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Prevalence and determinant factors of Anemia Adolescent Girls in Indonesia: A protocol of systematic review and meta analysis

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ADMINISTRATIVE INFORMATION

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Conflicts of interest - None declared.

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Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 17 July 2025 and was last updated on 17 July 2025.

INTRODUCTION

Review question / Objective The researchers will perform a systematic review and meta-analysis regarding the prevalence and determinant factors anemia adolescent girls in Indonesia. The review question are:
1. Is the incidence of anemia among adolescent girls greater in urban or rural regions?
2. Is the incidence of anemia among adolescent females in Indonesia greater in academic institutions or Islamic boarding schools?
3. What are the factors contributing to anemia in adolescent girls in Indonesia?
4. What are the primary determinants of anemia in adolescent girls in Indonesia?

Rationale Intervention programs for adolescent females with anemia necessitate a suitable intervention strategy to guarantee good program outcomes. Timely baseline data on prevalence and the most significantly linked determining factors within the Indonesian setting are critically required. Moreover, thorough prevalence figures from all studies on adolescent female anemia in Indonesia are urgently required to present an accurate depiction of the condition based on reliable research findings.

Condition being studied The prevalence of anemia among adolescent girls ranges from 15% to 54%, with a prevalence of anemia in Asia of 54%, which is the highest (Benedict et al., 2018). The results of the Basic Health Research for the 5-14 age group show a prevalence of anemia of 26.8%, while for the 15-24 age group, the prevalence of anemia is 32%. Twenty-five percent of anemia patients live in rural areas and 22.7% in urban areas (Badan Penelitian dan Pengembangan Kementerian Kesehatan RI, 2018).
Fifty percent of anaemia in adolescent girls is caused by iron deficiency (Stevens et al., 2013). However, anaemia can also be caused by

deficiencies in other micronutrients, such as riboflavin, vitamin A, vitamin B12, and folate (Christian & Smith, 2018), vitamin A deficiency, acute and chronic inflammation, parasitic infections, and congenital diseases that affect haemoglobin synthesis, red blood cell production, or red blood cell survival (Targets, 2014).

Evidence shows that anaemia affects the mental health of adolescents (Khanna et al., 2019),, academic ability, and thinking (Madjdian et al., 2018). If left untreated, anaemia can have fatal consequences in the future. Pregnant women with anaemia have a higher risk of experiencing complications during childbirth and pregnancy compared to pregnant women without anaemia. Additionally, pregnant women with anaemia are also at risk of giving birth to babies with stunting (Abioye et al., 2024; Ali et al., 2024; Dwivedi et al., 2023).

Various primary studies conducted on anaemia among adolescent girls have yielded heterogeneous and inconsistent findings. This situation may reflect the actual conditions in the population if the studies were conducted according to scientific principles. However, it is possible that the existing results may be biased due to various factors such as selection bias, measurement bias, confirmation bias, and others. Therefore, an analysis to assess the quality of primary studies on anaemia among adolescent girls in Indonesia is important to reflect the actual field conditions. A review of scientific databases shows that, to date, there has been no systematic review or meta-analysis estimating the prevalence of anaemia and associated factors among adolescent girls in Indonesia.

METHODS

Search strategy The method for this review is based on the Preferred Reporting Items for Systematic Reviews and Meta-Analyses protocol (PRISMA) (Page et al., 2021). Literature searches were conducted independently by two researchers using keywords determined in accordance with Medical Subject Headings (MESH). The keywords used were frequency OR incidence OR prevalence OR prevalence AND anemia AND causality OR causes OR pathogenesis OR etiology AND females OR Adolescents, Female. The online systematic review management system RAYYAN will be used to assist with the search and retrieval process (Ouzzani et al., 2016).

Participant or population Adolescents girls aged 10-19 years old.

Intervention N/A.

Comparator N/A.

Study designs to be included Quantitative method with cross sectional, cohort or case control study and meet the inclusion criteria.

Eligibility criteria Inclusion criteria for articles include: studies conducted on the prevalence and/or risk factors of anemia in adolescent girls, research designs to be reviewed are cohort, cross-sectional and case-control designs, articles written in English and Indonesian, study time frame reported up to 2024 with no lower time limit, research conducted in Indonesia. Exclusion criteria include anemia in pregnant women, publications in the form of reviews, experiments, opinions, case reports, comments, conference abstracts, editorials, and theses/dissertations.

Information sources Researchers used several databases in this study, including Sciencedirect, PubMed, Directory of Open Access Journal (DOAJ), Wiley, Taylor n Francis, and Google Scholar.

Main outcome(s) Any report concerning prevalence and determinant factors of anemia adolescent girls will be included.

Additional outcome(s) None.

Data management The selection of studies was conducted in two stages: (i) screening of titles and abstracts was carried out by two people, one from a public health nursing/public health background and one from the field of public health. The first stage will result in a yes/no/maybe conclusion for each item. Items labelled “maybe” or where there is a difference of opinion between the two reviewers will be discussed between the reviewers to reach a yes or no agreement; (ii) full-text screening by two reviewers, resulting in a yes/no designation. A third reviewer will be used to resolve any conflicts between the first and second reviewers. In both screening stages, inclusion/exclusion criteria will be applied. Reasons for exclusion at any stage of study selection will be recorded. All items will be stored in the RAYYAN application. Relevant data from each selected study in stage (ii) of screening will be extracted and mapped using the RAYYAN application.

Quality assessment / Risk of bias analysis Quality assessment / Risk of bias analysis: The study quality assessment used was a tool developed by the Joana Brigg Institute for cross-sectional, cohort, and case-control studies. The overall risk of bias assessment is based on criteria

adapted from Cochrane ROBINS-I: (1) High risk if ≥2 critical items (Items 3, 5, 7) are rated “No”, (2) Moderate risk if there is 1 “No” or ≥2 “Unclear”, and (3) Low risk if there are no “No” and ≤1“Unclear”."

Strategy of data synthesis Narrative synthesis will be analyzed in descriptive data including year of publication, location, research design, methods, analytical approach, participant characteristics, setting, measurement tools, prevalence and determinants. Meta-analysis using R studio tools will be used to analyze quantitative data. Forest plot analysis, funnel plot analysis, Egger's test (if necessary and studies are sufficient), Beg and Mazumdar test, and Fill and Trimm analysis will be conducted to assess publication bias.

Subgroup analysis The subgroup analysis conducted is described as follows:
a. Anemia prevalence data
Anemia prevalence was grouped into two categories: residence type and study setting.
b. Determinant factors
Determinant factors with measurement indicators identical to those in ≥ 2 studies will be grouped into subgroups. The risk factor subgroups consist of: iron supplementation, nutritional status, dietary patterns, and menstrual patterns.

Sensitivity analysis Sensitivity analysis will be performed using leave one out analysis.

Language restriction The review includes publications in English language.

Country(ies) involved Indonesia.

Keywords anemia; determinant factor; prevalence; adolescent girl.

Dissemination plans The findings will be published in peer-reviewed journals.

Contributions of each author
Author 1 - Rohayati Rohayati - Developing a preliminary review plan, acting as a reviewer in screening stages (i) and (ii), assisting in data extraction, leading narrative synthesis and meta-analysis, co-authoring the results report, and assisting in preparing manuscripts for publication.
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Author 2 - Noerfitri Noerfitri - Conduncting a preliminary searches for materials according to inclusion criteria and uploading these materials to Rayyan, leading data grouping and leading data grouping, quality assessment in the data extraction phase, and contributing to the writing of the results report.
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Author 3 - Susi Hartati - Act as a reviewer in stage (ii) of screening in the event of a conflict, contribute to the development of a narrative synthesis, and contribute to the writing of the report on the results.
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