Negative attitudes also emerged because the information received was perceived as irrelevant or did not directly address adolescents' emotions and experiences. Therefore, attitude formation needs to be carried out more systematically and empathetically.

The relationship between attitudes and behavior regarding iron tablet consumption demonstrates that attitudes are the bridge between knowledge and action. However, positive attitudes do not develop automatically from information alone; they are formed through experience, social reinforcement, and communication that taps into emotional aspects. Therefore, intervention programs need to utilize approaches that combine cognitive and affective aspects, such as peer testimonials, the use of inspirational narratives, social media campaigns, and direct involvement in promotional activities to ensure adolescents feel a sense of involvement and meaning in their behavior.

Thus, it can be concluded that a positive attitude is a crucial factor in improving iron tablet consumption, but it must be fostered through an educational process that is personal, engaging, and emotionally engaging. Adolescent health interventions cannot simply rely on lectures or formal counseling; they must be based on a socio-emotional approach relevant to the world of adolescents. Fostering positive attitudes through engaging campaigns, two-way dialogue, and peer role models will significantly help encourage consistent adherence to iron tablet consumption.

The Relationship between the Role of Health Workers and the Behavior of Consuming Iron Tablets

The results of the bivariate analysis showed a significant relationship between the role of health workers and the behavior of consuming iron tablets in adolescent girls. Respondents who stated that health workers play a role showed a level of iron tablet consumption of 83.7%, much higher than respondents who felt that health workers do not play a role (60.1%). The p-value <0.0001, with a Prevalence Odds Ratio (POR) of 3.406 and a 95% confidence interval: 1.952–5.944. This means that adolescents who perceive health workers to play a role have a 3.4 times greater chance of having good consumption behavior than those who do not feel that they play a role.

Researchers found that while the statistical relationship between the role of officers and consumption behavior was strong, fundamental weaknesses persist in practice. Officers often simply come to distribute tablets without engaging in educational activities or directly monitoring consumption. Qualitative findings revealed that most adolescents reported no follow-up mechanisms for absentees, and officers rarely inquired about side effects such as nausea. This indicates that officers' roles are not being implemented holistically, even though they should also serve as mentors, building adolescents' trust and motivation.

The optimal role of health workers should include distribution, communicative education, monitoring consumption, and managing side effects. Limited staff involvement leads to low adolescent trust and participation. This role is especially crucial in schools, where adolescents do not always receive support from their families. When staff are only present sporadically and without an engaging approach, the potential for positive influence on adolescent behavior is diminished. Therefore, a sustainable, collaborative monitoring and education system based on a participatory and emotional approach is necessary.

In conclusion, the role of health workers has been shown to significantly influence iron tablet consumption behavior. However, their effectiveness lies not only in physical presence, but also in the quality of interactions, consistency of support, and delivery methods that address adolescents' psychosocial needs. Therefore, increasing the capacity of health workers, using clear standard operating procedures (SOPs), and integrating them with school activities are crucial to ensuring that adolescents not only receive the tablets but are also fully supported throughout their consumption process.

The Relationship between Mass Media Exposure and Iron Tablet Consumption Behavior

The results of the bivariate analysis showed that there was no significant relationship between mass media exposure and the consumption behavior of Fe tablets in adolescent girls. Of the 293 respondents, those exposed to the media had good consumption behavior of 64.8%, while those not exposed had a higher consumption rate, namely 75.4%. The statistical test produced a p value = 0.063 and an Odds Ratio (OR) of 0.598 with a 95% CI of 0.360–0.995. Although the p value approached significance, these results indicate that media exposure has not significantly influenced the consumption behavior of Fe tablets in adolescents in this study area.

Researchers assessed that although media has been used as a means of information, there has been no systematic approach to producing and disseminating educational content that is appropriate for adolescents. In interviews and focus group discussions (FGDs), adolescents stated that they did not recognize the figures in promotional videos, were bored with one-way communication, and did not receive engaging posters or leaflets. Community health center (Puskesmas) social media was also deemed less popular because the content did not align with adolescent trends. This suggests that exposure alone is insufficient without appropriate quality and approach.

The effectiveness of mass media in shaping iron tablet consumption behavior is greatly influenced by its format, frequency, and familiarity with adolescents' communication styles. Media that is passive, one-way, or impersonal will not be powerful enough to influence behavior. Therefore, media approaches in the context of adolescent health programs need to be directed at visual, short, narrative media, and delivered through familiar digital platforms, such as TikTok, Instagram Reels, or WhatsApp. Furthermore, content should involve adolescent participation, for example through testimonials, video challenges, or educational comics.

It can be concluded that although mass media theoretically has the potential to influence health behavior, in the context of this study, its effectiveness has not been significantly demonstrated. The low media influence is due to the lack of communication strategies that adapt to adolescent preferences and needs. To increase the media's influence on iron tablet consumption behavior, a transformation in communication strategies is needed, one that is more personalized, relevant, and based on participatory digital media that is appropriate for today's adolescent world.

The Relationship Between Family Support and Iron Tablet Consumption Behavior

Based on the results of the bivariate analysis, it was found that there was no statistically significant relationship between family support and the behavior of consuming iron tablets. Respondents who received family support showed a level of iron tablet consumption of 75.3%, while those who did not received support showed a figure of 65.0%. The statistical test produced a p-value = 0.075 with an Odds Ratio (OR) of 1.638 (95% CI: 0.985–2.725). Although not significant at the 95% confidence level, the p-value approaching the significance limit indicates that in practice, family support still has the potential to influence consumption behavior.

Researchers believe that this insignificant relationship does not necessarily indicate that family support is unimportant, but rather indicates that this form of support is passive or unconscious among adolescents. Qualitative data shows that most families do not directly monitor iron tablet consumption, are not involved in education, and do not remind them about the dosage schedule. Some adolescents even never discuss iron tablets with their parents. This suggests that the family's role is still limited and programs have not facilitated active participation in anemia prevention interventions.

Family support is a crucial aspect in developing healthy habits in adolescents. However, its effectiveness depends heavily on the extent to which families understand the issue of anemia, the benefits of iron tablets, and how they provide concrete and emotional support. The lack of family involvement in the iron tablet program's communication strategy renders the support passive and less impactful. Therefore, it is crucial for program organizers to involve families, for example through parent education, distribution of educational leaflets to homes, and social media campaigns targeting families.

Although not statistically significant in this study, family support remains of practical relevance in shaping iron tablet consumption behavior. The role of families as emotional support and reminders of healthy behaviors needs to be strengthened through interventions that directly involve them. Program strategies that reach families and encourage communication between parents and adolescents regarding iron tablet consumption will be a crucial investment in improving adherence and the long-term effectiveness of adolescent anemia prevention programs.

Multivariate Analysis

The results of multivariate analysis using logistic regression showed that there were four variables that significantly influenced the behavior of consuming Fe tablets in adolescent girls, namely knowledge, attitude, the role of health workers, and exposure to mass media. These four variables had a p value ≤ 0.05, while family support was eliminated from the model

because the p value = 0.858. Among the significant variables, the role of health workers emerged as the dominant variable with a p value = 0.002 and an OR of 2.655 (95% CI: 1.429–4.935), which indicated that adolescents who felt supported by health workers were 2.7 times more likely to consume Fe tablets.

In contrast, based on a qualitative analysis of the most dominant variables in the Fe tablet supplementation program for adolescent girls in the Nan Balimo Community Health Center working area, it was found that program implementation still faces interrelated multidimensional challenges. The distribution of Fe tablets shows irregularity with frequencies varying from monthly to six months due to budget limitations and the availability of personnel, while the education provided is still monotonous with a dominance of oral counseling without the support of visual media that is attractive to adolescents. The monitoring and evaluation aspects of the program are very weak due to the lack of direct supervision of tablet consumption and the absence of follow-up on side effects experienced by adolescents, coupled with a recording and reporting system that is only quantitative without considering the quality of distribution and consumption. The main obstacles identified include low interest in Fe tablets among adolescents due to unpleasant taste and smell, limited health promotion media, and suboptimal coordination between health workers and schools, which ultimately impacts the stagnation of Fe tablet consumption achievements as reflected in e-PPGM data which shows a downward trend from 96.6% to 83.06% for four consecutive quarters.

Researchers assessed that although the role of health workers was statistically significant, their effectiveness in the field was still suboptimal. Qualitative analysis revealed that support from health workers was still limited to conventional counseling that was less adaptive to adolescent preferences. A lack of innovation in educational methods and minimal involvement of adolescents in the learning process resulted in health messages not being conveyed optimally. Furthermore, weaknesses in the monitoring and recording system resulted in individual barriers to consumption, such as complaints of side effects or boredom, going undetected. This contradicted the statistical significance found in the quantitative analysis.

A comprehensive look at the findings reveals that the success of iron tablet consumption among adolescents is not determined by a single factor, but rather the interaction of various promotional and structural elements. The role of health workers is crucial, but must be supported by educational strategies that are communicative, innovative, and relevant to the world of adolescents. Knowledge and attitudes provide the cognitive and affective foundation, while exposure to mass media serves as a bridge to convey information that can reinforce health messages. Program failure is more influenced by a weak implementation management system in the field than by a lack of interest from adolescents themselves. Therefore, improvements in distribution, monitoring, and cross-sector communication systems are urgently needed.

Based on the results of this study, the researchers concluded that interventions to increase iron tablet consumption among adolescent girls should focus on strengthening the role of health workers as strategic agents of change. However, this role cannot be achieved alone without support from the mass media, increased adolescent health literacy, and an accurate and reflective reporting and evaluation system. A multisectoral approach is needed that is not solely based on reporting figures but also considers the quality dimension and adolescent preferences. This research provides direction for iron tablet supplementation program policies to be more responsive and integrated with the needs and dynamics of today's adolescent girls' lives.

Conclusion

Based on the results of quantitative and qualitative research conducted on 293 young women in the working area of the Nan Balimo Health Center, Solok City, as well as interviews with key informants through a triangulation approach, the following conclusions can be drawn: 1) Frequency distribution shows that most young women have good Fe tablet consumption

behavior (71.0%), good knowledge (76.1%), and a positive attitude (51.9%). However, perceptions of the role of health workers are still relatively low, with only 46.1% of respondents stating that health workers play a role. In addition, exposure to mass media and family support are also still limited, at 41.6% and 58.0%, respectively. 2) There is a significant relationship between knowledge and Fe tablet consumption behavior (p <0.0001). Young women with poor knowledge have a 3.185 times greater chance of having irregular consumption behavior. 3) There is a significant relationship between attitudes and Fe tablet consumption behavior (p <0.0001). Adolescent girls with negative attitudes have a 2.794 times greater chance of having irregular consumption behavior. 4) There is a significant relationship between the role of health workers and the behavior of consuming Fe tablets (p <0.0001). Adolescent girls who stated that health workers do not play a role in implementing and providing information about consuming Fe tablets to adolescent girls have a 3.406 times greater chance of having irregular consumption behavior. 5) There is no significant relationship between mass media exposure and the behavior of consuming Fe tablets (p = 0.063), although there is a tendency that respondents who are not exposed to the media actually show better consumption behavior. 6) There is no significant relationship between family support and the behavior of consuming Fe tablets (p = 0.075). However, descriptively, adolescents who receive family support show a higher tendency to consume. 7) The results of the multivariate analysis show that the most dominant variable influencing the behavior of consuming Fe tablets is the role of health workers (POR = 2.655; p = 0.002), followed by attitudes, knowledge, and exposure to mass media. Family support was not proven significant in the multivariate model. 8) Qualitative research results support that the role of health workers is a dominant factor influencing consumption behavior. Based on analysis of the triangulation table, it was found that inconsistent tablet distribution, lack of direct education, and the absence of monitoring consumption resulted in low understanding and compliance among adolescents. Health workers who were directly present, provided education, and monitored consumption were shown to improve student compliance. One-way educational activities, the lack of visual or interactive aids, and minimal involvement of teachers and the health unit (UKS) also presented obstacles. Therefore,Strengthening the role of health workers in the aspects of distribution, education, monitoring, and evaluation is key to increasing the success of the Fe tablet consumption program for adolescent girls.

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