

Iron Deficiency Anemia

Problems in Diagnosis and Prevention at the Population Level



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KEYWORDS

• Iron • Hepcidin • Anemia • Public health • Children • Infection • Malaria

KEY POINTS

- Anemia remains a highly prevalent global health problem, affecting 43% of children younger than 5 years, 38% of pregnant women, and 29% of nonpregnant women worldwide.
- Current public health strategies to alleviate this burden include iron supplementation, home fortification with multiple micronutrient powders, and/or universal fortification of staple foods.
- Evidence that iron interventions benefit health outcomes is strongest in pregnant and nonpregnant women and weakest in young children.
- Emerging evidence indicates that iron interventions, especially in children, increase the risk of infection (especially from malaria and diarrhea) in areas of high transmission.
- Stratification of iron interventions toward children most in need, for example, using novel biomarkers, such as hepcidin, may facilitate more rational, safer, and effective interventions in the population for the future.

EPIDEMIOLOGY OF ANEMIA

There have been several recent estimates of the prevalence of anemia across the world. Overall, these studies indicate that the prevalence of anemia has marginally reduced. Although, with growth in the global population, the absolute number of anemic individuals continues to increase. Stevens and colleagues¹ studied the trends in hemoglobin (Hb) concentrations for each country between 1995 and 2011 using an ongoing systematic review of 257 national surveys, peer-reviewed scientific reports of national and subnational surveys held on the World Health Organization (WHO) Vitamins and Mineral Nutrition Information System, and data from national and

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international agencies. Data were specifically considered for children younger than 5 years and pregnant and nonpregnant women, adjusted for altitude and smoking, and were reported in the original resources. The investigators estimated that in 2011, the global mean Hb concentration and anemia prevalence in children was 111 g/L and 43% respectively, in pregnant women 114 g/L and 38% respectively, and in nonpregnant women 126 g/L and 29% respectively.

These estimates reflect a probable improvement in Hb concentrations and anemia prevalence since 1995. However, enormous disparity persists, reflecting differences in economic development and infection burden. For example, the prevalence of anemia in Central and West African children exceeds 70%, and the prevalence also exceeds 50% in East Africa and in South Asia; the prevalence is only 11% in high-income countries. Similar patterns are seen among pregnant and nonpregnant women. Overall, Stevens and coworkers¹ estimated that about 273 million children, 496 million nonpregnant women, and 32 million pregnant women were anemic in 2011. The investigators also estimated that, although most anemia was amenable to iron in settings where few other causes of anemia exist (eg, Latin America, high-income countries), this decreases to less than half in settings where malaria infection is endemic.¹ In mid-2015, the WHO republished global estimates for the prevalence of anemia, confirming approximately 800 million women and children were anemic worldwide in 2011 (Figs. 1–3).²

A second estimate of the global prevalence of anemia, which subsequently estimated the disease burden of anemia, was published in 2014 by Kassebaum and colleagues.³ Using data from more than 400 references, the investigators modeled the global prevalence of anemia in 187 countries and across both sexes and 20 age groups and then modeled cause-specific attribution to anemia due to 17 key diseases. The investigators then estimated the total years lived with disability (YLDs) using global burden of disease methodology. The investigators reported that 32.6% of the world's population were anemic in 2010 and that about 50% of cases of anemia overall were attributable to iron deficiency. In contrast to the Stevens analysis, the prevalence of anemia attributable to iron deficiency was smaller (not higher) in high-income countries where other causes (eg, hemoglobinopathies, renal impairment) were

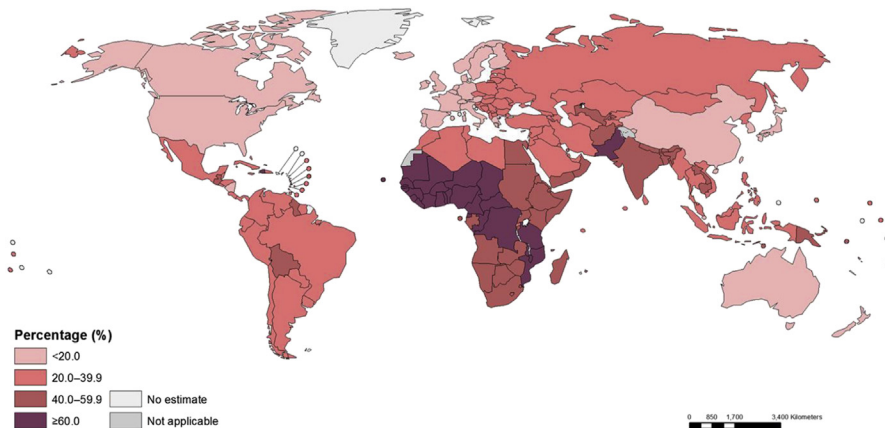


Fig. 1. Prevalence of anemia in children aged 6 to 59 months, 2011. (From World Health Organization. The global anaemia prevalence in 2011. Geneva (Switzerland): World Health Organization; 2015; with permission.)

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