



OPEN ACCESS

EDITED AND REVIEWED BY

Birgit Knoechel,

Dana–Farber Cancer Institute, United States

*CORRESPONDENCE

Sachith Mettananda

✉ sachithmetta@yahoo.com

RECEIVED 01 August 2025

ACCEPTED 13 August 2025

PUBLISHED 22 August 2025

CITATION

Mettananda S, Songdej D and Yasara N (2025)
Editorial: Anemia in children: from nutritional
deficits to genetic disorders.
Front. Pediatr. 13:1678056.
doi: 10.3389/fped.2025.1678056

COPYRIGHT

© 2025 Mettananda, Songdej and Yasara. This
is an open-access article distributed under the
terms of the [Creative Commons Attribution
License \(CC BY\)](#). The use, distribution or
reproduction in other forums is permitted,
provided the original author(s) and the
copyright owner(s) are credited and that the
original publication in this journal is cited, in
accordance with accepted academic practice.
No use, distribution or reproduction is
permitted which does not comply with
these terms.

Editorial: Anemia in children: from nutritional deficits to genetic disorders

Sachith Mettananda^{1,2*}, Duantida Songdej³ and Nirmani Yasara⁴

¹Department of Paediatrics, University of Kelaniya, Ragama, Sri Lanka, ²University Paediatrics Unit, Colombo North Teaching Hospital, Ragama, Sri Lanka, ³Hematology-Oncology Unit, Department of Pediatrics, Faculty of Medicine Ramathibodi Hospital, Mahidol University, Bangkok, Thailand, ⁴Department of Biochemistry and Clinical Chemistry, University of Kelaniya, Ragama, Sri Lanka

KEYWORDS

anemia, thalassemia, sickle cell anemia, hereditary spherocytosis, Diamond-Blackfan anemia (DBA)

Editorial on the Research Topic

Anemia in children: from nutritional deficits to genetic disorders

Anemia is one of the most common health problems among children globally (1). The prevalence of anemia among preschool children ranges between <10% in developed countries in Europe and North America to >50% in developing countries in sub-Saharan Africa (2, 3). The causes for anemia are numerous and include nutritional deficiencies, hemoglobinopathies, inherited red cell disorders, bone marrow failure, and chronic infections (4). The relative contribution of these etiologies to the burden of anemia among children varies from country to country.

This research topic aims to provide insight into many outstanding issues related to anemia in children. The seven manuscripts of this Research Topic examine different aspects related to various causes of anemia among children, ranging from nutritional problems to genetic diseases in different parts of the world.

A study done in Uganda by Komakech et al., published in this research article collection, reported the prevalence of anemia among children aged 6–59 months as 67%. The study highlighted malaria as a significant cofactor, with children who had a history of malaria showing a 20% higher risk of anemia. It also showed that children with older caregivers were more likely to be anemic, while children aged between 3 and 5 years had a lower risk. This emphasizes how local health conditions and family factors influence anemia risk.

The study by Akindutire et al., done in Gambia, uses structural equation modelling to identify sociodemographic determinants of childhood anemia. It identified parental educational attainment, housing location, type of restroom, gender, level of education, marital status, drinking water source, state, number of children, and income status as factors affecting anemia in children.

In addition to the above community-based research studies, the research topic collection published papers covering inherited genetic diseases causing anemia in children. These include sickle cell disease, thalassemia, hereditary spherocytosis, Diamond-Blackfan anemia, and bone marrow failure syndromes.

An observational study done in Senegal by Petigas et al. described how the introduction of neonatal screening impactfully changed the trajectory of sickle cell

disease in the country. Infants diagnosed at birth through screening had fewer complications and needed fewer interventions than those who were diagnosed later, when symptoms had already developed. This demonstrates how early diagnosis can reduce suffering and improve long-term health outcomes of children with sickle cell disease.

The thalassemia study reported in this article collection reviews the mechanisms of cardiac injury due to iron overload in thalassemia. Regular blood transfusions are the leading cause of iron overload in children with transfusion-dependent thalassemia (5). The review by [Fu and Yang](#) showed that cardiac iron overload affects about a quarter of patients with beta-thalassemia major, contributing to heart failure and early death. The paper describes plausible mechanisms of injury, including oxidative stress and ferroptosis in the heart, and emphasizes the importance of early diagnosis and careful monitoring.

Another brief research report describes the clinical characteristics of a cohort of 64 patients with hereditary spherocytosis in China. The study by [Cheng et al.](#) presents the clinical features and correlates the clinical phenotype with genotypes of these patients. The study revealed that patients with genetic variants in *ANK1* and *SPTB* genes have severe disease, whereas *SPTA1* variants are associated with a milder disease.

Diamond-Blackfan anemia (DBA) is another genetic disease that causes anemia through pure red blood cell aplasia. The recent case report by [Zhou et al.](#), published under this research topic, described a 56-day-old infant with severe DBA presenting in shock due to an extremely low hemoglobin level of 1.8 g/dl; a rare presentation of the disease. The case report highlights the importance of establishing early genetic testing in patients with DBA before life-threatening complications arise.

The final paper in the collection presents a retrospective analysis of early clinical and laboratory features of 167 primary bone marrow failure syndromes in children in Shandong, China. The study by [Leng et al.](#) describes how clinical manifestations, peripheral blood counts, reticulocyte levels, red blood cell indices, and bone marrow examination findings help to differentiate aplastic anemia from refractory cytopenia and idiopathic cytopenia of undetermined significance.

Overall, the research topic has provided insight into the need for multifaceted responses in combating anemia in children. For genetic diseases like thalassemia and sickle cell disease, early diagnosis by genetic testing plays a pivotal role (6). Neonatal screening programs for sickle cell disease, thalassemia, and other inherited conditions can identify affected infants before complications arise. Genetic testing for infants presenting with unexplained severe anemia should be standard practice where resources permit (7).

From a public health viewpoint, improving overall social conditions would have a positive impact on reducing the burden

of anemia, especially in underdeveloped countries. Nutrition interventions should be locally designed, including caregiver education on good dietary practices and discouraging harmful habits, like excessive tea consumption with meals (8, 9). Addressing infectious diseases, particularly malaria, remains crucial (10). Without these decisive actions, the combined burden of nutritional and genetic anemia will continue to affect growth, learning, and life opportunities for millions of children around the world.

Author contributions

SM: Validation, Conceptualization, Resources, Data curation, Formal analysis, Project administration, Investigation, Writing – review & editing, Methodology, Supervision, Writing – original draft. DS: Writing – review & editing, Methodology, Conceptualization, Validation, Data curation. NY: Writing – review & editing, Data curation, Project administration, Validation, Conceptualization, Methodology.

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Generative AI statement

The author(s) declare that no Generative AI was used in the creation of this manuscript.

Any alternative text (alt text) provided alongside figures in this article has been generated by Frontiers with the support of artificial intelligence and reasonable efforts have been made to ensure accuracy, including review by the authors wherever possible. If you identify any issues, please contact us.

Publisher's note

All claims expressed in this article are solely those of the authors and do not necessarily represent those of their affiliated organizations, or those of the publisher, the editors and the reviewers. Any product that may be evaluated in this article, or claim that may be made by its manufacturer, is not guaranteed or endorsed by the publisher.

References

1. Collaborators GA. Prevalence, years lived with disability, and trends in anaemia burden by severity and cause, 1990–2021: findings from the global burden of disease

study 2021. *Lancet Haematol.* (2023) 10(9):e713–34. doi: 10.1016/S2352-3026(23)00160-6

2. Tesema GA, Worku MG, Tessema ZT, Teshale AB, Alem AZ, Yeshaw Y, et al. Prevalence and determinants of severity levels of anemia among children aged 6–59 months in sub-Saharan Africa: a multilevel ordinal logistic regression analysis. *PLoS One*. (2021) 16(4):e0249978. doi: 10.1371/journal.pone.0249978
3. Stevens GA, Finucane MM, De-Régil LM, Paciorek CJ, Flaxman SR, Branca F, et al. Global, regional, and national trends in haemoglobin concentration and prevalence of total and severe anaemia in children and pregnant and non-pregnant women for 1995–2011: a systematic analysis of population-representative data. *Lancet Glob Health*. (2013) 1(1):e16–25. doi: 10.1016/S2214-109X(13)70001-9
4. Mettananda S, de Silva DG. Anaemia in children: are we using the correct prevention strategies? *Ceylon Med J*. (2017) 62(2):73–6. doi: 10.4038/cmj.v62i2.8469
5. Suriapperuma T, Peiris R, Mettananda C, Premawardhena A, Mettananda S. Body iron status of children and adolescents with transfusion dependent beta-thalassaemia: trends of serum ferritin and associations of optimal body iron control. *BMC Res Notes*. (2018) 11(1):547. doi: 10.1186/s13104-018-3634-9
6. Quarmyne M-O, Bock F, Lakshmanan S, Attell BK, Snyder A, Boudreaux J, et al. Newborn screening for sickle cell disease and thalassemia. *JAMA Health Forum*. (2025) 6(3):e250064. doi: 10.1001/jamahealthforum.2025.0064
7. Russo R, Marra R, Rosato BE, Iolascon A, Andolfo I. Genetics and genomics approaches for diagnosis and research into hereditary anemias. *Front Physiol*. (2020) 11:613559. doi: 10.3389/fphys.2020.613559
8. Samararatna R, Gunaratne AVC, Mettananda S. Knowledge and practices on childhood anaemia, thalassaemia and iron deficiency among mothers of children aged between 6 and 59 months in a suburban area of Sri Lanka. *J Health Popul Nutr*. (2022) 41(1):59. doi: 10.1186/s41043-022-00341-7
9. Mettananda S, Athapathu AS. 1.10 - Iron deficiency anemia. In: Rezaei N, editor. *Comprehensive Hematology and Stem Cell Research*. 1st ed. Oxford: Elsevier (2024). p. 172–95.
10. White NJ. Anaemia and malaria. *Malar J*. (2018) 17(1):371. doi: 10.1186/s12936-018-2509-9