

# Malnutrition and Women's Health: A Global Public Health Challenge Across the Life Course

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## 1. Abstract

### 1.1. Background

Malnutrition in women is a multifaceted and complex global health issue. It involves undernutrition, micronutrient deficiencies, and overnutrition. It is a global health challenge despite concerted global efforts to combat it. It still remains an issue for women due to their biological and gender-related vulnerabilities.

### 1.2. Objective

The main aim of this review was to comprehensively examine and explore the prevalence of malnutrition in women, its causes and biological vulnerabilities, health impacts, and remedies for malnutrition in women.

Methods: This was done by carrying out a narrative evaluation based on peer-reviewed articles from reliable sources such as PubMed, WHO, UNICEF, and other leading global health information platforms.

### 1.3. Key Findings

The dual burden of malnutrition: Despite an increased prevalence of overweight and obesity in various regions of the world, undernutrition and micronutrient deficiencies persist in developing and middle-income countries. This increases their risk of chronic health conditions and impacts their reproductive health and maternal mortality.

### 1.4. Conclusion

In order to address the malnutrition challenges of women in various regions of the world, a multi-faceted and multi-sectoral intervention strategy would be required. This would be able to address their biological and gender-related vulnerabilities.

## 2. Introduction

Malnutrition includes a wide range of diseases such as undernutrition, micronutrient deficiencies, and overnutrition, which are caused by an imbalance or deficiency of food and nutrient intake. In the past, it was believed that malnutrition was caused by food shortages, but today it is well recognized as a complex issue influenced by a multitude of factors. These factors include biological, socioeconomic, environmental, and political factors [1].

Globally, malnutrition is a major cause of death and illness, particularly among vulnerable groups like women and children [2]. Because of their reproductive roles, physiological requirements, and status, women are particularly faced with many nutritional challenges. These challenges are further complicated by issues of inequality, including access to healthcare services, education, and economic empowerment [9].

The need for improved nutritional status among females is important for reasons beyond their own health. The cycle of hunger and illness is perpetuated through maternal nutrition, which plays a critical role in fetal and infant development, impacting health outcomes at the community level. Therefore, the achievement of global health and development goals is dependent on improving nutritional status among women [12].

The aim of this review is to provide a comprehensive overview of malnutrition in women, with particular emphasis on the importance of a life-course approach, as well as a focus on the global burden, causes, health consequences, and evidence-based solutions.

## 3. Global Burden and Epidemiology

Despite the numerous forms that malnutrition assumes, it is a

common condition that affects all income classes of people in the world. For instance, an estimated population of almost a third of the world's woman population suffers from anemia, which is a consequence of micronutrient malnutrition. This highlights the continued prevalence of malnutrition in the world. The capability of a person for work, mental capabilities, and pregnancy outcomes is all greatly influenced by this illness alone [3,4].

Malnutrition is a condition that has continued to affect women and children, with studies conducted across the globe indicating that there is a continued disparity in healthcare and nutrition between different classes of people [5]. Undernutrition is a major challenge for public health in low and middle-income countries. Due to food insecurity, poverty, and inaccessibility of healthcare services, regions such as South Asia and Sub-Saharan Africa experience the highest prevalence of this condition. On the contrary, a sedentary lifestyle and a diet that is rich in calories but low in nutrients have led to an increase in overweight and obesity among women in high income countries [20].

The emergence of the "double burden of malnutrition" phenomenon, whereby a population, home, or even an individual is faced with the coexistence of undernutrition and overnutrition, is a very worrying trend. This is a consequence of the rapid nutritional transitions driven by globalization, urbanization, and diet-related factors. This coexistence of disparate forms of malnutrition, which need to be addressed simultaneously, is a challenge for health systems [17].

## 4. Biological and Gender-Specific Vulnerabilities

### 4.1. Physiological Demands

Throughout their lives, women are more vulnerable to malnutrition because of certain physiological demands; the need for iron and other essential minerals increases during adolescence as growth is more rapid and menstruation starts. Iron deficiency anemia may develop if the requirements are not met, and this may persist throughout adulthood [9].

Dietary needs for the growth of the baby and the mother herself define pregnancy as a crucial period. Preterm births, low birth weights, and maternal mortality are related to inadequate intake of essential minerals such as calcium, iron, and folate. Additional demands are imposed on the mother's nutritional reserves by lactation [15].

### 3.2 Gender Inequality and Social Determinants

Gender disparity also has a significant impact on the nutritional status of women, apart from biological factors. The unfair distribution of food among households, as required by cultural norms in many countries, favors males and children at the expense of females. The disparity is particularly notable in resource-scarce environments where the food deficit worsens the already existing inequality [17].

The educational level and economic status of women have a significant impact on the nutritional status of women. Women who are well educated are likely to express their nutritional needs, access healthcare facilities, and make informed food choices. Conversely,

the nutritional status of women is compromised by the low educational level and economic dependency, which leads to the cycle of malnutrition [16].

## 5. Types of Malnutrition in Women

### 5.1. Undernutrition

Undernutrition is a serious public health concern in various environments around the world, especially in poor environments. It is usually characterized by poor energy and food intake, which leads to various illnesses such as being underweight and wasting. Undernutrition weakens the body's immune system, making the body more susceptible to various illnesses and increasing the duration of the illnesses [8].

### 5.2. Micronutrient Deficiencies

Micronutrient deficiency, also called "hidden hunger," affects billions of people around the world. Iron deficiency anemia and related disorders like fatigue, decreased productivity, and cognitive impairment are common among women [3,4]. In addition to iron deficiency anemia, vitamin B12 deficiency and other crucial micronutrient deficiencies cause neurological and hematological disorders [21]. Deficiencies of iodine, vitamin A, and folate cause various health problems, including thyroid disorders, vision impairment, and neural tube defects [22].

### 5.3. Overnutrition and Obesity

In particular, overnutrition has emerged as a major global health concern in urban and affluent settings. Obesity levels among women have been increasing due to a reduction in physical activity and an increased intake of processed foods containing high levels of fats and sugars [7]. Obesity has been linked to an increased risk of non-communicable diseases, including cardiovascular diseases, type 2 diabetes, and cancers [20]. Global statistics indicate that the prevalence of overweight and obesity is increasing at an alarming rate among women from both developed and developing countries [19].

## 6. Effects on Health

### 6.1. Reproductive and Maternal Health

Poor nutrition has been shown to be one of the major contributors to women's reproductive health outcomes at all stages of life. Poor maternal nutrition can play a large role in maternal morbidity and maternal mortality, especially in resource-poor settings where sufficient nutrition and health care are not readily available. Pregnancy-related metabolic demands are met through maternal energy stores, and when those stores are low due to inadequate consumption of macro- and micronutrients, the mother is at a greater risk of experiencing complications (bleeding, infection, etc.) during pregnancy [15].

When withdrawing from nutrition, mothers will likely experience the following negative effects in pregnancy: preterm delivery, low birth weight, and intrauterine growth restriction. These are all aspects of preterm birth that result from a lack of nutrition to mother during pregnancy, such as a reduced nutrient transfer to the infant from mother, and/or a failure of miscible fetal development

in the placenta. In addition to serious risks to the maternal and fetal health of mother, deficiencies in any of the several essential micronutrients (such as iron and folate) translate into an increase in the risk of development of neural tube defects and anemia [15]. The long-term health impacts of maternal malnourishment on children exist beyond just the prenatal and neonatal stage. Stunting, poor cognitive status, and low educational success have all been shown to be more prevalent in children that were born to mothers that were malnourished. Furthermore, another concept called “developmental programming” states that children born to mothers with inadequate nutrition during pregnancy are susceptible to chronic diet-related diseases as they transition into adulthood [12].

### 6.2. Chronic Diseases

Malnutrition, especially as a result of the obesity epidemic, has been identified as a key factor in the increasing rates of non-communicable diseases (NCDs), which are currently a global issue. The association between excess body weight and increased risk for hypertension, type 2 diabetes mellitus, cardiovascular disease and other cancers is well established. Additionally, the rapid increase in the number of obese women around the world has significantly contributed to the burden of diseases associated with these “lifestyle diseases” around the world [11].

The complex and two-way relationship between chronic disease and malnutrition has both an environmental and physiological component. Excessive sugar, saturated fat and highly processed foods have been shown to cause impairment of metabolism, insulin resistance and systemic inflammation. As time progresses, these physiological changes will lead to metabolic syndrome and its subsequent health problems [11].

Additionally, chronic disease risk is also associated with undernutrition. Research studies have shown that children who are malnourished during the early years of life are at greater risk for developing NCDs throughout their adult life due in part to physiological changes associated with glucose metabolism and the lack of development of other organs (i.e., the heart). The “thrifty phenotype hypothesis” is often referred to when addressing the long-term deleterious impact of malnutrition throughout one’s life [11].

Ultimately, there are gender specific considerations regarding the relationship of nutrition to chronic disease. Hormonal changes experienced by women, including those experienced during menopause, will affect women’s metabolism and how fat is distributed in the body, thereby contributing to their risk for cardiovascular disease. Therefore, there is a need for gender-specific approaches to be developed to prevent the development of chronic disease among males and females [11].

### 6.3. Mental Health and Cognitive Outcomes

Nutritional health is becoming more widely recognized as an important part of overall health, especially when analyzing the relationship between nutrition and mental well-being. Research indicates that malnutrition, whether just from calories or also from micronutrients, is associated with many adverse symptoms related

to mental health, including but not limited to fatigue, reduced concentration and increased risk for depression and/or anxiety [13].

Micronutrients, including but not limited to iron, vitamin B12 and folate, are essential in the production of neurotransmitters and overall brain function. Deficiencies in these vital nutrients can damage neural pathways, resulting in cognitive impairments and emotional disorders. In particular, iron deficiency anemia is well associated with diminished attention, memory deficits, and diminished work productivity among women. Moreover, psychosocial stressors associated with food availability or poverty further compound mental health impacts [13].

Women with food availability issues have been shown to experience more depressive symptoms and report higher levels of emotional distress, highlighting that malnutrition and mental health may have a bidirectional relationship. In addition, malnutrition during periods of critical development such as pregnancy and early childhood, may produce permanent damage to neurodevelopment. Children of malnourished mothers have an increased risk of developing cognitive impairments and experiencing lower levels of academic achievement, thereby continuing the cycle of disadvantage through multiple generations [13].

### 7. Life Course Perspective

A life-course way of thinking about nutrition is that how well someone eats at every point in life will affect what happens in later points of life. This is important to understand malnutrition for women because there are many things that happen to every woman over their life (biological, social and environmental), which all add together during time [14].

Adolescents are a very important intervention point for nutrition. This is because adolescents are rapidly growing and menstruating, making them have higher caloric needs than children. The main nutrients that adolescents are deficient in, due to their eating habits, are iron and protein. If they don’t consume enough of either, they may develop anemic or have blunted growth. Both of these complications are likely to continue into adulthood and affect their reproductive outcome [14].

Adequate nutrition before pregnancy [11] is necessary for pregnancy and for good outcome during pregnancy.[9] Poor nutrition during the reproductive years can create risk factors for infertility, poor outcome and increased maternal morbidity if the woman does become pregnant. The most sensitive time for a woman is while she is pregnant. A pregnant woman’s nutrition will have a direct impact on her infant’s development in utero and provide an environment that will ensure that the child has a healthier life [14].

The intergenerational transmission of malnutrition is a major component of life-course construction. Women who are undernourished as children have a greater likelihood of delivering an infant who is low birth weight. Low birth weight infants have a greater chance of developing malnutrition and chronic diseases later in life [14].

## 8. Determinants and Risk Factors

### 8.1. Socioeconomic Factors

Women's socioeconomic status will substantially affect their nutritional outcomes. Women who live in poverty are more likely to be food insecure, eat a limited variety of foods, and have limited access to health care services. Financial difficulties compel many women to use cheaper, calorie-dense foods, making them susceptible to both undernutrition and overweight or obesity [16].

The education level of a woman is an important factor that affects her food knowledge, ability to seek out health services, and decision-making ability in the family. Higher-than-average education usually corresponds with improved nutritional outcomes. Similarly, having a stable job and income increases a woman's ability to purchase and access healthful foods and health services; however, a large proportion of women in developing and lower-middle-income countries, continue to be economically disenfranchised [16]. Gender norms, in conjunction with socioeconomic factors, can create additional barriers for women's access to food and resources in many societies, particularly in times of food scarcity. As such, a complex set of socioeconomic factors working in conjunction with gender norms will increase the vulnerability of many women to malnutrition [16].

### 8.2. Environmental and Food Systems

Food systems shape the way people eat through food availability, cost and quality. Urban areas have become more globalized, resulting in an increase in processed foods, which are calorie-dense, further exacerbating obesity among women [6].

The "nutrition transition" is defined as a shift from traditional diets to those of Westernized nations, which typically are associated with poor nutrition quality. At the same time, the decrease in agricultural produce has led to a decrease in available micronutrient-rich foods, contributing to hidden hunger [6].

Climate change has caused further food insecurity, impacted the yield of crops and increasing food prices. Women have higher vulnerability rates due to their role in growing food and meeting the nutritional needs of their families, making them especially susceptible to the combined impacts of these environmental and systemic driving factors of undernutrition and overnutrition [6].

### 8.3. Health System Factors

In order to tackle malnutrition there are vital healthcare systems to provide prevention, screening and treatment. Maternal health care services enables the provision of antenatal care etc. which provide access to supplementary data and nutritional counseling [4].

Accessibility and quality of services available to the population present a significant difference particularly in low resource settings, as ineffective nutrition programming is limited by the challenges of weak infrastructure, workforce shortages and inconsistent supply chain management. Furthermore, the ability to create accessibility to integrated nutrition services with primary health care system reduces the potential to identify and appropriately manage issues early [4].

There are Sociocultural sensitivities such as lack of knowledge and gender role limitations that help to restrict female access to health care, and thus there is a need for culturally competent, accessible services [4].

## 9. Global and Regional Case Studies

The extent of malnutrition varies according to region and is influenced by economic factors, culture and cultural behaviours, health systems, and food availability. This shows that the type of intervention must be appropriate to the context [24].

In Sub-Saharan Africa, undernutrition and micronutrient deficiencies are common, especially in women of reproductive age. The causes of this include continuing poverty, food insecurity, and limited access to health services. As a consequence many women are anaemic, which is a direct result of malnutrition, and have poor maternal nutrition, both of which are further compounded by having to cope with the effects of infectious disease such as malaria and parasites creating a between malnutrition and the increased risk of infection [24].

In South Asia, maternal nutrition is amongst the world's worst. This is compounded by cultural behaviours such as marrying young; giving birth multiple times before age 25; and limited time between births to replenish depleted nutritional resources. [20] Furthermore, those social norms restrict women from having access to adequate food and health services. Despite their countries' economic growth, many women still have poor nutrition, and this demonstrates that structural inequality continues to exist in South Asia despite some progress [24].

In general, maternal malnutrition is a significant problem in low-income settings, and as such continues to have a major impact on health outcomes for mothers and children, including an increased incidence of low birth weight and increasing rates of neonatal mortality. This also creates an inter-generational cycle of malnutrition since children who are born to mothers who are malnourished are also at a greater risk of poor nutrition due to their mother's nutritional status [23].

## 10. Interventions and Public Health Strategies

### 10.1. Nutritional Interventions

Evidence-based nutritional interventions are the cornerstone in the fight against malnutrition among women at all stages of life. Supplementation programs for iron and folic acid have been effective in the reduction of anemia prevalence. This is especially important for pregnant women, as iron requirements are increased during pregnancy due to increased blood volumes and the needs of the fetus. Folic acid supplementation also plays a critical role in the prevention of neural tube defects in newborn babies, thereby making it an intergenerational intervention [8].

Fortification strategies for foods such as iron-fortified flour, salt, and cooking oil have been effective in addressing micronutrient deficiencies. These strategies are especially important in low- and middle-income settings, as these are the settings with limited food variety. Dietary diversification strategies are long-term interven-

tions that encourage the consumption of a variety of foods. These foods are rich in nutrients and include fruits, vegetables, animal source foods, legumes, and whole grains. Such strategies are important in behavior change communication and nutrition education. These are especially important during pregnancy, lactation, and early childhood, as these are critical windows for intervention and are periods of heightened nutritional vulnerability and opportunity [8].

### 10.2. Health System Approaches

Strengthening health systems to integrate nutrition services is crucial in the early detection, prevention, and management of malnutrition. The primary healthcare platform is effective in providing an entry point for the implementation of nutrition interventions. Malnutrition screening, including anthropometric and biochemical measurements, may be effective in facilitating the early detection of at-risk individuals [10].

The antenatal care (ANC) and postnatal care (PNC) services are crucial in providing targeted nutritional interventions. During ANC, the nutritional status of the expectant mother may be assessed, and she may be given nutritional supplements and educated on appropriate dietary practices. The PNC service may support the recovery of the new mother and promote appropriate infant feeding practices, including exclusive breastfeeding [10].

Nutrition service integration with other health programs, including reproductive health, infectious disease prevention, and non-communicable disease (NCD) prevention, may be effective in providing a comprehensive approach to addressing nutritional problems. Capacity building for health workers, strengthening nutritional supplements, and improving health information systems are crucial in effective implementation [10].

### 10.3. Policy and Multisectoral Approaches

Nutrition-sensitive interventions, including agriculture, education, and social protection programs, play a crucial role in addressing underlying determinants of malnutrition [18]. Addressing malnutrition requires coordinated efforts across sectors, including health, education, agriculture, and social protection. Empowering women through education and economic opportunities is a key strategy for improving nutritional outcomes [17].

In order to address malnutrition, there is a need to address various aspects of malnutrition. This calls for a multi-sectoral approach to address malnutrition. Various nutrition-sensitive activities, such as improving agricultural productivity and food security, and promoting equitable education opportunities, play an important role in addressing malnutrition. Improving agricultural productivity and food security can have a direct impact on nutrition. Education, especially for women, has been linked to improved nutrition. Improving agricultural productivity and food security and empowering women to improve their nutrition status are two of the activities that have been identified to be effective in improving nutrition [18].

## 11. Challenges and Barriers

Despite progress, significant challenges remain. Cultural norms, limited resources, and inequalities in program implementation hinder efforts to address malnutrition. In many settings, gender inequality continues to limit women's access to adequate nutrition and healthcare [17].

Despite the gains that have been realized in addressing malnutrition, several challenges and barriers continue to affect the effective implementation of malnutrition interventions. One of the factors is the cultural and traditional practices that affect nutrition, such as food taboos and gender-based dietary restrictions, which affect access to nutrition for some individuals, particularly women [17].

Another factor is the resources available, particularly in low- and middle-income countries, which affect the availability and accessibility of nutrition programs. For instance, a lack of funding, poor infrastructural facilities, and a lack of skilled healthcare workers are some of the factors that affect access to nutrition programs [17].

Another factor is the inequalities that exist in the implementation of nutrition programs, which lead to disparities in nutrition outcomes. For instance, rural residents are likely to experience a lower level of access to healthcare services and nutrition programs compared to urban residents. Furthermore, gender inequality is a pervasive barrier that affects access to education, economic opportunities, and healthcare services for some individuals, particularly women [17].

Another factor that affects the effectiveness of malnutrition is the political instability, which affects access to food, and the effects of climate change, which disrupts the food systems, thereby affecting access to nutrition for some individuals [17].

## 12. Future Directions and Research Gaps

Future research should focus on developing gender-sensitive interventions and evaluating their long-term impact. There is also a need for more longitudinal studies examining the life-course effects of malnutrition in women. Future studies should focus on the design and evaluation of gender-sensitive interventions that address the specific nutritional needs of women throughout different stages of life.

There is an urgent need for longitudinal studies that explore the effects of malnutrition on the health of women throughout different stages of life. This will help provide insights into how malnutrition affects the health of women throughout different stages of life, including old age. Future studies should also focus on implementation science, which will help provide insights into how best to scale up interventions and make them sustainable.

Advances in digital health technologies, data analytics, and data systems also provide opportunities for addressing issues related to nutrition. Strengthening data systems, particularly in low-resource settings, is critical for addressing the knowledge gaps that exist in the field.

### 13. Conclusion

Therefore, addressing global nutrition issues necessitates urgent and coordinated actions, which need to be taken at the national and international levels. Malnutrition among women is a multifaceted issue, which is not only biological in nature but also has social, economic, and environmental dimensions [25].

Taking a course approach is critical for addressing malnutrition issues effectively, as this acknowledges that nutritional status throughout different stages of life affects health outcomes in the future. It is, therefore, critical that malnutrition issues are addressed through an integrated approach that covers different stages of life, from adolescence through pregnancy and old age.

Malnutrition has a wider impact that goes beyond the health of individuals, as it affects families, societies, and societal development as a whole. Malnutrition among pregnant women, for instance, has a negative impact on birth outcomes, which may lead to intergenerational malnutrition and poverty [25].

Therefore, addressing this challenge requires a comprehensive strategy that incorporates biological, social, and environmental perspectives. Strengthening health systems, evidence-based interventions, and intersectoral collaboration are critical components of an effective strategy. Ultimately, addressing malnutrition among women is critical for achieving global health and development goals, including the Sustainable Development Goals (SDGs). It's crucial to commit resources and investments to ensure that all women have access to the nutrition they need for optimal health [25].

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