Biological Times

Volume No. 5 | Issue No. 2 | Pages 7-9

Nutritional and Reproductive Determinants of Anemia in Women of Childbearing Age

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ABSTRACT

Today anemia severely limits the ability of women to reproduce and negatively impacts the health of mothers before, during, and after labour. Changes to diet and levels of activity have a direct effect on the amount of iron stored in my body; especially for women aged 15 through 49. Consuming less than enough iron and poorly available forms of iron, not consuming adequate amounts of other essential vitamins and nutrients, along with overall undernourishment lead to anemia. If you can maintain a balanced diet that provides proper nutrition to support reproductive functions, you can increase the likelihood that you will be able to remain healthy throughout your life. Identification of these issues will lead to better developed and implemented responses for nutrition, care, and feeding that are based upon population-based behaviours or tendencies.

Keywords: Anemia, women of childbearing age, Nutritional determinants, Reproductive factors, Iron deficiency, Public health nutrition

To cite this article: Hammad A, S Altaf & T Iqbal. Nutritional and Reproductive Determinants of Anemia in Women of Childbearing Age. Biological Times. 2026. February 5(2): 7-9.

Introduction

Women of reproductive age, or child-bearing age, have a problem globally with anaemia, specifically in developing and middle-income countries. One in three women worldwide suffer from anaemia; South Asia and sub-Saharan Africa have the highest rates of anaemia. Income, poor dietary intake, and lack of access to healthcare are the major causes of anaemia, in addition to nutrition and maternal health projects that are being implemented to address these issues. Anemia has serious consequences for women's health, increasing the risk of lethargy, reduced productivity, reduse the immunity, and maternal mortality. During pregnancy, it is associated with adverse outcomes such as low birth weight, preterm delivery, and high risk of perinatal mortality; as a result, it affects both maternal health and child health. Nutritional and reproductive factors are directly related to the development of anemia. This study aims to assess anemia prevalence and examine the combined influence of nutritional and reproductive determinants among women of reproductive age.

Nutritional Determinants of Anemia

Iron Intake and Bioavailability

The intake of iron and its bioavailability are central nutritional determinants of anemia. Heme iron, found in animal sources of foods are highly absorbed in the body as compared to non-heme iron, which is from plant-based sources (1). In many low-income countries, diets and meal are often rely on crop and plant-based food, resulting in lower iron absorption, even if they have adequate intake levels of iron. Iron availability greatly depends on what people eat, due to the presence of inhibitors and enhancers that either block or support its uptake. Phytates, tannins, and calcium limit the absorption of iron. Calcium acts as a barrier; in contrast, vitamin C and proteins from meat help the body use non-heme iron more effectively. When meals include strong tea, often consumed in large amounts, iron use drops even lower. Dietary habits influence these outcomes without immediate notice.

Micronutrient Deficiencies

Deficiencies of essential micronutrients other than iron also contribute to anemia. Folate deficiency impairs DNA synthesis, disrupting the formation of red blood cells and resulting in large cells
(megaloblastic anemia). Vitamin B12 deficiency interferes with red blood cell development(erythropoiesis) and is common in populations with low animal food consumption. Vitamin A plays a role in iron metabolism and particularly in releasing it from storage sites, while zinc is essential for cell development and immune function. Deficiencies in these micronutrients can worsen anemia severity and limit the effectiveness of the iron supplementation program.

Dietary Diversity and Food Security

Lack of dietary diversity is strongly associated with micronutrient deficiencies and anemia. Not easily available food that limits access to nutrient-rich foods, particularly animal-source foods, fruits, and vegetables. A household financial system and socioeconomic status influence food choices, meal frequency, and overall diet quality (2). Because of social norms, females in childbearing years face greater risks of iron deficiency. Restrictions tied to tradition tend to reduce nutritional access specifically for this group. Unequal sharing of meals based on identity plays a role in poor health outcomes. Patterns shaped by culture can deepen existing biological challenges. Access to essential nutrients becomes narrower under such conditions. Gendered routines at mealtimes contribute to long-term imbalance. What is considered acceptable to eat shapes physical well-being over time.

Malnutrition and BMI Status

Anemia can result from malnutrition in several ways: limited reserves of components required for optimal growth and development caused by being 'underweight', chronic inflammation caused by excess weight that negatively impacts the metabolism of iron and its uptake by the body, and excess levels of body fat have the potential to disrupt normal metabolic processes related to the formation of healthy red blood cells. Anemia has the potential to develop from both extremes of malnutrition (being overweight or underweight) and follow different biological pathways.

Reproductive Determinants of Anemia

Females of reproductive age often struggle to maintain proper iron levels. Because of regular menstrual bleeding, alter essential minerals. Meanwhile, expecting a child gradually increases nutritional needs over months. These shifts occur naturally, yet impact body reserves (3). Lactation after birth continues to deplete iron stores, different from pre-pregnancy states. Contraceptive use significantly influences iron requirements and losses. Medical services reaching fewer people worsen the imbalance further. Supplements missing from routines leave gaps unaddressed more often than seen elsewhere.

Menstrual Factors

Blood lost during menstruation often leads to low iron levels among women who can bear children. Those women heaving heavier periods face greater chances of lacking sufficient iron because the body loses more than usual each month. Most cycles involve around 30 to 40 milliliters of fluid leaving the body. When flow intensifies, volume might rise past 80 milliliters, steadily draining stored iron, leading to significant iron depletion over time(4). Early onset of menstruation at a young age extends the duration of monthly blood loss, which raises the chance of developing low iron levels over time. Additionally, menstrual irregularities and lack of awareness or treatment for excessive bleeding contribute to undiagnosed and untreated anemia in many women.

Pregnancy and Parity

The body needs more iron during pregnancy due to physiological changes that occur, including expanded maternal blood volume, the formation of the

placenta, and fetal growth. The amount of iron required during pregnancy is approximately twice as much as for women who are not pregnant. When there is not enough iron in the diet or there is no continuing use of iron supplements, anemia will occur from the lack of iron. Many people do not consider the additional loss of vital nutrients with multiple pregnancies, particularly with two or more fetuses at the same time. Women have inadequate time to replace their iron after having a child, increasing the likelihood of having anemia later on. Both the mother and her child will be negatively impacted by continued anemia, thereby affecting their health while pregnant (5).

Lactation Practices

Lactation places additional nutritional demands on the mother to support breast milk production. Although iron loss during lactation is generally lower due to lactational amenorrhea in many women. Prolonged breastfeeding without adequate dietary compensation can still result in maternal iron depletion. In settings where maternal diets are low in iron-rich foods and supplementation is limited, extended breastfeeding may contribute to worsening anemia. Ensuring adequate maternal nutrition during lactation is essential to maintain iron stores and overall maternal health. The lactation phase increases food demands to support breast milk production. Because monthly bleeding often stops while nursing, less iron leaves the body through blood flow due to lactational amenorrhea in many women. If meals lack enough nutrients, a woman's internal reserves may drop. Women who enter the lactation period with pre-existing anemia are particularly vulnerable (6).

Use of Contraceptives

Women's iron balance and menstrual patterns are affected by the use of contraceptive methods. Hormonal contraceptive methods, such as the oral contraceptive pill and injectables, are associated with less menstrual blood loss and an improvement in iron status and act to protect women against developing iron deficiency anemia. By way of contrast, non-hormonal methods of contraception (such as a copper IUD) may lead to increased menstrual flow in the first few months of their use, thus increasing the risk of developing anemia. Therefore, when selecting a contraceptive method, the woman's baseline iron status and anemia risk should be considered. Incorporating anemia screening and counseling into family planning services is a means to address reproductive-related iron deficiency.

Interaction Between Nutritional and Reproductive Factors

Nutritional and reproductive factors increase the risk of anemia among women of reproductive age. Poor diets, particularly inadequate comsumption of iron, folate, vitamin B12, and other micronutrients, weaken the body's ability to handle blood loss or support fetal growth during childbearing years, which has the adverse effects of reproductive demands such as menstruation, pregnancy, and lactation. When dietary intake fails to meet increased physiological requirements, iron stores become progressively depleted, leading to iron deficiency anemia. Women of Reproductive Age are More Likely to be Anemic When They are Nutritionally or Reproductively Compromised. For Example, When Women Have an Inadequate Diet (e.g., Low Iron, Folate, Vitamin B12, and Other Micronutrients), weaken the body's ability to handle blood loss or support fetal growth during childbearing years, which has the adverse effects of reproductive demands such as menstruation, pregnancy, and lactation. Beginning in childhood, poor nutrition sets the stage for later health challenges. Early onset of menstruation brings forward the timing of physical demands. Without sufficient gaps between pregnancies, repeated childbirth depletes iron stores over time. Solutions for anemia must link better nourishment with sustained care in reproductive well-being across a woman's years.

Socio-Demographic and Health System Factors

Anemia is often affected by social, demographic, and health care system factors. Educational status strongly influences food choice, health awareness, and utilization of healthcare services when needed. If women do not have access to these types of services, the likelihood that they will have a hemoglobin screening for anemia, have access to proper nutrition counseling, and receive iron and folate supplementation will be greatly diminished. In many cases, due to the poor infrastructure of health care delivery systems, a lack of connections between health care providers and clients regarding treatment plans and medications for the prevention or treatment of anemia will prevent women from receiving the appropriate treatment. In addition, parasitic infections (malaria and worms) contribute significantly to the prevalence of anemia, as these types of infections result in blood loss, hemolysis, and decreased iron absorption.

Public Health and Nutrition Implications

Research shows evidence to make possible decisions regarding nutrition and reproductive health. Further, communities will use the research to develop strategies for improving the nutritional quality of their food supply through fortifying foods (nutritional supplements) and stating why daily nutritional choices are important. In addition, both services working together to provide a comprehensive approach to prevent anaemia yield positive results in reducing the incidence of anaemia.

Table 1: Nutritional and Reproductive Determinants of Anemia among Women of Childbearing Age

Category	Determinant	Mechanism /Pathway	Effect on Anemia Risk	Public Health Implication	References
Nutritional	Low iron intake	Inadequate hemoglobin synthesis	Increased risk	Promote iron-rich diets and supplementation	(1)
Nutritional	Poor iron bioavailability	Presence of phytates and tannins	Reduced iron absorption	Dietary counseling on enhancers/inhibitors	(1)
Nutritional	Folate deficiency	Impaired red blood cell formation	Increased risk	Food fortification and supplementation	(5)
Nutritional	Vitamin B12 deficiency	Defective erythropoiesis	Increased risk	Improve intake of animal-source foods	(1)
Nutritional	Low dietary diversity	Multiple micronutrient deficiencies	Increased risk	Improve food security and diversity	(2)
Reproductive	Heavy menstrual bleeding	Excessive iron loss	Increased risk	Early diagnosis and management	(4)
Reproductive	High parity	Repeated nutrient depletion	Increased risk	Promote birth spacing	(3)
Reproductive	Short birth intervals	Inadequate replenishment of iron stores	Increased risk	Family planning services	(5)
Reproductive	Prolonged lactation	Maternal nutrient depletion	Moderate risk	Nutritional support during lactation	(6)
Health system	Poor IFA supplementation coverage	Uncorrected iron deficiency	Increased risk	Strengthen antenatal care programs	(4)

Recommendations

To increase dietary diversity and strengthen micronutrient supplementation, more time should ideally be spent between pregnancies. Increased access to health care during reproductive years will be shaped by broader access to related services. Future research on the long-term effects, intergenerational changes, and the effectiveness of interventions should reflect an integrated approach.

Conclusion

Anaemia in women of childbearing age represents a challenging public health issue. In order to prevent the disease effectively, we must consider the interaction between nutrition and reproduction in determining a woman's risk for developing the disease. Inadequate intake of iron-rich foods and lack of availability of iron from consumed foods, along with a lack of other vitamins, minerals, and variety in the diet due to malnourishment, are key contributors to low levels of haemoglobin in the blood. Excessive menstrual bleeding, having many children, short intervals between pregnancies, and long periods of breastfeeding are some of the reproductive issues that increase a woman's risk of becoming nutritionally depleted. To fully address anaemia means thinking about both types of factors (nutritional and reproductive) together across a woman's lifespan when looking at the relationship between them. The best way to improve a

woman's long-term health, productivity, and quality of life is to link the concept of nutrition-sensitive health to reproductive health.

References

[1] Li S, Luo M, Wong S, Zhang Y, Xiao H, Julian D. Iron Bioavailability : A Comparative Study of Plant-Based and Animal- Based Burgers. 2025;

[2] Mccullough ML, Chantaprasopsuk S, Islami F, Rees-punia E, Um CY, Wang Y. Association of Socioeconomic and Geographic Factors With Diet Quality in US Adults. 2022;5(6):1–16.

[3] Recovery P weaning, Kovacs XCS. MATERNAL MINERAL AND BONE METABOLISM. 2026;449–547.

[4] Munro MG, Mast AE, Powers JM, Kouides PA, Brien SHO, Richards T, et al. Expert Reviews The relationship between heavy menstrual bleeding , iron deficiency , and iron deficiency. Am J Obstet Gynecol [Internet]. 2023;229(1):1–9. Available from: https://doi.org/10.1016/j.ajog.2023.01.017

[5] Wierzejska RE. Review of Dietary Recommendations for Twin Pregnancy : Does Multiple Gestations ? 2022;

[6] Calik-ksepka A, Stradczuk M, Czarnecka K, Grymowicz M, Smolarczyk R. Lactational Amenorrhea : Neuroendocrine Pathways Controlling Fertility and Bone Turnover. 2022;1–16.