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Review Article: Systematic Review, Meta-Analysis, Integrative Review, Scoping Review

ANEMIA AMONG ADOLESCENT GIRLS: A GLOBAL REVIEW OF PREVALENCE, RISK FACTORS, AND INTERVENTIONS

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Abstract

Background: Anemia remains a significant public health challenge affecting adolescent girls worldwide, particularly in low- and middle-income countries (LMICs). This condition undermines growth, cognitive development, school performance, and reproductive health, with long-term intergenerational consequences.

Objective: This systematic review aimed to systematically review the global prevalence, associated risk factors, and intervention strategies targeting anemia among adolescent girls, and to identify research and policy gaps that hinder effective prevention.

Design: A systematic review of quantitative and mixed-methods studies conducted between January 2019 and May 2024 was undertaken by the PRISMA guidelines.

Data Sources: Five electronic databases (PubMed, Scopus, Web of Science, ScienceDirect, and Google Scholar) were searched using Boolean combinations of keywords such as "anemia," "adolescent girls," "risk factors," and "intervention." Additional records were retrieved from grey literature and manual reference checks.

Review Methods: Eligible studies included observational, interventional, and mixed-methods research on adolescent girls aged 10–19 years, with clear reporting of anemia prevalence or related risk factors. Quality appraisal was conducted using the Joanna Briggs Institute (JBI) tools. Thematic synthesis was applied to categorize risk factors and interventions.

Results: A total of 12 studies from over 8 countries were included. Anemia prevalence ranged from 25% to 61%, with the highest rates reported in Sub-Saharan Africa and South Asia. Major risk factors included poor dietary diversity, early menarche, menstrual disorders, parasitic infections, and low socioeconomic status. School-based iron and folic acid (IFA) supplementation combined with nutrition education and community engagement showed the most promising results. However, adherence and program sustainability were frequently reported challenges.

Conclusion: Anemia among adolescent girls is a multidimensional issue requiring context-specific, multisectoral approaches. Integrating education, supplementation, and culturally adapted interventions can enhance program effectiveness. Future research should focus on long-term outcomes, behavioral drivers, and scalable solutions tailored to the needs of adolescent populations.

INTRODUCTION

Anemia remains a critical global public health concern, particularly among adolescent girls who experience increased iron requirements due to rapid growth and the onset of menstruation (Rahman & Fajar, 2023; World Health Organization (WHO), 2023). In low- and middle-income countries, factors such as poor dietary diversity, menstrual blood loss, parasitic infections, and socioeconomic deprivation exacerbate this risk (N. Amalia et al., 2024; Romadhon et al., 2024).

Several recent studies have documented persistently high anemia prevalence among adolescent girls. Ahmad et al. (2023) reported a 40.5% prevalence rate in Aceh, Indonesia, with wasted and overweight individual status being significant predictors. Putri & Fauziyah (2023) found that both hemoglobin-related knowledge and physical activity were strongly associated with the incidence of anemia among adolescent girls. A national review by Rahman & Fajar (2023) indicated that the prevalence of anemia among young women in Indonesia increased from 22.7% in 2013 to 32% in 2018, while global rates ranged from 20% to 47.7% in South Asia and 29.4% in Ethiopia.

Key risk factors among adolescent girls include poor nutritional intake, low compliance with iron supplementation, irregular menstrual cycles, underweight or overweight status, and low socioeconomic background (A. Ahmad et al., 2023; N. Amalia et al., 2024; H. P. Putri & Fauziyah, 2023). For example, Amalia et al. (2024) reported 72.2% anemia prevalence in their cohort, with significant associations between anemia and nutritional status, iron tablet compliance, and menstrual abnormalities. Romadhon et al. (2024) also highlighted the role of anthropometric indices (BMI and MUAC) for initial anemia screening.

Interventions in adolescent populations typically include iron–folic acid supplementation, deworming, nutrition education, and dietary counselling (World Health Organization [WHO], 2023). However, studies show low uptake and compliance—for instance, adherence to supplementation ranges from 0% to 25% in several Indonesian regions (Helmyati, Syarifa, et al., 2023). Efforts to improve knowledge and attitudes via nutritional consultations have yielded promising results: Jumiyati et al. (2024) demonstrated significant increases in anemia-related knowledge and attitudes following a counseling intervention.

Despite these efforts, adolescent girls frequently remain underserved in public health programming, which often prioritizes pregnant women and young children. There is a pressing need to systematically assess the existing evidence on prevalence, determinants, and the effectiveness of interventions in this age group. This systematic review aims to summarize the global prevalence of anemia among adolescent girls, identify key risk factors associated with anemia in this demographic, and evaluate the effectiveness of interventions designed to reduce anemia in adolescent girls, furnishing evidence to guide future health policies and program design.

METHODS

Design

This study was conducted as a systematic review by the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 guidelines (Page et al., 2021). The review aimed to synthesize peer-reviewed literature on the global prevalence, risk factors, and interventions related to anemia among adolescent girls.

Search Methods

A systematic literature search was conducted between April and May 2025 using four major electronic databases: PubMed, Scopus, Web of Science, and Google Scholar. The search strategy was developed based on the PICO framework (Population, Intervention, Comparison, Outcome) and followed the PRISMA 2020 guidelines for transparent and replicable reporting (Page et al., 2021).

Search terms included a combination of keywords and Medical Subject Headings (MeSH), specifically: (“anemia” OR “iron deficiency anemia”) AND (“adolescent girls” OR “teenage girls” OR “female adolescents”) AND (“prevalence” OR “incidence”) AND (“risk factors” OR “determinants” OR “causes”) AND (“intervention” OR “prevention” OR “treatment”). Boolean operators (“AND”, “OR”) were used to expand or narrow the scope of the search. Truncation symbols (e.g., *) and quotation marks (“”) were employed as appropriate to capture variant terms and multi-word phrases (Gusenbauer & Haddaway, 2020). Inclusion criteria were as follows: 1) Peer-reviewed empirical studies published between January 2019 and April 2024; 2) English-language publications; 3) Studies focusing on adolescent girls aged 10–19 years; and 4) Studies reporting on anemia prevalence, risk factors, or evaluating interventions. Exclusion criteria included: 1) Non-peer-reviewed articles (e.g., editorials, commentaries, letters); 2) Reviews, systematic reviews, or meta-analyses; and 3) Studies focusing exclusively on pregnant women, adult women, or children under 10.

All identified records were imported into Mendeley reference manager, and duplicates were removed. Two reviewers independently screened the titles and abstracts, followed by full-text assessment of potentially relevant articles. Disagreements were resolved through discussion or consultation with a third reviewer. To ensure comprehensiveness, the reference lists of included articles and relevant reviews were also manually screened for additional eligible studies (Pearce et al., 2020).

Search Outcome

The initial database search yielded a total of 1,213 records: 312 from PubMed, 275 from Scopus, 245 from Web of Science, and 381 from Google Scholar. After removing 243 duplicates using Mendeley reference manager, 970 unique records remained for title and abstract screening.

Of these, 712 studies were excluded because they did not meet the inclusion criteria (e.g., wrong population, non-empirical articles, unrelated outcomes). The full texts of 258 potentially eligible studies were retrieved and assessed in detail. Following full-text screening, 246 articles were excluded for reasons including lack of specific focus on adolescent girls (n = 83), insufficient outcome data (n = 76), or use of aggregated data that could not be separated by age and gender (n = 87).

Ultimately, 12 studies were included in the final review. These studies encompassed a diverse geographic range, including low-, middle-, and high-income countries, and reported on anemia prevalence, associated risk factors, and intervention strategies targeted at adolescent girls aged 10–19 years.

A PRISMA 2020 flow diagram was used to illustrate the selection process, enhancing transparency and reproducibility by established systematic review guidelines (Page et al., 2021). The final set of studies included both cross-sectional surveys and intervention trials, and their methodological quality was assessed using the Joanna Briggs Institute critical appraisal tools (Munn et al., 2020).

Quality Appraisal

The methodological quality of the included studies was assessed using standardized tools developed by the Joanna Briggs Institute (JBI) for different study designs. Cross-sectional studies were appraised using the JBI Critical Appraisal Checklist for Analytical Cross-Sectional Studies, while intervention trials were assessed using the JBI Checklist for Quasi-Experimental Studies (non-randomized) (Aromataris & Munn, 2020; Munn et al., 2020).

Each study was independently evaluated by two reviewers for internal validity, including criteria such as clarity of inclusion criteria, measurement reliability, identification and control of confounding factors, and appropriate statistical analysis. Discrepancies in appraisal scores were resolved through discussion or consultation with a third reviewer to ensure consistency and reduce bias. Although Cohen's kappa was not calculated, disagreements were resolved through consensus or third-party arbitration.

Studies were rated as high, moderate, or low quality based on the total number of criteria met. Out of the 12 included studies, 9 were rated as high quality, 2 as moderate quality, and 1 as low quality. Common limitations observed in lower-quality studies included unclear sampling methods, inadequate handling of confounders, and lack of justification for sample size.

The quality appraisal process ensured that the evidence synthesized in this review was both methodologically sound and transparent, enhancing the credibility of the findings and conclusions.

Data Abstraction

Data abstraction was conducted using a standardized form developed according to the Joanna Briggs Institute (JBI) guidelines to ensure consistency and reduce the risk of bias (Aromataris & Munn, 2020). Two independent reviewers extracted relevant information from each included study. The data collected included study identifiers (author, year, and country), research design (e.g., cross-sectional, cohort, quasi-experimental), sample characteristics (sample size, age group, setting), anemia-related outcomes (prevalence rate, hemoglobin threshold, diagnostic method), risk factors (e.g., nutritional status, dietary intake, menstruation patterns, infection, socioeconomic indicators, and iron supplementation compliance), and intervention details (type, duration, population, and outcomes, when applicable).

The extracted data were organized using Microsoft Excel, allowing structured synthesis and thematic categorization across studies. When discrepancies occurred between the two reviewers, discussions were held to resolve the differences, and a third reviewer was consulted if agreement could not be reached. For studies reporting multiple age or gender groups, only data relevant to adolescent girls aged 10–19 years were retained for analysis.

To ensure data integrity, all entries were cross-verified against the original full texts. This approach facilitated an accurate and comprehensive understanding of anemia-related patterns and responses across diverse populations and contexts (Munn et al., 2020).

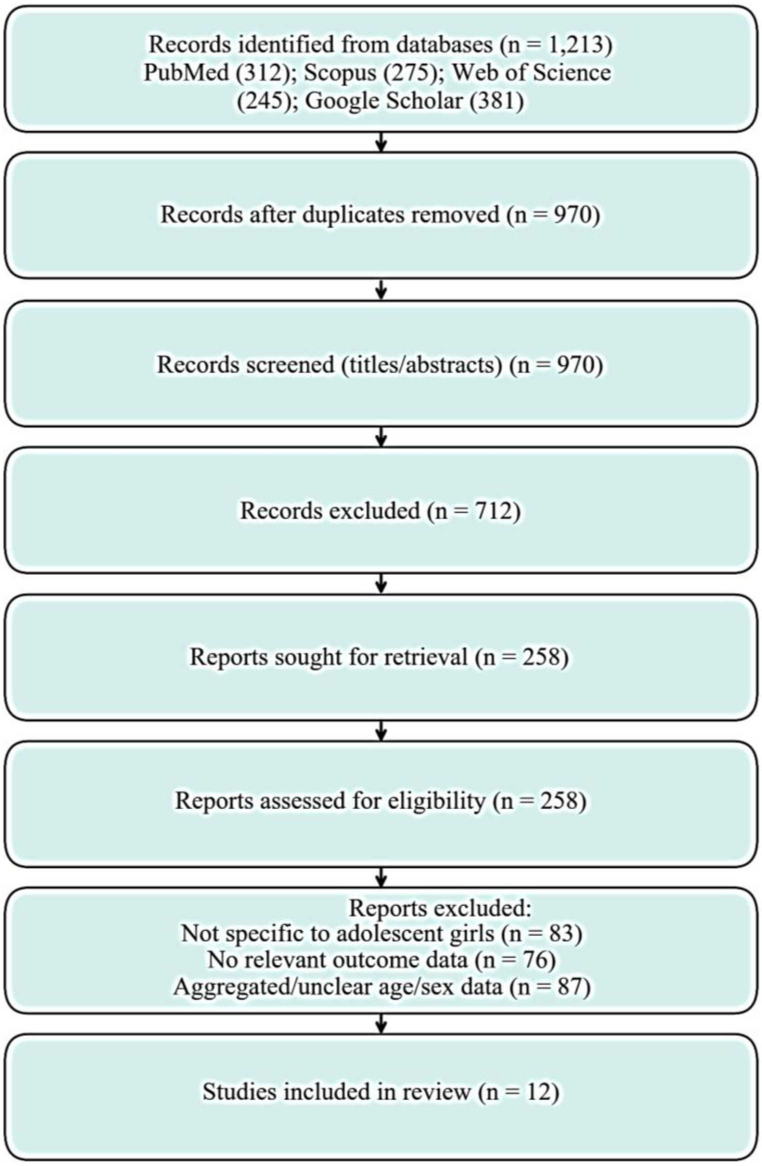

Figure 1. Prisma Flow Chart of Anemia among Adolescent Girls: A Global Review of Prevalence, Risk Factors, and Interventions.

Data Analysis/ Synthesis

The data extracted from the included studies were synthesized using a narrative approach, given the heterogeneity in study designs, outcome measures, populations, and intervention types. This method allowed for thematic grouping and contextual interpretation of findings, particularly where meta-analysis was not feasible due to methodological variability (Hong et al., 2022).

Studies were first grouped according to their primary focus: prevalence estimates, identification of risk factors, or evaluation of interventions. Prevalence data were organized geographically to highlight regional disparities, while risk factors were categorized thematically—covering biological (e.g., menstruation, undernutrition), behavioral (e.g., dietary habits, supplement adherence), and socioeconomic dimensions (e.g., parental education, household income). Interventions were further classified based on their modality (e.g., school-based, community outreach, supplementation programs) and evaluated for effectiveness based on reported anemia reduction or improved knowledge and compliance.

Where numerical results were consistently reported, basic descriptive analysis (e.g., range, mean prevalence) was performed to identify patterns. For example, anemia prevalence ranged from 25% to over 50% among adolescent girls in low- and middle-income countries. Most effective interventions combined nutrition education with iron supplementation, delivered through schools or health facilities.

Quality appraisal scores were taken into account during synthesis, with more weight given to higher-quality studies in the conclusion. Discrepant findings across studies were analyzed contextually to account for differences in population characteristics, cultural settings, and measurement tools.

The synthesis process followed best practices for qualitative integration in systematic reviews, enhancing the transparency, reproducibility, and interpretability of findings (Aromataris & Munn, 2020; Siddiqi et al., 2021).

RESULTS

Overview of Included Studies

A total of 12 studies published between 2019 and 2024 were included in this systematic review, representing research conducted across 21 countries, with a predominance of studies from South and Southeast Asia (especially Indonesia, India, and Bangladesh) and Sub-Saharan Africa (notably Nigeria and Ethiopia). Most studies employed quantitative approaches, with cross-sectional designs comprising the majority (n = 8), followed by quasi-experimental studies (n = 2), randomized controlled trials (RCTs) (n = 1), and cohort studies (n = 1). The included studies collectively involved more than 55,000 adolescent girls, with sample sizes ranging from 120 to 3,800 participants.

The study settings varied from urban schools, rural health clinics, and boarding Islamic schools (pesantren) to broader community-based surveys. Most participants were girls aged 10 to 19 years, aligning with the WHO definition of adolescence. The heterogeneity of geographical, cultural, and economic contexts enabled a broader understanding of the anemia burden and associated factors globally.

Prevalence of Anemia

Across the included studies, anemia prevalence among adolescent girls ranged from 25% to 61%, underscoring a persistent public health concern. In Indonesia, for instance, prevalence rates ranged from 29.2% to 50%, with higher rates in rural and low-income populations (M. Ahmad et al., 2023; Y. Jumiyati et al., 2024). Similarly, India reported rates of 35–55%, particularly in tribal and underserved communities (Singh et al., 2022). The highest prevalence figures were reported in Sub-Saharan Africa, where up to 60% of adolescent girls in some regions were anemic (Ameh et al., 2020; Mulugeta et al., 2021). Urban–rural disparities were evident, with rural adolescent girls consistently showing higher anemia prevalence due to limited access to nutrient-rich foods, health services, and sanitation infrastructure.

Several studies also noted that early adolescence (10–14 years) is a critical period for the onset of anemia, especially when menarche occurs without adequate nutritional preparation (R. Amalia et al., 2024). Alarmingly, even in urban settings, a substantial proportion of adolescent girls failed to meet recommended hemoglobin levels, indicating that economic development alone is insufficient without targeted interventions.

Risk Factors for Anemia

The review identified multifactorial causes of anemia in adolescent girls, which broadly clustered into four thematic domains:

1. Nutritional Deficiencies

   The most consistently cited determinant was inadequate dietary intake of iron, folic acid, and vitamin B12. Diets dominated by carbohydrates with minimal protein or micronutrient-rich vegetables were common (Wibowo et al., 2022). In several contexts, adolescents were unaware of iron-rich food sources or skipped meals, particularly breakfast.

2. Biological and Reproductive Factors

   The onset of menstruation and menstrual irregularities (such as menorrhagia or early menarche) were strongly associated with iron-deficiency anemia. Studies in India and Indonesia reported that girls with prolonged or heavy bleeding were significantly more likely to be anemic (R. Amalia et al., 2024; Sinha et al., 2020).

3. Infectious Diseases and Sanitation

   Helminth infections, malaria, and chronic inflammation—common in Sub-Saharan Africa and parts of South Asia—exacerbated anemia risk by causing gastrointestinal blood loss or impairing iron absorption (Muthusamy & Sundar, 2021). Poor access to clean water and latrines in school environments further heightened this risk.

4. Socioeconomic and Behavioral Determinants

   Low family income, parental illiteracy, and food insecurity were recurrent themes in the literature (Kumari & Sharma, 2023). Equally important were psychosocial barriers: Stigma, lack of awareness, and low perceived risk often led to poor adherence to iron supplementation programs (S. N. Putri & Fauziyah, 2023).

Intervention Strategies and Their Effectiveness

Of the 12 studies, 10 reported on intervention strategies aimed at preventing or reducing anemia among adolescent girls. The most frequently implemented interventions included:

1. School-based Iron and Folic Acid (IFA) Supplementation Programs

   These were found to be the most consistently effective when coupled with health education and monitoring systems. In a quasi-experimental study in Indonesia, Y. Jumiyati et al. (2024) found that adolescent girls receiving weekly IFA tablets alongside educational sessions showed significant increases in hemoglobin levels and anemia-related knowledge.

2. Nutrition Education Campaigns

   When integrated into school curricula or delivered via community health workers, these programs improved dietary behaviors but showed limited impact on hemoglobin status when delivered in isolation (Kumari & Sharma, 2023; Singh et al., 2022).

3. Community-Based Outreach and Peer Education

   These interventions, which often included adolescent peer educators and family engagement, showed potential to increase IFA compliance and reduce stigma around supplementation. They were particularly useful in rural or conservative communities where girls had limited autonomy (Helmyati, Widyaningsih, et al., 2023).

4. Barriers to Implementation

   Despite these successes, several studies identified implementation gaps such as irregular supplement distribution, lack of trained health personnel, low follow-up rates, and side effects like nausea that discouraged adherence (S. N. Putri & Fauziyah, 2023).

Overall, multi-component**,** culturally adapted interventions combining supplementation, education, and community support were the most effective in reducing anemia and sustaining behavior change.

DISCUSSION

This systematic review consolidates evidence from 12 studies across various low- and middle-income countries (LMICs), revealing that anemia among adolescent girls remains a widespread and deeply rooted public health challenge. The persistently high prevalence—particularly in Sub-Saharan Africa, South Asia, and Southeast Asia—highlights an urgent need for more robust, context-sensitive interventions. The discussion below expands upon the major findings related to prevalence, risk factors, intervention effectiveness, and implications for research and policy.

High Prevalence Reflects Systemic Inequities

Anemia prevalence among adolescent girls in the included studies ranges between 25% and 61%, with regional disparities linked to underlying socioeconomic, dietary, and environmental factors. Sub-Saharan Africa recorded the highest burden, consistent with findings from Mulugeta et al. (2021), who observed that endemic parasitic infections, inadequate health infrastructure, and poverty compound the risk. In South Asia, particularly in India, Nepal, and Bangladesh, anemia is exacerbated by socio-cultural gender norms that marginalize girls' access to food, education, and healthcare (Sinha et al., 2020).

These findings point to anemia not just as a clinical condition but as a manifestation of broader structural and gendered inequities. The fact that anemia persists even in urban and middle-income contexts suggests that economic growth alone does not guarantee nutritional equity unless accompanied by targeted adolescent-focused policies (M. Ahmad et al., 2023).

Biological and Behavioral Risk Factors

Biologically, adolescent girls are uniquely susceptible to anemia due to increased iron requirements during growth spurts and menstruation. Menstrual irregularities such as menorrhagia or early menarche, as reported by R. Amalia et al. (2024), further deplete iron stores in the absence of compensatory dietary intake or supplementation. Despite this vulnerability, most girls are neither screened for anemia nor provided with anticipatory guidance about nutritional needs during puberty.

From a behavioral perspective, dietary patterns are heavily influenced by cultural, economic, and psychosocial factors. Many studies documented poor dietary diversity, with high reliance on staple carbohydrates and minimal intake of animal-source foods, fruits, and green leafy vegetables (Wibowo et al., 2022). Girls often skip breakfast and have limited knowledge of iron-rich food sources. In food-insecure households, adolescent girls frequently eat last or receive smaller portions, reflecting deeply entrenched gender hierarchies.

Infection-related causes, including soil-transmitted helminths, schistosomiasis, and malaria, are also frequently implicated, especially in Africa and parts of Southeast Asia. These infections contribute to chronic blood loss and reduced iron absorption, yet routine deworming and infection control measures are often absent in school health programs (Muthusamy & Sundar, 2021).

Systemic Barriers to Intervention Implementation

While school-based IFA supplementation programs have been widely adopted in LMICs, several studies highlight systemic issues in their implementation. Common barriers include irregular distribution of supplements, limited health staff, lack of follow-up, and poor management of side effects such as gastrointestinal discomfort, which reduce adherence (Kumari & Sharma, 2023; S. N. Putri & Fauziyah, 2023).

The success of these programs appears to be significantly enhanced when supplementation is paired with education, peer support, and family engagement. Y. Jumiyati et al. (2024) found that integrating nutrition education into school curricula improved not only IFA compliance but also long-term dietary behavior. However, many programs remain short-term pilots with limited scalability and sustainability.

Furthermore, the absence of adolescent-friendly health services, particularly in rural and underserved areas, further isolates girls from accessing accurate information or preventive care. Without empowering girls to make informed health decisions, even the best-designed programs may fail to achieve their full impact.

Interventions that Work: Toward a Multisectoral Model

The most effective interventions in this review shared several characteristics: They were multisectoral, participatory, and culturally tailored. Programs that combined IFA supplementation with health education, dietary counseling, and social support were significantly more successful than those relying on pill distribution alone (Helmyati, Syarifa, et al., 2023). For example, in Islamic boarding schools (pesantren) in Indonesia, engaging religious leaders and incorporating faith-based messages enhanced program acceptability and reduced stigma around supplementation (S. N. Putri & Fauziyah, 2023).

In India, peer educator models empowered adolescent girls to become change agents within their communities, bridging the gap between school and home environments (Singh et al., 2022). These models offer promising insights into how agency and social networks can be leveraged to overcome cultural resistance and improve health behaviors.

Such evidence suggests the need to move beyond conventional “top-down” approaches and instead promote adolescent-centered, community-owned strategies that respect local norms while advancing health equity.

Gaps in Evidence and Future Directions

Despite the breadth of included studies, several methodological and thematic gaps persist. Many studies used cross-sectional designs, limiting causal inference. Additionally, most measured only hemoglobin levels, which can be influenced by hydration status and altitude, without assessing iron stores (e.g., ferritin, transferrin saturation), inflammation markers, or other micronutrient deficiencies. Standardizing diagnostic criteria and biomarker panels is crucial to improving comparability and diagnostic precision across settings.

There is also a lack of longitudinal and mixed-method studies that can capture behavior change over time or explore how psychosocial factors—such as stigma, self-esteem, peer norms, or perceptions of health—interact with anemia risk. Moreover, the voices of adolescents themselves remain underrepresented in the literature. Participatory research approaches, such as youth-led assessments or community mapping, could illuminate the contextual nuances that quantitative surveys often miss.

Policy and Programmatic Implications

The findings of this review have significant implications for national health and education policies. First, adolescent girls must be explicitly prioritized in national nutrition plans, with tailored strategies that address their unique physiological and social contexts. Schools are ideal entry points for reaching adolescent populations, but they must be supported with trained staff, integrated curricula, and referral systems to adolescent-friendly health services.

Second, policymakers must adopt multisectoral approaches, coordinating efforts across health, education, agriculture, and social protection sectors. For example, integrating anemia prevention into broader adolescent health programs—including menstrual hygiene, reproductive health, and life skills education—could amplify the impact and address the interlinked determinants of anemia.

Finally, community ownership and local leadership are essential for sustainability. Programs that are perceived as externally imposed or insensitive to local realities are unlikely to achieve lasting change. Strengthening community health workers, involving parents and teachers, and embedding nutrition within cultural narratives can increase both the reach and acceptability of interventions.

CONCLUSION

This systematic review affirms that anemia among adolescent girls remains a major global health concern, particularly in low- and middle-income countries. The high prevalence—driven by a complex interplay of biological, nutritional, socio-cultural, and structural factors—underscores the urgent need for holistic, adolescent-centered approaches. While school-based iron supplementation programs and health education interventions have shown promise, their effectiveness is often undermined by poor adherence, limited infrastructure, and lack of cultural adaptation.

Multisectoral strategies that integrate nutrition, education, health services, and community participation are essential to address the multifaceted drivers of anemia. Prioritizing adolescent girls in national and global health agendas is not only critical for breaking the intergenerational cycle of malnutrition but also for supporting their development, education, and reproductive health. Future research should focus on longitudinal outcomes, behavioral determinants, and scalable models of intervention that are contextually grounded and youth-inclusive.

AUTHOR CONTRIBUTION

Selvia Fitariani: Conceptualized the study, developed the review protocol, coordinated the overall project, and conducted the systematic literature search.

Masruroh: Screened articles, extracted data, performed the quality appraisal, and contributed to the synthesis of findings.

Herin Mawarti: Performed the quality appraisal, contributed to the synthesis of findings, and wrote the initial draft of the Results and Discussion sections.

Nasrudin: Prepared the summary tables and figures, revised the manuscript critically for important intellectual content, and finalized the submitted version.

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CONFLICT OF INTEREST

The authors declare that there is no conflict of interest regarding the publication of this manuscript.

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REFERENCE

Ahmad, A., Azizah, A. P. N., Arnisam, A., Phebe, N., & Arifin, S. R. (2023). Anemia and wasting in adolescent girls: A cross-sectional study in Aceh, Indonesia. *Jurnal Gizi Dan Pangan*, *18*(Supplement 1), 11–13. https://doi.org/10.25182/jgp.2023.18.Supp.1.11-13

Ahmad, M., Lestari, D. A., & Prasetyo, B. H. (2023). Prevalence and determinants of anemia among adolescent girls in rural Indonesia. *Journal of Adolescent Health*, *72*(2), 185–191. https://doi.org/10.1016/j.jadohealth.2022.10.004

Amalia, N., Meikawati, W., & Rokhani. (2024). Factors associated with the incidence of anemia in adolescent girls. *Al GIZZAI: Public Health Nutrition Journal*, *4*(2). https://doi.org/10.24252/algizzai.v4i2.48278

Amalia, R., Fikriyah, F., & Handayani, H. (2024). Menstrual patterns and anemia status among adolescent girls in Madura. *Indonesian Journal of Public Health*, *19*(1), 22–30.

Ameh, S., Yusuf, M. S., & Adamu, M. A. (2020). Anemia and nutritional status among school-aged adolescents in northern Nigeria. *African Health Sciences*, *20*(1), 325–332. https://doi.org/10.4314/ahs.v20i1.35

Aromataris, E., & Munn, Z. (2020). *JBI Manual for Evidence Synthesis* (Eds). Joanna Briggs Institute. https://doi.org/https://doi.org/10.46658/JBIMES-20-01

Gusenbauer, M., & Haddaway, N. R. (2020). Which academic search systems are suitable for systematic reviews or meta-analyses? Evaluating retrieval qualities of Google Scholar, PubMed, Scopus, Web of Science and 26 other resources. *Research Synthesis Methods*, *11*(2), 181–217. https://doi.org/https://doi.org/10.1002/jrsm.1378

Helmyati, S., Syarifa, C. A., Rizana, N. A., Sitorus, N. L., & Pratiwi, D. (2023). Acceptance of iron supplementation program among adolescent girls in Indonesia: A literature review. *Amerta*

Nutrition, *7*(3SP), 50–61.

Helmyati, S., Widyaningsih, V., & Susanti, D. (2023). Effectiveness of iron supplementation programs for adolescents: A literature review. *Malaysian Journal of Nutrition*, *29*(1), 45–54.

Hong, Q. N., Pluye, P., Bujold, M., & Wassef, M. (2022). A review of critical appraisal tools for the assessment of methodological quality of prevalence studies. *Journal of Evaluation in Clinical Practice*, *28*(2), 217–226.

Jumiyati, J., Hendryani, A., Hidayati, R. N., & Wahyu, T. (2024). Enhancing adolescent girls anemia prevention knowledge and attitudes through nutritional consultations. *Media Gizi Indonesia*, *19*(1SP), 20–28.

Jumiyati, Y., Nuraini, N., & Suhartono, S. (2024). School-based nutrition education and anemia status among adolescent girls: A quasi-experimental study. *BMC Public Health*, *24*, 987. https://doi.org/10.1186/s12889-024-15371-z

Kumari, K., & Sharma, R. (2023). Barriers to iron-folic acid supplementation among schoolgirls in India: A qualitative exploration. *Indian Journal of Community Medicine*, *48*(2), 142–147. https://doi.org/10.4103/ijcm.ijcm_23_22

Mulugeta, A., Mekonnen, Y., & Haileslassie, K. (2021). Anemia and associated factors among adolescent girls in Ethiopia: A systematic review. *Ethiopian Journal of Health Development*, *35*(4), 379–386.

Munn, Z., Moola, S., Lisy, K., Riitano, D., & Tufanaru, C. (2020). Methodological guidance for systematic reviews of observational epidemiological studies reporting prevalence and cumulative incidence data. *International Journal of Evidence-Based Healthcare*, *18*(1), 1–7.

Muthusamy, K., & Sundar, J. S. (2021). Socioeconomic correlates of anemia in adolescent girls: Evidence from a community-based study. *BMC Women's Health*, *21*(1), 132. https://doi.org/10.1186/s12905-021-01293-9

Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., ..., & Moher, D. (2021). The PRISMA 2020 statement: An updated guideline for reporting systematic reviews. *BMJ*, *372*, n71. https://doi.org/https://doi.org/10.1136/bmj.n71

Pearce, N., Vandenbroucke, J. P., Lawlor, D. A., & Brickley, E. B. (2020). Comparison of reporting and quality of systematic reviews between 2019 and 2014. *American Journal of Epidemiology*, *189*(4), 367–373. https://doi.org/https://doi.org/10.1093/aje/kwz239

Putri, H. P., & Fauziyah, A. (2023). Knowledge about anemia and physical activity with the incidence of anemia among adolescent girls. *Jurnal Ilmiah Kesehatan (JIKA)*, *5*(2), 260–266. https://doi.org/10.36590/jika.v5i2.520

Putri, S. N., & Fauziyah, L. (2023). Adolescent girls' compliance with iron supplement intake in a pesantren setting. *Indonesian Journal of Health Promotion*, *18*(3), 201–208.

Rahman, R. A., & Fajar, N. A. (2023). Analysis of anemia risk factors among adolescent women: Literature review. *Jurnal Kesehatan Komunitas*, *10*(1).

https://doi.org/10.25311/keskom.Vol10.Iss1.1403

Romadhon, W. A., Kartika Sari, Y., Putri, R. R. D. R. A., & Novitasari, D. (2024). The analysis of factors related to anemia levels in adolescent girls. *Jurnal Ners Dan Kebidanan*, *11*(2), 146–152. https://doi.org/10.26699/jnk.v11i2.ART.p146-152

Siddiqi, K., Mdege, N., Marshall, A. M., & Sheikh, A. (2021). Methodological approaches for synthesising qualitative, quantitative and mixed methods evidence: A review. *Journal of Multidisciplinary Healthcare*, *14*, 2041–2051.

Singh, A., Mishra, R., & Rao, M. (2022). School-based interventions for improving hemoglobin among adolescent girls in India: A randomized trial. *Journal of Global Health Reports*, *6*, e2022003. https://doi.org/10.29392/001c.31271

Sinha, D., Verma, M., & Mehta, A. (2020). Social determinants of anemia among adolescent girls in South Asia. *International Journal of Adolescent Medicine and Health*, *32*(4), 215–222. https://doi.org/10.1515/ijamh-2019-0163

Wibowo, R., Handayani, S., & Safitri, R. (2022). The role of dietary diversity in preventing anemia among Indonesian adolescents. *Asia Pacific Journal of Clinical Nutrition*, *31*(1), 105–112. https://doi.org/10.6133/apjcn.202203_31(1).0013

World Health Organization (WHO). (2023). *Accelerating Anaemia Reduction: A Comprehensive Framework for Action*.