**Review Article**

# RISK FACTORS OF ACUTE MALNUTRITION AMONG CHILDREN UNDER FIVE YEARS OF AGE


## Abstract

Childhood malnutrition remains a significant global public health concern, and despite numerous advances and improvements in child health care; acute malnutrition among children still one of the main public health challenges in the 21st century, particularly in developing countries and is associated with a high risk of morbidity and mortality. Children are the most vulnerable group to the effects of acute malnutrition during the period of their most rapid physical growth and development, because of the extra nutritional requirements for growth and development at this time. Acute malnutrition results from the complex interplay of a range of distal and proximal factors. This review article gives a comprehensive background on the causes of acute malnutrition among children under five years of age.


**KEYWORDS:** Malnutrition, acute malnutrition, causes of acute malnutrition, children

## Introduction

Childhood malnutrition remains a significant global public health concern (Groot et al., 2020), and despite numerous advances and improvements in child health care; acute malnutrition among children still one of the main public health challenges in the 21st century, particularly in developing countries (Bhutta & Salam, 2012), and is associated with a high risk of morbidity and mortality (Cashin & Oot, 2018). Children are the most vulnerable group to the effects of acute malnutrition during the period of their most rapid physical growth and development, because of the extra nutritional requirements for growth and development at this time (Picot et al., 2012). Malnutrition defined as cellular imbalance between the supply of nutrients and energy and body's demand to ensure growth, maintenance, and specific functions (Kasio Iboyi & Zha, 2019), causes measurable adverse effects on body form, function and clinical outcome (Younis et al., 2015).

Acute malnutrition occurs when the quantity of one or more nutrients available to body tissues is inadequate to maintain optimal bodily functions (Schoonees et al., 2013). It develops as a result of recent rapid weight loss or a failure to gain weight (WFP, 2012). It can manifest over a short period of time when the body does not receive adequate amounts of micronutrients or energy, either as a result of insufficient dietary intake or through malabsorption of nutrients or loss of appetite due to illness (James et al., 2015). It increases dramatically in emergencies and in developing countries generally, where these settings are plagued by chronic poverty, poor hygiene, lack of education, poor diets and limited access to food (UNICEF, 2015b). The term of acute malnutrition has been defined in various ways and names with partially overlapping definitions; including protein-energy malnutrition, wasting, marasmus and kwashiorkor, with different clinical and pathological characteristics (Lenters et al., 2016; Trehan & Manary, 2015).

**Components of nutrition:**

Good nutrition is essential for the growth, health, development, and economic well-being of individuals and populations (Cashin & Oot, 2018). It is crucial for optimal child development throughout the first years of life and beyond (Black et al., 2013). It is divided to tow mains groups which include the following:

**Macronutrients:** Macronutrients refer to carbohydrates, proteins and fats, which make up the bulk of a diet and supply the body with energy. Carbohydrates (starches and sugars) are often a large part of the diet (80%) and the main source of energy. Fats, also an essential component in the diet, make up about 10% of the diet and supply energy and are important in cell formation. Proteins are required to build new tissue, mostly derived from animal origin such as milk, meat and eggs, which products contain essential amino acids (WHO & UNICEF, 2009).

**Micronutrients:** Micronutrients include about forty types from different minerals and vitamins that are essential for good health. Most micronutrients are classed as two types; type I, which includes iodine, iron and Vitamins as Vit A and Vit C, its deficiency do not affect growth, but leading to compromised body functions such as impaired vision, reduced intelligence, anemia, scurvy and impaired immunity. It is not determined by anthropometric measurement (Okello, 2016; WHO & UNICEF, 2009). Type II micronutrients are essential for growth and tissue repair, it includes phosphorus, zinc, potassium, magnesium, sulphur, nitrogen, essential amino acids, sodium and chloride. It is required in small quantities, but the correct balance is essential for good health. A deficiency in any of the type II micronutrients will lead to growth failure in children (WHO & UNICEF, 2009).

**Types of malnutrition:**

Malnutrition is a condition that results from deficiencies, excesses, or imbalances in a person's intake of energy or nutrients. According to classification of malnutrition by classified as three broad groups of conditions such as the following (WHO, 2020):

**Undernutrition:** Undernutrition is a consequence of inadequate nutrient intake, absorption and illness or disease (Cashin & Oot, 2018; UNICEF, 2015a). It is including:

- Acute malnutrition (wasting; low weight for height)
- Chronic malnutrition (stunting; low height for age)
- Underweight (low weight for age)

**Micronutrient deficiencies:** Micronutrient deficiencies refer to lack of important vitamins and minerals such as vitamin A, iodine, iron, and zinc. It is assessed using biochemical and clinical methods, not by anthropometric measurements (Cashin & Oot, 2018).

**Overweight (obesity):** Overweight is mostly described as an imbalance between the calories ingested and the calories expended. Childhood obesity is associated with health problems in adulthood such as insulin resistance, type 2 diabetes, hypertension or hyperlipidemia, and psychological problems like depression and eating disorders (Ayala-Marín et al., 2020).

**Acute malnutrition:**

Acute malnutrition results from acute food shortages or an insufficient intake of energy, protein or other nutrients (Fanzo et al., 2019; Shanka et al., 2015). According to UNICEF

definition, acute malnutrition is characterized by a rapid deterioration in nutritional status over a short period of time. Among children, it can be identified using the weight for height nutritional index or with mid upper arm circumference (MUAC), or identified based on the presence of bilateral pitting oedema (UNICEF, 2015a).

**Classification and definitions of acute malnutrition:**

In children less than five years of age, acute malnutrition can be classified for individual as either moderate or severe based on level of wasting, and according to specific cut offs and reference standards. At the population level, acute malnutrition is categorized in three levels as the following (UNICEF, 2015a; WFP, 2012; WFP, UNICEF, et al., 2017):

**Moderate acute malnutrition (MAM):** MAM in children 6–59 months is defined as a weight for height Z-score (WHZ) < -2 and ≥ -3 standard deviations of the WHO standards, and/or MUAC from 115 mm to less than 125 mm (UNICEF, 2015a; WFP, 2012).

**Severe acute malnutrition (SAM):** SAM is the most extreme and visible form of acute malnutrition that requires urgent treatment to survive (UNICEF, 2015a). It results from sudden reductions in food intake or diet quality and is often combined with pathological causes, and is associated with loss of body fat and wasting of skeletal muscle, develops as a result of recent rapid weight loss or a failure to gain weight (Lenters et al., 2016; Picot et al., 2012; WFP, UNICEF, et al., 2017). SAM in children 6–59 months of age defined as a weight for height/length <–3 Z-score of the WHO growth standard, and/or MUAC of less than 115 mm, or the presence of bilateral pitting oedema (nutritional oedema) (UNICEF, 2015a; WFP, 2012; WHO, 2013).

**Global acute malnutrition (GAM):** It refers to MAM and SAM together; it used as a measurement of nutritional status at a population level and as an indicator of the severity of an emergency situation (Force, 2012; Lenters et al., 2016; WFP, 2012).

**Risk factors of acute malnutrition:**

Acute malnutrition results from the complex interplay of a range of distal and proximal factors, as illustrated by UNICEF conceptual framework for malnutrition. The framework defines basic, underlying and immediate causes of malnutrition and demonstrates how these causes are interconnected (Groot et al., 2020; UNICEF, 2013). Based on scientific literature investigating the relationships among specific individual, household, and environmental factors and the development of acute malnutrition in children, the following are significant risk factors for SAM (Black et al., 2013; ENN et al., 2016; Groot et al., 2020; Sphere, 2018; UNICEF, 2013; WFP, FAO, et al., 2017):

**Immediate causes of acute malnutrition:**
The common immediate causes of acute malnutrition include the following:

**1- Inadequate dietary intake:** Inadequate dietary intake is one of the important immediate causes of child malnutrition (JMoH, 2013). Inadequate feeding lacking in quality and quantity can restrict growth and jeopardize child survival and development (UNICEF, 2011). The results from a matched case control study conducted in Chad by Dodos et al. (2018) showed that the type of complementary meal introduced for children was significantly associated with acute malnutrition.

**2- Disease (health status):** Acute malnutrition is a consequence of repeated infections, which may further worsen the child's nutritional status at a time of greater nutritional needs. This interaction between acute malnutrition and infection creates a potentially lethal cycle of worsening illness and deteriorating nutritional status (UNICEF, 2013). Acute malnutrition is associated with increased severity of infectious diseases (Jones & Berkley, 2014). Childhood illness is a contributing cause to acute malnutrition, and it is a major immediate cause of child malnutrition (JMoH, 2013; Lenters et al., 2016). Children in the first five years of life are also more susceptible to recurrent infectious such as diarrhea and respiratory infection, which adversely affect metabolism, appetite and nutritional status. Being exposed recurrent infections; children can easily enter a vicious circle of weight loss and ever worsening nutritional status. Diarrhea, in turn, not only leads to further loss of micronutrients such as potassium, zinc and other nutrients, but also deteriorates the absorption capability of the intestine, an addition to that the fever increases energy expenditure; thus putting the child at an increased risk of acute malnutrition. (Bhutta & Salam, 2012; Picot et al., 2012; Rodríguez et al., 2011; Schoonees et al., 2013; WHO, 2013). The relationship between acute malnutrition and acute diarrhea is bidirectional, acute malnutrition predisposes children to a greater incidence and duration of diarrhea, while diarrhea can, in turn, precipitate or worsen acute malnutrition. Diarrhea leads to reduced absorption of carbohydrates, protein, potassium, zinc and other nutrients, which may contribute to malnutrition. Also significant water losses from diarrhea can lead to dehydration and electrolyte imbalance (WHO, 2013).

**Underlying causes of acute malnutrition**:

There are many major underlying causes of acute malnutrition which include the following (Groot et al., 2020; UNICEF, 2013):

**1- Inappropriate feeding practices:** Inappropriate IYCF practices increase vulnerability to undernutrition (Sphere, 2018). Inappropriate IYCF practices such as inappropriate breastfeeding and complementary feeding is one of the essential reasons lead to high rates of acute malnutrition (Mahmood et al., 2017). It is characterized with poorly timed introduction of complementary foods (too early or late), infrequent feeding and poor feeding methods, poor hygiene and care practices, which take the highest tall on complementary feeding problems (Abeshu et al., 2016). Inappropriate complementary feeding practices, such as early onset of weaning, inadequate nutritional content of weaning foods, inadequate feed rations, insufficient breastfeeding and poor hygiene behaviors, have been identified as the leading causes of acute malnutrition, growth faltering, diarrhea, increased rate of infections, vitamin-mineral deficiency, poor cognitive development and increased mortality among children (Arikpo et al., 2018). Combination of nutritionally inferior diets and improper feeding practices and suboptimal breastfeeding are major contributing factors for the development of childhood malnutrition and put children at high risk for acute malnutrition especially in developing countries (Abeshu et al., 2016; UNICEF, 2011).

**2- Household food insecurity (limited access or availability of food):** Household food insecurity is one of the underlying causes of undernutrition (Sphere, 2018). It is an important factor contributing to poor nutritional status during conflict and associated with the risk of acute malnutrition in children (Carroll et al., 2017), and is one of the major causes of acute malnutrition (Schoonees et al., 2013). Young and Marshak (2018), mentioned that the acute malnutrition is nevertheless still strongly associated with situations of food insecurity. Children affected by food insecurity due to conflicts, face a disproportionate burden of malnutrition and poor health outcomes (Carroll et al., 2017). Food shortages may be acute (sudden/sharp) or chronic (long lasting), arise as a result of poverty, natural disaster or

conflicts, which may lead to the displacement of people from their homes and disruption of food supplies which results in accelerate and increase of acute malnutrition among children (Picot et al., 2012; Younis et al., 2015).

**3- Unhealthy household environment and limited access to health services:** Limited access to adequate health services or inadequate environmental health conditions such as access to safe water and sanitation facilities are associated with develop of acute malnutrition (Young & Marshak, 2018). Poor water, sanitation and hygiene have serious consequences on health and nutritional status, especially among the most vulnerable population groups (WFP, FAO, et al., 2017). A case control study done in Chad by Dodos et al. (2018) showed that absence of toilet in the household and caretakers' hand washing habits were significantly associated with both acute malnutrition and diarrhea.

**4- Other causes:** Incomplete vaccinations one of the underlying cause of malnutrition, a study conducted in Burkina Faso founds incomplete vaccinations was a risk factor for acute malnutrition relapse (Lenters et al., 2016). Birth order of children and number of family members are significantly associated with SAM (Purohit et al., 2017). Lenters et al. (2016), refer to the large size of the family is associated with an increased risk of acute malnutrition. Purohit et al. (2017), demonstrated significant association between birth weight and acute malnutrition. Also, study conducted in Pakistan by Lenters et al. (2016), found that low birth weight was risk factor for acute malnutrition in CU5.

**5- Poverty and Famine:** Famine is fundamentally linked to alleviating hunger and malnutrition (Young & Marshak, 2018). Poverty is the main underlying cause of acute malnutrition and its determinants (Müller & Krawinkel, 2005; Schoonees et al., 2013). Economically disadvantaged families are less likely to have access to improved sources of food, drinking water and less likely to have access to latrines (Lenters et al., 2016).

**Basic causes of acute malnutrition:**

Young and Marshak (2018), indicated that the several basic causes of acute malnutrition include the root causes that impact on all underlying causes such as describe in UNICEF conceptual framework for malnutrition, it is include the following:

**1- Sociocultural, economic, political, and environmental instability:** The basic causes of acute malnutrition in a community originate at the regional and national level, where strategies and policies that affect the allocation of resources (human, economic, political and cultural) influence what happens at community level. In addition, geographical isolation and lack of access to markets or services due to poor infrastructure, displacement or conflict can have a huge negative impact on health and food security that lead to child malnutrition (Groot et al., 2020; JMoH, 2013).

**2- Lack of education:** Lack of mother's knowledge has an important role lead to child malnutrition (Sangra & Nowreen, 2019). Children may not have access to the variety of foods that will provide all the necessary vitamins and minerals in their diet, this often happens as a result of a lack of mother's knowledge about appropriate feeding (Picot et al., 2012). Lenters et al. (2016), indicated to a several studies conducted in Bangladesh, India, and Pakistan demonstrated a correlation between low parental education and increased risk of acute malnutrition in children. Also, study conducted in India by Purohit et al. (2017), concluded that maternal education was significantly associated with acute malnutrition among CU5.

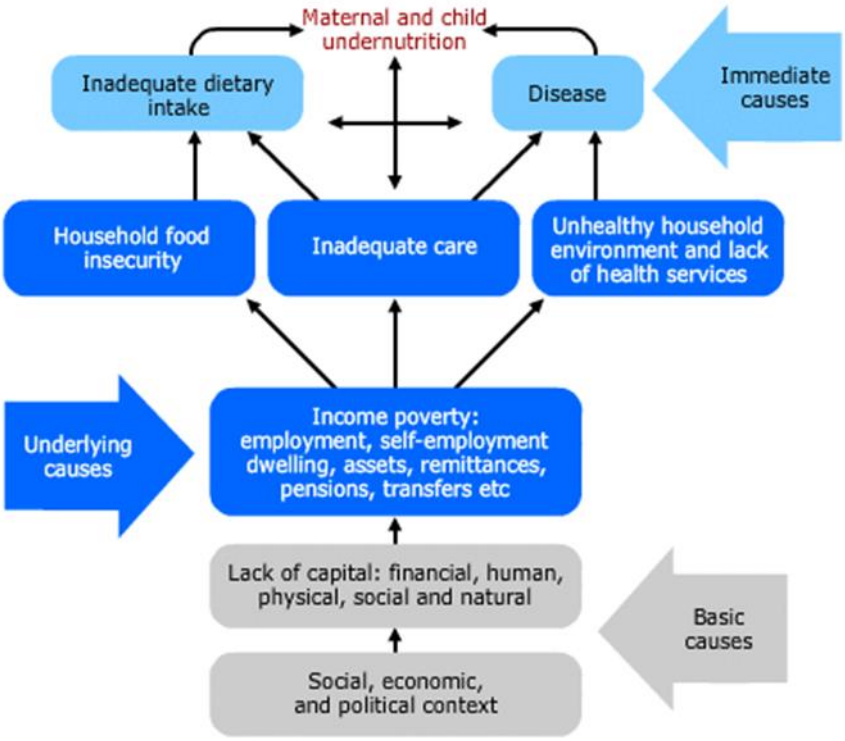


**Fig 1: Conceptual framework of the risk factors of child malnutrition (Groot et al., 2020; UNICEF, 2013)**

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