

Planning and Procurement of the Blood Enhancing Tablet Program for Adolescent Girls in Indonesia with a Systematic Review

Dessy Fajarini, Rizma Adlia Syakurah, Haerawati Idris

Public Health Science Study Program, Universitas Sriwijaya, Indonesia

dessyapt84@gmail.com

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Abstract

Introduction: Anemia in adolescent girls remains a public health problem in Indonesia, while the Iron Supplement (TTD) program has not been running optimally due to constraints in planning, procurement, and distribution. Systematically reviewing the scientific evidence related to the planning and procurement of TTD for adolescent girls in Indonesia. **Methods:** This study used a systematic review method based on the PRISMA guidelines. Article searches were conducted through PubMed, Google Scholar, ScienceDirect, DOAJ, and Garuda during the period 2020–2025. Of the 212 articles found, 15 met the inclusion criteria and were analyzed using a narrative approach based on the following themes: program planning, distribution, and compliance. **Results :** The study results show that the planning and procurement of iron tablets remains inaccurate, distribution is inconsistent, and adolescent girls' compliance with iron tablets remains low. Inhibiting factors include budget delays, weak cross-sectoral coordination, a lack of regional regulations, and minimal education and environmental support. Innovations through teacher empowerment and the use of digital media have been shown to improve knowledge and compliance. **Conclusion:** Improved data-driven planning, optimized logistics distribution, and innovative educational strategies are needed to increase the effectiveness of the TTD program in reducing the prevalence of anemia among adolescent girls in Indonesia.

Introduction

Anemia is a significant public health problem worldwide, particularly affecting young children, menstruating adolescent girls, and pregnant and postpartum women. By 2023, the global prevalence of anemia among women aged 15–49 years was recorded at 30.7%. This figure reflects that nearly one-third of women of reproductive age suffer from anemia, whether pregnant or not. The highest burden is found in low- and lower-middle-income countries, especially in rural areas, poor families, and individuals without formal education. Africa and Southeast Asia are the most affected, with approximately 106 million women and 103 million children in Africa, and 244 million women and 83 million children in Southeast Asia experiencing anemia. Among countries in Southeast Asia, Indonesia contributes a significant burden of anemia, with the prevalence of anemia among women aged 15–49 years reaching 26.7%. Based on the 2023 Indonesian Health Profile, it was reported that the prevalence of anemia in women of childbearing age was still around 22.3%. These results are in line with the findings of the 2023 Indonesian Health Survey (SKI), which showed the prevalence of anemia in women aged 15 years and above was 22.3%, indicating that anemia remains a significant health problem among Indonesian women.

To address the problem of anemia in adolescent girls, the Indonesian government has increased prevention and control efforts by prioritizing the distribution of iron supplements (IBF) in schools. Iron supplements aim to meet the increased iron needs during puberty, particularly due to blood loss during menstruation. Adolescent girls who regularly take iron supplements have been shown to reduce the incidence of anemia and increase hemoglobin (Hb) levels, which positively impact health, fitness, and academic achievement. Based on the 2023 Indonesian Health Profile, the coverage of iron supplementation for adolescent girls aged 12–18 years in Indonesia in 2021 was recorded at 31.3%, still far below the set target. Meanwhile, the latest data from the 2023 Indonesian Health Survey (SKI) shows that the proportion of adolescent girls aged 10-19 receiving TTD is 45.2%. South Sumatra Province is one of the provinces where the proportion of adolescent girls aged 10-19 receiving TTD is below the national average of 37.7%.

The main reasons for the unavailability of Iron Tablets among adolescent girls, such as lack of information about Iron Tablets (59.6%), not being provided by officers (17.6%), and out of stock (0.7%), indicate obstacles in procurement and distribution planning. Furthermore, negative perceptions of Iron Tablets, such as feeling unnecessary (11.2%) or fear of side effects, also reflect the weak integration between physical procurement and educational efforts in program planning. This situation emphasizes the need for a comprehensive evaluation of the needs planning strategy, procurement accuracy, and effectiveness of Iron Tablet distribution in South Sumatra so that this program can run according to target and have a real impact in preventing anemia in adolescent girls.

One of the crucial root problems in implementing health programs, particularly the procurement of Iron Supplement Tablets (TTD), lies in the planning and procurement aspects that are not based on real-world needs data. This inaccuracy in planning can lead to stock shortages that hinder distribution to targets, or conversely, excess stock that is unused and at risk of expiring. This condition impacts suboptimal drug availability and reduces the overall effectiveness of the program. A study by Firdaus et al. showed that inaccurate drug requirement planning due to weak estimation of usage and lead times can result in untimely or excessive drug availability, thereby increasing the potential for waste and state losses due to damaged or expired drugs. Therefore, planning and procurement

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based on actual data and applying priority analysis methods such as ABC-VEN are very necessary to prevent inefficiencies and ensure the effectiveness of health logistics distribution.

Method

This study applied a systematic review approach based on Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. The review aimed to synthesize available evidence on the planning and procurement of iron supplement tablets (Tablet Tambah Darah/TTD) for adolescent girls in Indonesia. Literature searches were performed in PubMed, Google Scholar, ScienceDirect, DOAJ, and Garuda databases, covering publications from 2020–2025. The search terms used were: “tablet tambah darah”, “iron supplementation”, “adolescent girls”, “planning”, “procurement”, and “Indonesia”. Boolean operators (AND/OR) were applied, and reference lists were screened manually. Inclusion and Exclusion Criteria

Inclusion criteria:

1. Studies discussing planning, procurement, or distribution of TTD for adolescent girls in Indonesia.
2. Published in peer-reviewed journals or credible institutional reports within the last 5 years 2020-2025.
3. Available in English or Indonesian.

Exclusion criteria:

1. Studies unrelated to adolescent girls or the Indonesian context.
2. Editorials, opinion papers, or commentaries without empirical data.

Two reviewers independently screened titles and abstracts, followed by full-text assessment for eligibility. Discrepancies were resolved by discussion. Data extraction covered authors, year, study design, objectives, methods, and key findings. Narrative synthesis was used to categorize results into: (1) Planning accuracy, (2) Procurement and supply chain issues, and (3) Program coverage and challenges. The Joanna Briggs Institute (JBI) Critical Appraisal Checklist was used to assess study quality, with only moderate-to-high quality studies included.

Results and Discussion

The initial search identified 212 records from five databases. After removing 42 duplicates, 170 titles/abstracts were screened, and 115 were excluded due to irrelevance. A total of 55 full-text articles were assessed for eligibility, with 40 articles excluded due to methodological limitations or lack of relevant results. Ultimately, 15 articles met the inclusion criteria. The following are the results of the systematic review:

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Table 1
Systematic Review Research Results

No	Authors and years	Research Methods	Outcome of Analysis	Summary of results
1	(Sholiqin et al., 2023)	This research is a quantitative descriptive observational study conducted in July 2023 by means of observation.	The accuracy of planning and deviations in planning of the Health Center in Tuban Regency are still not standard, for the results of the distribution in this study using the ITOR (Inventory Turn Of Ratio) indicator, the average results for the distribution of Iron Supplement tablets in Tuban Regency in 2022 were still below 8 times while for 2023 it was above 8 times while the standard value was 8-12 times, and for the procurement of Iron Supplement Tablets with the procurement fund indicator for 2022, the results were 101% while for 2023 it was 85.5%. At the input stage, there are differences in facilities and infrastructure. At the process stage, discrepancies occur in distribution, monitoring, recording, and reporting. At the output stage, discrepancies occur in targeting, timeliness, and distribution. At the outcome stage, there are changes in knowledge. The prevalence of anemia is found in 3 out of 10 adolescent girls.	The results of the evaluation of the planning, distribution and procurement of Iron Supplement Tablets in Tuban Regency showed that the average research results did not meet the indicator standards, only one indicator met the standards in this study, namely the percentage of the results of the accuracy of procurement funds in 2022 obtained a value of 101%.
2	(Fitriana & Dwi Pramardika, 2023)	This research is an evaluation research using qualitative research methods which was conducted from April to May 2019 in the working area of Bengkuring Community Health Center.		At the input, process and output stages, there are still discrepancies in implementation, while the results still need to be improved, and there are still teenage girls who suffer from anemia.
3	(Helmyati et al., 2023)	Literature searches were conducted on the NCBI, PubMed, Scopus, ScienceDirect, and Garuda databases for literature published in 2013-2023 according to PRISMA guidelines.	The majority of the implementation of the TTD provision program and the method of TTD distribution are not carried out according to standards, where TTD is not necessarily consistently provided every week and consumed simultaneously in schools.	Factors influencing iron supplement consumption among adolescent girls include knowledge, motivation, self-efficacy, attitudes, parents, peers, school policies and commitments, and the iron supplement provided. Positive factors encourage iron supplement consumption, while negative factors inhibit iron supplement consumption.
4	(Jayadi et al., 2021)	The qualitative method used in-depth interviews with nutritionists and	There were discrepancies in the input aspect of facilities and infrastructure. In the process aspect, discrepancies occurred in distribution,	In this study, there are still discrepancies in the input, process, and output aspects in the implementation of the

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		junior high school students.	monitoring, recording, and reporting. In the output aspect, discrepancies occurred in targeting accuracy, timing, and distribution.	TTD program in the work area of the Binamu City Health Center.
5	(Yudina & Fayasari, 2020)	This study was evaluation research that used the qualitative method with purposive sampling in January - February 2020	At the input stage, there were discrepancies in the facilities and infrastructure. At the process, stage nonconformities occur in distribution, monitoring, recording, and reporting. At the output, stage nonconformities occur in target accuracy, time, and distribution.	There were still incompatibilities in its implementation in Pasar Rebo Health Care.
6	(Widiastuti et al., 2020)	The research method used was descriptive qualitative. Data were obtained through in-depth interviews.	Three models or patterns were obtained in the implementation of iron supplementation tablets in this study. The more effective model in providing iron supplementation tablets was through empowering community health center officers, school teachers, and female student representatives in managing the distribution and consumption of iron tablets.	To improve adolescent girls' understanding of iron supplementation tablets, empowerment of teachers and female students by community health center nutritionists is needed so that the goal of the iron supplementation program for adolescent girls can be effective.
7	(Putriamanah & Fikawati, 2025)	The research method used was a systematic literature review. The search was conducted through PubMed, Scopus, Science Direct, Google Scholar, and Garuda for the period 2018–2024.	Problems and obstacles in implementing the program of providing iron tablets to adolescents in Indonesia include the inadequate number of health workers implementing the program, lack of teacher involvement, lack of compliance of adolescent girls in consuming iron tablets, inconsistency of program implementation with guidelines, lack of coordination, socialization, and monitoring of the program, inaccuracy in the timeliness of budget disbursement, and limited availability of socialization and education media.	Socialization, cross-sectoral cooperation, as well as regular supervision, monitoring, and evaluation are needed to improve program quality.
8	(Maulida et al., 2021)	This research uses a qualitative method which is then presented with a descriptive narrative.	The implementation of the TTD program for young women in Pekanbaru City is underway, but many obstacles remain, preventing the program from reaching its national target. These obstacles include a lack of cross-sectoral coordination, a lack of IEC	At the input stage, human resources for the implementation of this program can be said to be sufficient, there is still a delay in budgeting funds for implementation, there is still a lack of procurement of

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			media for outreach, and low compliance among young women in consuming TTD.	information media for program implementation and the lack of strong regulations and coordination between sectors in program implementation. At the process stage, the program implementation planning has used real data in determining targets, there is no written organizational structure in program implementation, the distribution of iron tablets refers to the scheme from the Indonesian Ministry of Health, and there are still discrepancies in the monthly recapitulation regarding the implementation of this program in the regions. At the output stage, from its first implementation in 2018 in Pekanbaru City, coverage has increased in 2019, but there are still community health centers that have not implemented this program.
9	(Indar et al., 2022)	This research was an analytic with a cross sectional approach. The population in this study were Nutrition Officers (TPG) at the Public Health Center in North Toraja Regency	Distribution is hampered by the distance between the Puskesmas' work areas and the schools' areas, which are in remote areas, so that some TPGs still have difficulty getting to the training field directly.	It is recommended that the relevant agencies refer to the Guidelines for Providing Iron Tablets to Young Girls in Schools when implementing the program for providing iron tablets.
10	(Nafis & Hilmi, 2022)	This study uses the review article method with research data sources based on journal publications on the internet	There are many effects of giving blood supplement tablets to adolescent girls with iron deficiency anemia. The effect of giving blood supplement tablets can significantly increase hemoglobin (Hb) levels so as to avoid iron nutritional anemia.	The effect of giving blood supplement tablets can increase hemoglobin (Hb) levels so as to avoid the incidence of anemia (Hb <12 mg/dL) and reduce the prevalence of anemia in Indonesia.
11	(Mesalina et al., 2024)	The research is qualitative with a phenomenological study approach. The sample was	The research findings identified important themes, namely the unavailability of regional regulatory policies, limited human resources,	It is recommended to initiate a regional policy study to accommodate the solutions found in the research.

		determined through purposive sampling, consisting of 11 people.	funding, utilization of promotional media, weak monitoring and evaluation systems, suboptimal recording and reporting, as well as obstacles from cultural factors, low knowledge, lack of concern, and suboptimal family support. The results of the study revealed that the mean knowledge score of the students before the intervention was 42.4 with a standard deviation of 12.5, while the mean knowledge score after the intervention was 60.1 with a standard deviation of 16.8. There was a significant increase in knowledge by 17.7 points, with a p-value of <0.001, indicating the influence of education through Instagram on the improvement of students' knowledge about anemia. The WA-based intervention led to a significant improvement in knowledge scores among adolescent girls from the intervention school ($p < 0.001$). These students were also more likely to have taken WIFAS in the week preceding the endline survey ($p < 0.001$) and to have consumed at least 75% of the distributed WIFAS ($p = 0.015$) compared to the control school. Furthermore, the mean hemoglobin levels were significantly higher in the intervention	
12	(Zulfajriani et al., 2023)	The research design was a pre-experimental design with a one- group pre-test and post-test. A sample of 63 respondents was selected using simple random sampling.		The active use of Instagram as a social media platform plays a crucial role in enhancing the knowledge of adolescent girls about anemia. In the context of health education, Instagram proves to be an effective medium for delivering information to a broader target audience.
13	(Laurence et al., 2025)	A quasi-experimental design was employed in 2024, utilizing a pretest-posttest control group framework across two senior high schools in Salahutu Sub-District. The		The WA-based reminder messages were effective in enhancing knowledge and adherence to WIFAS. Expanding this approach to a broader population is recommended before scaling up implementation across Indonesia
14	(Intan Rujaby et al., 2022)	This study uses a qualitative method with a type of case study research.	This achievement is still relatively low compared to the target of the National Medium-Term Development Plan (RPJMN) in 2021, which is 52%. Based on the research conducted, the causes of low Fe administration in young women include several factors.	Due to the problem of low Fe coverage in Tulungagung District, public health students made an innovation proposal in the form of a reputation program, which aims to increase the provision of Fe to young women, especially in Tulungagung District
15	(Viyanti et al., 2025)	The method used is a systematic review with the PRISMA	the use of WhatsApp can enhance awareness and knowledge of adolescent girls	the combination of communication technology, teacher

(Preferred Reporting Items for Systematic Reviews and Meta-Analyses) approach.	about the importance of consuming TTD, although the outcomes vary. Teacher support has also been shown to play an important role in improving compliance, as teachers can provide the necessary encouragement and supervision. Positive attitudes of adolescent girls towards TTD consumption significantly contribute to compliance	support, and fostering positive attitudes can enhance TTD compliance among adolescent girls. This multidimensional approach can be an effective strategy to reduce the prevalence of anemia among adolescent girls.
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Based the 212 articles identified through a literature search, after a selection process based on inclusion and exclusion criteria, 15 articles were analyzed. The study grouped the findings into three main themes. First, planning and procurement aspects are still suboptimal due to non-data-based needs calculations, delays in budget allocation, and weak cross-sectoral regulations and coordination. Second, the distribution aspect shows many inconsistencies, both in terms of schedules, regional distribution, and monitoring and reporting mechanisms, resulting in uneven program coverage. Third, adolescent girls' compliance with iron tablet consumption is influenced by internal factors (knowledge, attitudes, motivation) and external factors (support from teachers and parents, school policies, and educational media innovation). Several studies have shown that teacher empowerment and the use of digital media such as WhatsApp and Instagram can improve compliance, but the impact remains limited if distribution and planning are not optimal.

In terms of planning and procurement, most studies emphasize that the calculation of iron tablet needs is still not based on real data, often resulting in a mismatch between needs and procurement quantities. This condition leads to shortages and excess stock, which is at risk of expiration. Sholiqin et al. (2023) in Tuban reported that the distribution indicator (ITOR) remains below national standards, while Fitriana & Pramardika (2023) found significant discrepancies from input to output, particularly in terms of facilities, distribution, recording, and reporting. Distribution is also a significant obstacle. Several studies found that iron tablet distribution to schools was not carried out consistently every week, and some areas even experienced stock shortages. Jayadi et al. (2021) and Yudina & Fayasari (2020) reported discrepancies in targeting accuracy, scheduling, and distribution equity. Widiastuti et al. (2020) proposed a more effective distribution pattern through empowering teachers, school cadres, and community health center nutrition officers to ensure more regular and monitored distribution. However, in remote areas like Toraja, distribution is still hampered by geographical distance (Indar et al., 2022).

Regarding compliance with iron supplement consumption, research shows that the availability of iron supplement tablets does not automatically guarantee adolescent girls' consumption. Internal factors such as knowledge, attitudes, and motivation, as well as external factors such as support from teachers, parents, and school policies, significantly influence consumption behavior (Helmyati et al., 2023; Viyanti et al., 2025). Negative perceptions of iron supplement tablets, such as nausea or perceived unimportance, remain barriers. Nevertheless, several technology-based innovations have proven effective: Zulfajriani et al. (2023) showed that education via Instagram can improve adolescent knowledge, while Laurence et al. (2025) found that reminder messages via WhatsApp can improve compliance and hemoglobin levels.

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Overall, these findings confirm that issues in planning, procurement, and distribution are closely interconnected with consumption compliance. The iron-stick tablet program will be ineffective if it focuses solely on procurement without considering distribution and education strategies. Therefore, integration of a data-driven health logistics system with innovative and sustainable educational interventions is needed. The role of cross-sectoral collaboration—particularly schools, community health centers, local governments, and family support—is crucial in increasing program coverage and effectiveness.

Conclusion

The Iron Supplement (TTD) program in Indonesia still faces significant challenges in planning, procurement, distribution, and consumption fulfillment. Planning that is not based on real data results in stocks that do not meet needs, inconsistent distribution impacts infrastructure limitations and cross-sector coordination, and low coverage among adolescent girls due to negative perceptions, side effects, and a lack of education. Improvement efforts need to be directed at accurate logistics planning, strengthening data-driven distribution systems, and educating about innovative strategies involving schools, parents, health workers, and utilizing digital media. This will allow the TTD program to more effectively reduce the prevalence of anemia among adolescent girls in Indonesia.

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