



# CASES IN GLOBAL HEALTH DELIVERY

GHD-C08  
OCTOBER 2015

## CONCEPT NOTE

### Malnutrition

In 1974, the World Food Conference declared, “Every man, woman and child has the inalienable right to be free from hunger and malnutrition.”<sup>1</sup> Since 1990, the number of malnourished individuals has fallen by 21%.<sup>2</sup> Yet, from 2011 to 2013, one out of every eight people in the world—almost one billion people—was still not getting enough food for an active and healthy life.<sup>3</sup> Most (98%) of these individuals lived in developing economic regions (see **Exhibit 1** for a map of the global prevalence of malnutrition in children under five).<sup>4</sup> Socially vulnerable groups such as children and childbearing women shoulder the largest burden of malnutrition.<sup>2</sup>

The United Nations (UN) Standing Committee on Nutrition identifies malnutrition as the single largest factor impacting the global disease burden.<sup>5</sup> In 2013 malnutrition was the underlying cause of death for at least 3.1 million children.<sup>6</sup> Malnutrition increases an individual’s susceptibility to disease by hindering the immune system, which increases vulnerability to infectious diseases such as TB, HIV, and hepatitis C.<sup>7,8</sup>

In 2013, the Food and Agriculture Organization of the UN (FAO) estimated the annual global cost of malnutrition from loss of productivity and healthcare expenditures was USD 3.5 trillion.<sup>9</sup> Underweight is responsible for nearly 15% of the total DALY<sup>i</sup> losses in countries with high child mortality.<sup>10</sup> Studies of low-income Asian countries estimate that micronutrient deficiencies decrease adult productivity by 5–17%.<sup>11</sup>

Preliminary data from the *Cost of Hunger in Africa* (COHA) study suggest malnutrition costs Uganda, Ethiopia, Swaziland, and Egypt each 1.9-16.5% of their national GDP, depending on factors including the intensity of illnesses and treatment measures in underweight children.<sup>12</sup>

---

<sup>i</sup> Disability-Adjusted Life Year. A DALY is a measure of the overall disease burden of a region expressed as the number of years removed from an individual’s live span from illness, disability, and untimely death.

---

*Julie Rosenberg, Keri Wachter, and Rebecca Weintraub prepared this concept note with assistance from Heather Pearson and Amy Madore for the purposes of classroom discussion rather than to illustrate either effective or ineffective health care delivery practice.*

Cases in Global Health Delivery are produced by the Global Health Delivery Project at Harvard. Project support was provided in part by the Ministerial Leadership in Health Program at the Harvard T.H. Chan School of Public Health and the Harvard Kennedy School in association with the Children’s Investment Fund Foundation (UK). Publication was made possible free of charge thanks to Harvard Business Publishing. © 2015 The President and Fellows of Harvard College. This case is licensed Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported.

## ***Defining Malnutrition***

Malnutrition is a broad term that refers to “all deviations from adequate and optimal nutritional status”<sup>13</sup> resulting from specific nutrient deficiencies or diets based on inappropriate combinations or proportions of foods. There are two forms of malnutrition: overnutrition and undernutrition. Overnutrition is the hyper-consumption of calories and nutrients beyond levels necessary for growth, development, and metabolic functioning. Overnutrition can lead to obesity. Undernutrition, often used interchangeably with malnutrition, results primarily from inadequate intake of dietary energy but may also be caused by infections that limit absorption of key nutrients.<sup>13</sup>

Undernutrition is further subdivided into two fluid disease categories that have different impacts: micronutrient deficiencies result from insufficient consumption of vitamins (for example, vitamin A, vitamin B), and minerals (for example, zinc, iodine, iron); and protein-energy malnutrition results from insufficient calorie and macronutrient (for example, protein) consumption.

Based upon the type of nutritional deficit, an individual is said to be acutely and/or chronically malnourished.<sup>14</sup> Acute malnutrition is caused by a sudden decrease in food consumption that results in rapid weight loss and a physical inability to meet the energetic needs of the body. Acute malnutrition is the most visible form of malnutrition and is typified by severe wasting (disproportional weight for height) and/or edema (the retention of fluid). Acute malnutrition can lead to reductions in age-appropriate growth, depressed immune functioning, fluid overload, heart failure, infection, and death.<sup>15</sup> The prevalence of acute malnutrition within a displaced populations is often used as an indicator of the severity of the humanitarian crisis.<sup>16</sup>

Chronic malnutrition is the result of inadequate nutrition over a long period of time and is not always as visible as acute malnutrition. It can begin *in utero* with poor maternal nutrition and persist through inadequate feeding practices and suboptimal food quality.<sup>17</sup> Frequent exposure to bacterial infections can further contribute.<sup>18</sup> Chronic malnutrition most commonly manifests through physical stunting—the term used to describe individuals whose weight and height may appear proportional but who are shorter and slighter than their full genetic potential (see **Exhibit 2** for the progression of stunting syndrome from conception through adulthood).<sup>15</sup>

The severity of chronic and acute malnutrition is diagnosed using anthropomorphic measures. Those with moderate acute malnutrition (MAM) or moderate chronic malnutrition (MCM) are 2–3 standard deviations below the population’s weight for age and height for weight averages.<sup>19</sup> Similarly, those who are severely acutely malnourished (SAM) or severely chronically malnourished (SCM) are at least 3 standard deviations below the population’s growth averages.<sup>20</sup>

## ***Malnutrition in Childhood***

Malnutrition is among the four leading causes of child mortality around the globe. In 2013, the World Health Organization (WHO) reported malnutrition was linked to 45% of all childhood deaths.<sup>21</sup> Malnutrition is a contributing factor in the deaths of 60.7% of children diagnosed with diarrheal diseases, 57.3% of deaths associated with malaria, 52.3% deaths associated with pneumonia, and 44.8% of deaths from measles.<sup>22</sup> The UN Standing Committee on Nutrition estimated 26.5% of children in developing countries were stunted in 2005,<sup>5</sup> and one year later, the United Nations Children’s Fund (UNICEF) reported South Asia had a 46% prevalence of stunting in children under five.<sup>23</sup>

Children are particularly vulnerable to malnutrition during the first 1,000 days following conception. Inadequate nutrition during this period can lead to delayed and impaired cognitive and physical

development.<sup>24</sup> This malnutrition-based damage is largely irreversible and can lead to poor school and work achievement and an increased risk for developing diseases later in life.<sup>25</sup> In 2007, the International Child Development Steering Group found that children raised with limited access to nutritional resources were less likely to be socially and economically productive adults.<sup>26</sup> This finding supported the inextricable link between childhood malnutrition and poverty later in life.<sup>26</sup>

## Causes of Malnutrition

Food insecurity, or an inability to access enough food, is often cited as a cause of malnutrition. The FAO has outlined six factors that work together to predispose individuals to food: agricultural production of food; the preservation of food (including processing); the population, in terms of child spacing and overall density; the prevalence of poverty; political ideologies; and disease and infection epidemiology (see **Exhibit 3** for further detail on the six determinants).<sup>27</sup> Usually there is not one single cause of malnutrition, but various factors at both the individual and communal levels that contribute.

### Clinical Causes

At the most fundamental level, a body becomes malnourished when it does not obtain a sufficient quantity and/or quality of food and nutrients. In addition to water, six different nutrient groups are critical for the body to sustain itself and grow: proteins, carbohydrates, minerals (e.g., zinc, calcium, sodium), fats, vitamins, and indigestible and un-absorbable particles such as fiber.<sup>28</sup>

In order for the body to benefit from nutrients consumed, it must be able to digest, absorb, and use the nutrients effectively. Infections and health problems such as cancer, diarrheal diseases, and HIV can limit the body's ability to absorb sufficient nutrients and calories, predisposing an individual to malnutrition.<sup>29</sup>

Physical ailments can also contribute to the degradation of nutritional status. Poor dental hygiene resulting in tooth decay, for example, can limit the amount and types of food consumed, and leprosy-related amputations and other mobility-reducing handicaps can impede physical access to food.<sup>30</sup>

The early cessation of breastfeeding for cultural reasons or due to the mother's lack of production contributes to childhood malnutrition. Ceasing breastfeeding often limits an infant's intake of calories and of vital antibodies that support immune system functioning and prevent diarrheal disease.<sup>31</sup>

### Social Causes

Poverty can be both a cause and a result of malnutrition. Low wages can lead to household food insecurity, making family members more vulnerable to infection or other clinical causes of malnutrition.<sup>32</sup> As discussed, children growing up malnourished are less likely to be productive adults and become trapped in the cycle of poverty.<sup>33</sup>

### Environmental Causes

Malnutrition tends to affect rural areas more than urban.<sup>27</sup> Food security in rural communities depends on natural and human resources that are vulnerable to change, including rain or weather patterns, access to tools, agricultural knowledge, and human capital.<sup>34</sup>

Other environmental causes of malnutrition include diarrhea due to poor sanitation, which impedes nutrient absorption. In India, for example, stunting from chronic malnutrition afflicts 65 million children under the age of 5, including one third of children from the nation's wealthiest socioeconomic class with secure access to food.<sup>18</sup> In 2011, an estimated 620 million people, about half of India's population, defecated

outdoors. Outdoor defecation stems from necessity—only 47% of Indian households have a toilet—as well as cultural norms and low educational attainment.<sup>35</sup> Extensive population growth suggests that more Indians are being exposed to pathogens in human waste than ever before. In children, repeated bacterial infections flatten intestinal linings, reducing the body's ability to absorb nutrients by 33%, as well as decrease levels of normal digestive bacteria.<sup>18</sup>

## Malnutrition Management

### *Pathophysiology*

Malnutrition can lead to various secondary health conditions that impact morbidity and mortality. Deficiencies of vitamin A, found in a variety of green and leafy vegetables, can lead to blindness and increased rates of infection.<sup>36</sup> Long-term vitamin C deficiency can cause scurvy, a micronutrient disease whose symptoms begin with general malaise, anemia, and gingivitis, but if left untreated can cause loss of teeth, neuropathy, and even death.<sup>37</sup> Other trace nutrient deficiencies such as those from iron and iodine yield anemia and goiters, the enlargement of the thyroid gland.<sup>38</sup>

Undernutrition affects almost every organ system, including the cardiovascular system, liver, genitourinary system, gastrointestinal tract, immune system, endocrine system, metabolism and circulation, cellular function, skin, and glands (see **Exhibit 4** for more on implications of malnutrition by organ system). Concurrent conditions may exhibit themselves differently in undernourished individuals.<sup>39</sup>

### *Diagnosis and Measurement*

Most malnourished children are not diagnosed until a health crisis, such as an infection, leads them to seek medical attention. Because malnutrition is a broad-spectrum disorder and not linked to a specific pathogen, there is no single test to confirm a diagnosis. In 1999, the WHO introduced a set of measurement guidelines for the identification and treatment of acute malnutrition based upon the practices of facilities with the lowest rates of mortality.<sup>40</sup> There are three forms of SAM: kwashiorkor, caused by insufficient protein intake and characterized by skin and hair changes; marasmus, caused by rapid deterioration in nutritional status and characterized by extreme wasting of fat and muscle; and marasmic kwashiorkor, a combination of the two previous forms.<sup>40,41</sup>

There are four methods to assess a person's nutritional status: anthropometry, biochemical assessment, clinical assessment, and dietary intake assessment. Anthropometric measurement is the most common method; it compares an individual's body composition and physical measurements (e.g., height, weight, mid-upper arm circumference (MUAC), body mass index (BMI)) to expected values for a person of the same sex and age.<sup>42</sup>

Anthropometric surveillance of a population can identify major nutritional problems such as famine and is the most efficient means to assess required nutritional intervention, such as additional screening and supplementary or therapeutic feeding.<sup>43</sup>

Clinical manifestations of malnutrition such as bilateral edema (fluid retention) and visible wasting offer insight to the health status of an individual and can aid in diagnosis. Biochemical tests, such as blood or urine tests, can identify lipid, vitamin, mineral, and protein concentrations.<sup>42</sup>

Physically assessing the food intake of an individual over a given period of time accurately identifies the quality and quantity of his or her diet. However, these assessments are very invasive, expensive, and time-consuming, and they require substantial biochemical and laboratorial infrastructure.<sup>42</sup>



## ***Prevention***

The best way to prevent malnutrition is to eat a nutrient-diverse and balanced diet. Immunizations and supplementary nutrients for children can also lower the burden of severe and moderate malnutrition.<sup>44</sup> In contexts where access to sufficient foods is limited, malnutrition prevention initiatives are critical to identifying and reducing chronic and acute malnutrition, especially among children.

For the first six months of life, exclusive breastfeeding is the best source of nutrition for infants under six months. It enhances infant and maternal health by providing essential antibodies, enzymes, and easily digestible nutrients. Breastfed infants are less likely to suffer from infectious diseases, diarrhea and severe bacterial infections, reducing infant morbidity and death. Exclusive breastfeeding also contributes to women's health by lowering female fecundity and increasing birth intervals, possibly benefitting infants for years to come.<sup>45</sup>

Adoption of exclusive breastfeeding may require addressing contrary cultural beliefs, training health professionals and paraprofessionals, and providing educational support. In 2006, WHO, the World Food Programme (WFP), and the UN began promoting “community-based management of acute malnutrition” to improve adoption of exclusive breastfeeding and other preventive strategies.<sup>46</sup> Community health workers (CHWs) meet with mothers individually or in small groups at local health posts, primary care clinics, or participants' homes to educate them about the practice and benefits of breastfeeding.<sup>47</sup> In addition, CHWs—overseen by a physician—administer nutritional screenings, provide clinical referrals for SAM, treat MAM, and offer nutrition, family planning, and other health education at community gatherings. Multiple countries have worked with UNICEF and WHO to implement a community-based approach, and studies suggest the decentralization of nutrition services enables communities to use their resources more efficiently and effectively.<sup>48</sup>

Other factors associated with malnutrition include limited clean water access, low maternal education and body mass index, low household caloric intake, and the absence of a toilet in the home.<sup>49,50</sup> Several studies indicate that female children tend to be more underweight, stunted, and wasted than male children; some suggest that this is due in part to gender discrimination in the allocation of household food resources.<sup>51</sup>

## ***Treatment***

There is no ‘silver bullet’, or instant cure, for malnutrition. The most apparent solution, giving an individual more to eat, can cause harm and lead to refeeding syndrome—a rapid shift in electrolyte and fluid levels that can lead to death.<sup>52</sup> The WHO, WFP, United Nations High Commission for Refugees (UNHCR), and UNICEF have outlined specific interventions for the safe and efficient reduction of malnutrition in both emergency and endemic settings through phased therapeutic feeding programs.

For over 30 years, therapeutic feeding programs were in-patient and available only at regional hospitals. When staffed and managed adequately, the programs were highly effective in treating severe malnutrition. However, access was limited. To receive treatment, patients (and their parents and guardians) faced high opportunity costs—forgoing the care of other children, household responsibilities, and/or employment. This expensive and fixed-capacity model was hard to scale or tailor to demand but was the only point of access to therapeutic high-calorie and high-nutrient supplements administered by trained health professionals until the early 2000s.<sup>53</sup>

Patients meeting regionalized anthropometric admission criteria underwent two treatment phases. Phase 1 included intensive care designed to stabilize patients and prevent further status degradation using nutritional supplementation, including fortified milks and meals, and lasted until a patient's appetite

returned and edema was eliminated. Phase 2 involved rehabilitation and supplementary feedings to improve the patient's nutritional status before discharge.<sup>53</sup>

The treatment standards for SAM shifted with the mass localized production of energy-dense, micronutrient-enhanced pastes called ready-to-use therapeutic foods (RUTF).<sup>54</sup> Unlike other refeeding treatments, RUTF do not have to be administered in the clinic setting. In 2013, UNICEF was the world's largest purchaser and distributor of RUTF.<sup>54</sup>

There has been debate about how to classify RUTF. Proponents of treating it like a drug highlight the benefits that would come with it being an “essential drug,” while others protest that doing so would prohibit local manufacturing—which could enhance local jobs and possibly lower production costs; they believe RUTF should be treated as manufactured food products.

How malnourished a child has to be before receiving “treatment” is often left to the discretion of individual organizations or government agencies. RUTF can both prevent and treat malnutrition, and some advocates suggest that even moderately malnourished children, especially those under five, should be entitled to RUTF to alleviate developmental or long-term damage.

RUTF allows for Community-based Therapeutic Care (CTC) models<sup>54</sup> that build upon existing social and health care infrastructure, including CHWs who deliver health instruction through home-based health monitoring visits and encourage early prevention and regimen compliance.<sup>55</sup> More complicated cases are still referred to therapeutic facilities or hospitals. CTC models rely on many layers of stakeholders. At the national level, there must be a demonstrated commitment to a singular and unified health policy for the treatment of malnutrition. At the district level, there must be a functional health system that has the capacity and resources necessary for interventions. And, at the community level, involvement in mobilization and awareness initiatives, active malnutrition surveillance, and follow-up are essential in empowering the community, promoting ownership, and facilitating dialog between the community and the health system.<sup>56</sup>

## The Malnutrition Landscape

### *Global Recognition of Malnutrition*

Over the past 50 years, national and international approaches to malnutrition have shifted. During the 1950s and 1960s, kwashiorkor and protein deficiencies were recognized as the most critical forms of malnutrition (see **Appendix A** for glossary of terms). Malnutrition interventions focused on increasing children's consumption of protein-rich foods and supplements such as fish protein concentrate and single-cell protein or amino acid fortification. The prioritization of kwashiorkor and protein led to a relative neglect of nutritional marasmus and adequate food intake and utilization of energy in children.<sup>57</sup>

The 1974 World Food Conference promoted nutrition planning and surveillance as the most effective mechanisms for reducing hunger. In 1977, the UN established the Sub-Committee on Nutrition (SCN; formerly the Administrative Committee on Coordination of the UN Subcommittee on Nutrition).<sup>58</sup> Internationally, policy design shifted to economists, away from nutritionists and pediatricians. There was increasing focus on improving national food security, and agencies such as the World Bank began stressing income generation as the optimal strategy for doing so.<sup>57</sup>

The 1989 World Summit on Children and the 1992 International Conference on Nutrition endorsed the elimination of vitamin A and iodine deficiency disorders (IDDs) before the turn of the century. They also advocated shifting from protein-focused nutrition programs to micronutrient programs, calling micronutrient deficiencies a form of “hidden hunger” that could be remedied with increased attention and investment.<sup>57</sup>

## Millennium Development Goals

In late 2000, the largest modern gathering of world leaders took place in New York at the Millennium Development Summit, where participants pledged their commitment to eight broad, multidisciplinary, and universal goals for the global community to achieve by 2015 (see **Exhibit 5** for complete set of goals). The first Millennium Development Goal (MDG-1) had three targets:<sup>59</sup>

1. Halve, between 1990 and 2015, the proportion of people whose income is less than USD 1.25 a day
2. Achieve full and productive employment and decent work for all, including women and young people
3. Halve, between 1990 and 2015, the proportion of people who suffer from hunger

The UN renamed the Sub-Committee on Nutrition the United Nations System Standing Committee on Nutrition (SCN) in 2001, and it began reporting to the Chief Executives Board of the UN, working from the WHO headquarters. With input from the relevant UN agencies, the committee's mandate was to promote cooperation between UN agencies and partner organizations to support national, regional, and international initiatives to end malnutrition. One of the questions the SCN grappled with was how to engage private sector actors in the "international nutrition system."<sup>60</sup>

The FAO's 2006 report, *The State of Food Insecurity in the World*, reported the percentage of hungry people in the world, particularly in Asia-Pacific and Latin American, had decreased by half over four decades. The regions that were making the least amount of progress included many African countries and countries experiencing natural disasters, epidemics, conflict, and/or economic instability.<sup>61</sup>

## Maintaining Momentum

Years after the MDG Summit, world hunger was actually on the rise. An estimated 923 million people were hungry in 2007, an increase of more than 80 million since the early 1990s. Most of the increase occurred in the mid-2000s and was largely the result of higher food prices, the FAO reported.<sup>62</sup>

In early 2008, the *Lancet* published a series on maternal and child undernutrition. In response, then-director of the WFP, Josette Sheeran, submitted a comment appealing to readers: "The time has come to focus on hunger as a top priority."<sup>63</sup> She stressed that most hunger-related deaths were the result of daily "unnoticed crises"—in areas and populations where households lived on less than USD 1 a day—not high-profile emergencies.<sup>63</sup>

Other contributors to the *Lancet* series shared evidence-based practices and interventions to improve nutrition and food security in developing regions.<sup>64</sup> Malnutrition prevention and reduction strategies shifted from addressing the proximate causes of malnutrition (e.g., calorie and nutrient deficiencies) alone to include the ultimate causes, such as poverty, agricultural production, and clean water access.<sup>64</sup>

Following the *Lancet* series, economists participating in the 2008 Copenhagen Consensus evaluated 30 proposed solutions to 10 global challenges, including malnutrition, hunger, air pollution, education, diseases, terrorism, and women and development. The economists ranked the five malnutrition responses among the top ten most cost-effective solutions. The malnutrition solutions were: micronutrient supplements for children (vitamin A and zinc), micronutrient fortification (iron and salt iodization), biofortification, deworming and other school-based nutrition programs, and community-based nutrition promotion.<sup>65</sup> A swell of major international development organizations responded to their analysis with new malnutrition policy recommendations.

From 2008 to 2011, nutrition-based aid increased more than 60% from USD 259 million to USD 418 million.<sup>66</sup> During the same period, the G8 countries reported a 50% increase in bilateral spending on nutrition-related interventions.<sup>66</sup>

At the spring 2010 meetings of the World Bank and IMF, during the height of a global financial crisis, stakeholders from Ministries of Health, the UN system, development agencies, civil society organizations, academia, the private sector, intergovernmental organizations, and philanthropic bodies launched a collaborative initiative to end malnutrition called the Scale-Up Nutrition (SUN) Movement. Building on the 2008 *Lancet* series with leadership from the UN, members of the SUN Movement developed a Framework for Action to Scale Up Nutrition that would place nutrition investments at the center of development work.<sup>67</sup> SUN countries set their own goals for scaling up nutrition, and the SUN Secretariat and SUN Lead Group provided overall support and coordination, facilitated knowledge exchange between countries, and held countries accountable for achieving their goals. The SUN Movement aimed to increase collaboration for nutrition and to foster a more coherent nutrition agenda at both global and national levels by developing global stakeholder networks.<sup>68</sup> The SUN Movement established four multi-stakeholder platforms (MSPs) headed by national leaders: the Country Network, the Civil Society Network, the Donor Network, and the Business Network (see **Exhibit 6** for more on SUN networks). SUN Movement participants set up MSPs in their respective countries as well.<sup>72</sup>

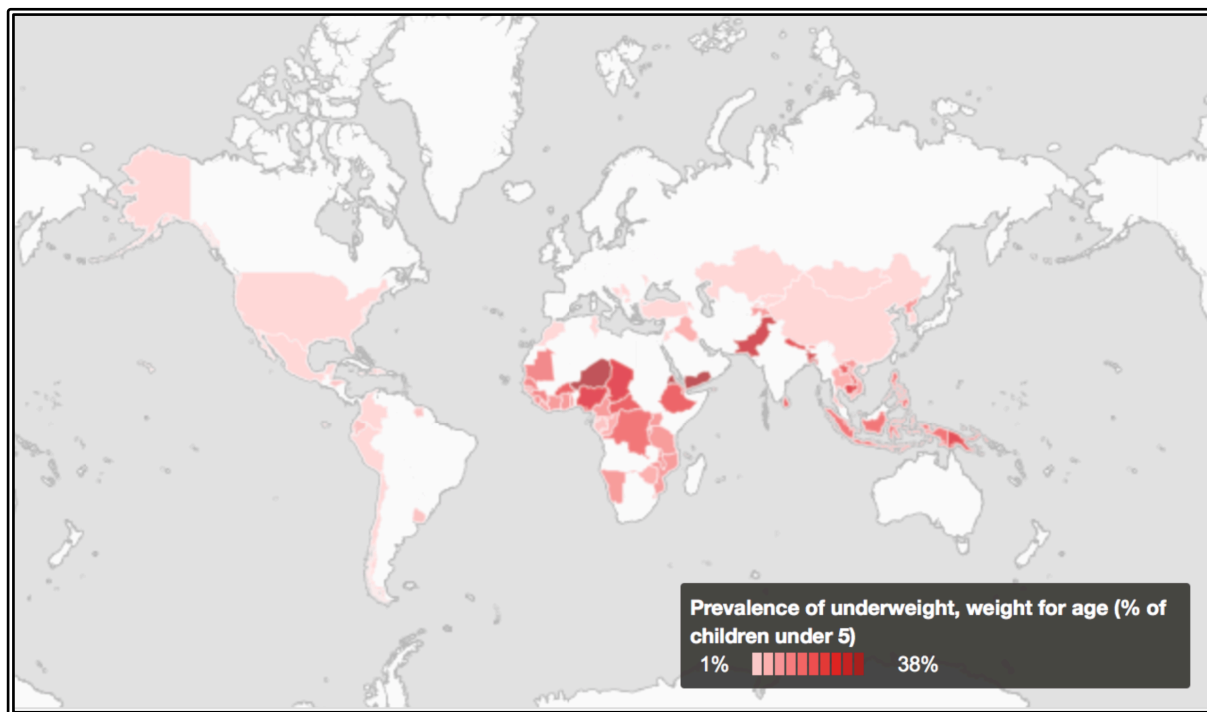
In 2014, the US Government allocated USD 1.06 billion to fight world hunger through its Feed the Future initiative.<sup>69</sup> Launched in 2009, Feed the Future aims to reduce chronic food insecurity by supporting increased agricultural research, development, productivity, and resilience in developing countries.<sup>70</sup> In addition, the US Government earmarked approximately USD 2 billion to feed between 2 and 4 million people through emergency food assistance and chronic food insecurity programs.<sup>69</sup>

The WHO allocated nearly USD 40 million to nutrition for the 2014-2015 biennium, a 21% increase over its 2012-2013 spending, to support three activities: developing and updating the evidence base for effective nutrition interventions; monitoring Members States' progress against global targets and the program implementation; and disseminating practical knowledge and capacities to support scale up.<sup>71</sup>

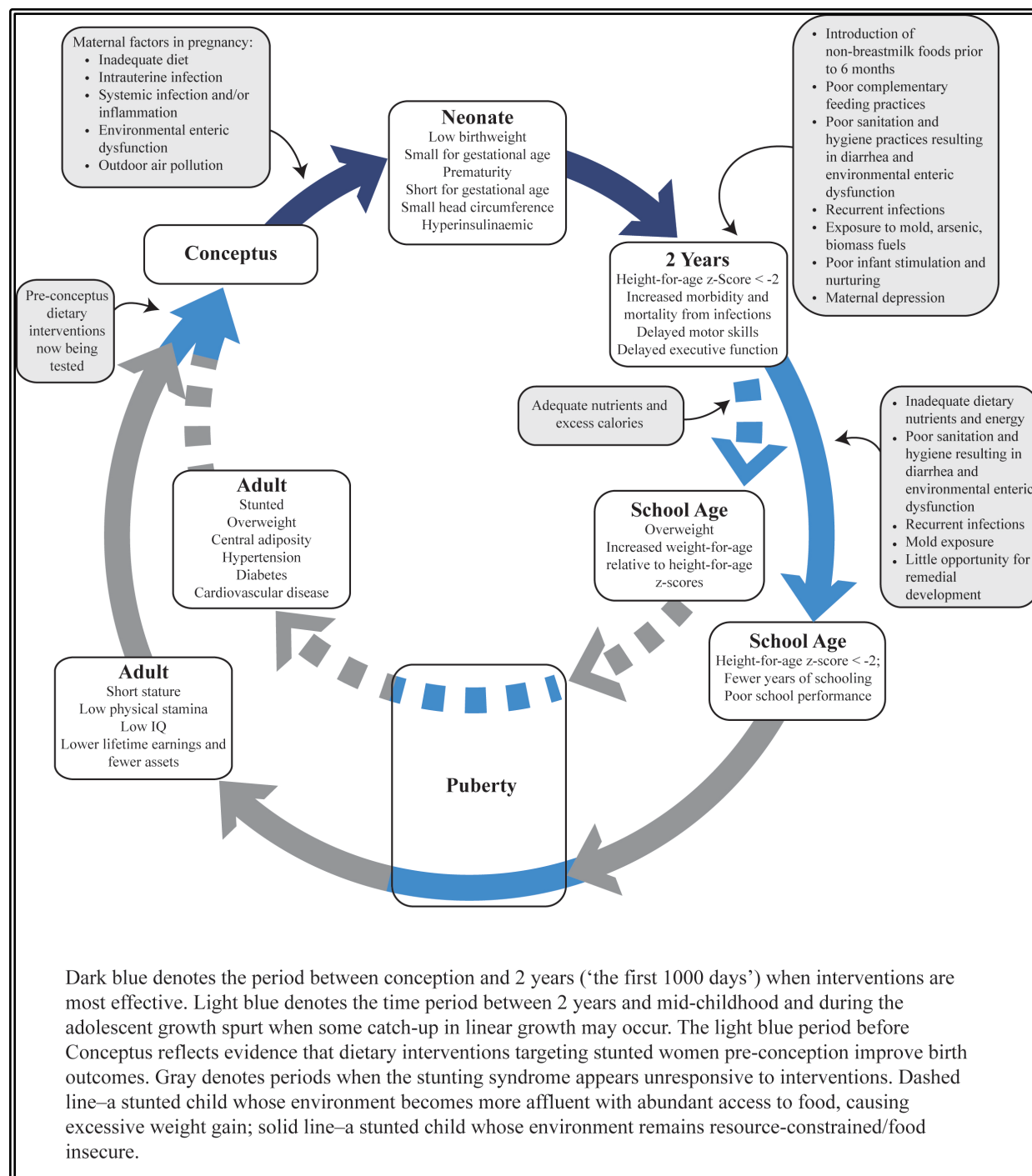
As of September 2015, there were 55 countries participating in SUN.<sup>68</sup>

### **The Cost of Scaling Up Nutrition**

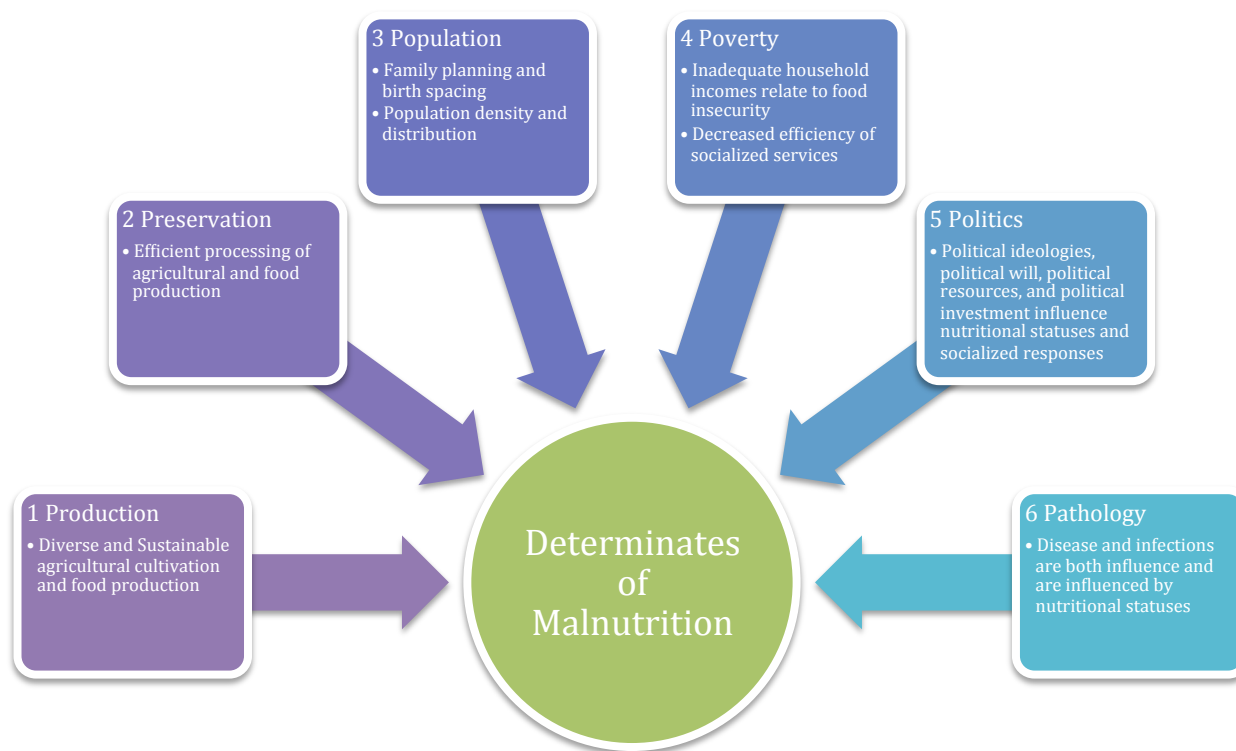
In 2009, the World Bank estimated it would cost USD 11.8 billion annually to scale up local nutritional programs in 36 high-burden nations in two phases.<sup>74</sup> The first phase would invest in micronutrients and deworming for children (USD 1.5 billion); behavior change interventions such as breastfeeding promotion (USD 2.9 billion); capacity-building to expand more complex food-based programs in areas with high undernutrition (USD 1.0 billion); and monitoring and evaluation, operations research, and technical support (USD 0.1 billion). The second phase would channel USD 6.3 billion into complementary feeding to prevent and treat moderate malnutrition in children under 2 (USD 3.6 billion); treatment of severe acute malnutrition (USD 2.6 billion); and additional monitoring and evaluation, operations research, and technical assistance (USD 0.1 billion).<sup>74</sup>

**Exhibit 1** *Malnutrition Prevalence in Children under 5, 2011-2015*

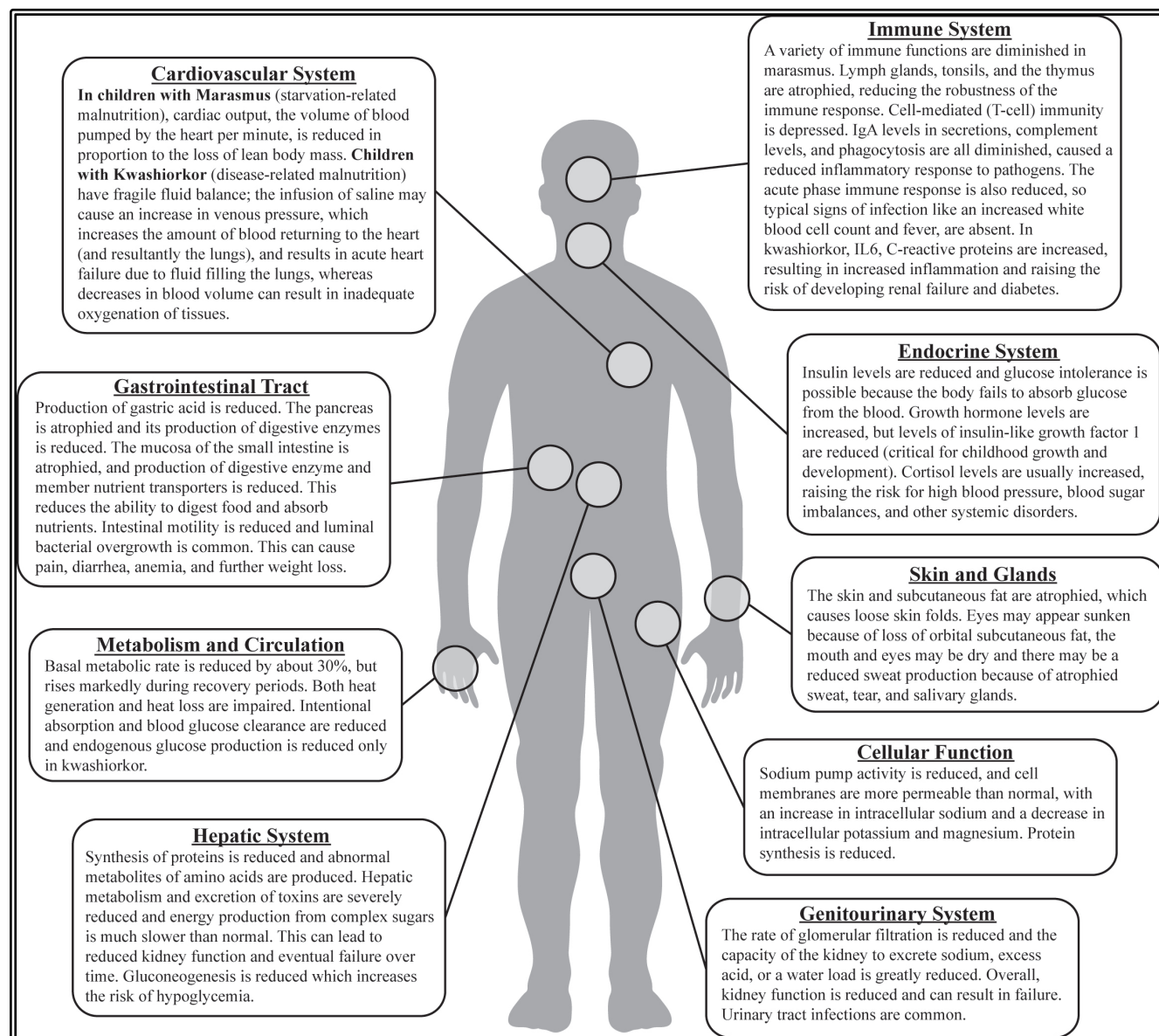
Source: The World Bank, based on UNICEF, WHO, and the World Bank harmonized dataset.

**Exhibit 2** *Stunting Syndrome from Conception through Adulthood*

Source: Adapted by case writers with assistance from Isabelle Celentano from Pendergast AJ, Humphrey JH. "The stunting syndrome in developing countries," *Paediatr Int Child Health*. 2014;34(4):250-265; doi:10.1179/2046905514Y.0000000158.

**Exhibit 3**    *The Six P's That Predispose Malnutrition*


Source: Adapted from *Human Nutrition in the Developing World*, Food and Nutrition Series No. 29 1997, Food and Agriculture Organization of the United Nations.

**Exhibit 4** *Organ Systems Impacted by Protein-Energy Malnutrition*

Source: Adapted with assistance from Isabelle Celentano and Damir Ljuboja from Saunders J, and Smith T. 2010. "Malnutrition: causes and consequences." *Clinical Medicine: Journal of the Royal Academy of Physicians*. 10(6): 624-627.



**Exhibit 5** *Millennium Development Goals*

<b>1. Eradicate Extreme Poverty and Hunger</b>	<ul style="list-style-type: none"> <li>• Halve, between 1990 and 2015, the proportion of people whose income is less than USD 1.25 a day</li> <li>• Achieve full and productive employment and decent work for all, including women and young people</li> <li>• Halve, between 1990 and 2015, the proportion of people who suffer from hunger</li> </ul>
<b>2. Achieve Universal Primary Education</b>	<ul style="list-style-type: none"> <li>• Ensure that, by 2015, children everywhere, boys and girls alike, will be able to complete a full course of primary education</li> </ul>
<b>3. Promote Gender Equality and Empower Women</b>	<ul style="list-style-type: none"> <li>• Eliminate gender disparity in primary and secondary education, preferably by 2015, and in all levels of education no later than 2015</li> </ul>
<b>4. Reduce Child Mortality</b>	<ul style="list-style-type: none"> <li>• Reduce by two thirds, between 1990 and 2015, the under-five mortality rate</li> </ul>
<b>5. Improve Maternal Health</b>	<ul style="list-style-type: none"> <li>• Reduce by three quarters, between 1990 and 2015, the maternal mortality ratio</li> <li>• Achieve, by 2015, universal access to reproductive health</li> </ul>
<b>6. Combat HIV/AIDS, Malaria, and Other Diseases</b>	<ul style="list-style-type: none"> <li>• Have halted by 2015 and begun to reverse the spread of HIV/AIDS</li> <li>• Achieve, by 2010, universal access to treatment for HIV/AIDS for all those who need it</li> <li>• Have halted by 2015 and begun to reverse the incidence of malaria and other major diseases</li> </ul>
<b>7. Ensure Environmental Sustainability</b>	<ul style="list-style-type: none"> <li>• Integrate the principles of sustainable development into country policies and programmes and reverse the loss of environmental resources; reduce biodiversity loss, achieving, by 2010, a significant reduction in the rate of loss; halve, by 2015, the proportion of the population without sustainable access to safe drinking water and basic sanitation; achieve, by 2020, a significant improvement in the lives of all</li> </ul>
<b>8. Develop a Global Partnership for Development</b>	<ul style="list-style-type: none"> <li>• Develop further an open, rule-based, predictable, non-discriminatory trading and financial system; address the special needs of least developed countries; address the special needs of landlocked developing countries and small island developing States; deal comprehensively with the debt problems of developing countries; in cooperation with pharmaceutical companies, provide access to affordable essential drugs in developing countries; in cooperation with the private sector, make available benefits of new technologies, especially information and communications</li> </ul>

Source: 2014 Human Development Report on Vulnerability and Resilience, United Nations Development Programme

## Exhibit 6 *The Four SUN Networks*

The **SUN Civil Society Network** encourages the alignment of civil society organizations' strategies, programs, and resources with nation-specific plans for scaling up nutrition programs. Current steering group members in the Civil Society Network include: Save the Children (UK), Comprehensive Africa Agriculture Development Programme (CAADP), Bread for the World Institute, OMAES (a Malian health and development NGO), World Vision International, Alliance Against Hunger and Malnutrition, ACF (France), African Nutritional Society, Concern Worldwide, International Paediatric Association (Germany), CARE Peru, Helen Keller International, and the International Union of Nutritional Sciences (India).<sup>72</sup>

The **SUN United Nations Network** supports nations in scaling up their nutrition programs through a UN nutritional team, facilitated by REACH: Ending Child Hunger and Undernutrition Partnership, a coproduction of the FAO, the WHO, UNICEF, and the WFP. The UN Network also coordinates UN agencies and initiatives combating global malnutrition by acting as a resource for advocacy and knowledge.<sup>72</sup>

The **SUN Donor Network** focuses on aligning, mobilizing, and tracking resources to support countries' nutrition initiatives. The Donor Network takes stock of nutrition-based programs and policies, provides technical assistance for the identification of vulnerable populations, and identifies gaps in delivery. Members of the Donor Network include: Australia, the Bill & Melinda Gates Foundation, Canada, Children's Investment Fund Foundation, Denmark, the EU, France, Germany, Inter-American Development Bank, Ireland, Japan, Netherlands, Spain, Sweden, Switzerland, the World Bank, USAID, the UK, and the US.<sup>73</sup>

The **SUN Business Network** unites companies that have pledged to reach over 120 million undernourished women and children together each year with direct and indirect nutrition interventions by 2020. As of 2013, the Business Network consisted of Ajinomoto (who aims to improve the nutrition of 500,000 pregnant and lactating mothers and children by 2017), Unilever (who aims to reach 500,000 mothers with their hand washing and soap behavior change program to improve the health of children under five), Cargill (through their Partners in Food Solutions, Cargill will partner with General Mills, DSM, and Bhuler to support 200 small and mid-sized food producers in improving the nutrition of their products by 2017), DSM (who will ensure the supply of 50 million pregnant and lactating women, children, and adults with their micronutrient powder and multivitamin tablets by 2020), BASF (who aims to provide access to affordable fortified foods for an extra 60 million people each year from 2012 to 2015), and Nutriset (who aims to increase the reach of their RUTFs to 9 million vulnerable children each year by 2018).<sup>73</sup>

## Appendix A *Glossary of Nutrition Terms*

**Complementary feeding:** introducing safe and adequate complementary food from the age of 6 months onward; it is recommended that a child continue breastfeeding as well until 2 years of age.

**Early initiation of breastfeeding:** breastfeeding during the first few days after delivery; provides essential nutrients to the baby that helps boost its immune system.

**Edema (Eodema):** the enlargement of organs, skin, and other body parts in response to a buildup of water and sodium in the tissues. This fluid can lead to a rapid increase in weight over a very short period of time and is a clinical indicator of severely acute malnutrition.

**Exclusive breastfeeding:** only feeding the baby breast milk for the first 6 months of life; recommended for proper growth and development.

**Global Acute Malnutrition (GAM):** at an epidemiological and population level, GAM is the sum total of the prevalence of SAM and MAM.

**Grades I-IV:** arly standards classified child nutritional status using grades I-IV, based on weight for age. In 2008, the WHO created new standards that changed the metric from “grades” to “stages,” such as SAM. Children previously classified as Grades III or IV would be classified as MAM or SAM under the WHO system.

**Home fortification:** sprinkling a mixture of vitamins and minerals (which are supplied in powdered form in single-serving sachets) over any semi-solid food before consumption.

**Iron supplementation:** helps reduce the prevalence of anemia (including iron deficiency), particularly among women and young children.

**Large-scale fortification:** adding micronutrients to staple foods, complimentary foods, and compliments in their respective production sites. Very common with iron, zinc, folic acid and other B vitamins.

**Low birth weight:** a weight at birth of less than 2500 grams (5.5 pounds).

**Malnutrition:** state in which the physical functioning of the body is impaired so extensively the individual can no longer maintain normal body functioning such as growth, pregnancy, cognitive faculties, physical labor and immune responses. This is a broad term that incorporates not only those who are underweight, but also those who are too short (stunting) from macronutrient deficiencies, and those who are overweight from the consumption of too many calories.

**Moderate Acute Malnutrition (MAM):** children between the ages of 6-59 months who are between the -2 and -3 standard deviation for weight for height (wasting) score.

**Overweight:** weight for height is above two standard deviations from the median of the WHO Child Growth Standards.

**Severe Acute Malnutrition (SAM):** children who are between the ages of 6-59 months and have a weight for height (wasting) score 3 standard deviations below the median, have a mid-upper-arm circumference less than 115 mm, or the presence of bilateral edema.

**Severe Chronic Malnutrition (SCM)** is calculated with the Z-score defined as a height-for-age index less than -3 standard deviations from the mean weight of a reference population of children of the same height and/or having edema.

**Stunting:** height for age is more than 2 standard deviations below the WHO Growth Standards median; a result of long term nutritional deprivation.

**Undernourishment:** term applied to individuals whose food intake does not meet minimum physiological caloric demands for normal functioning.

**Underweight:** weight for age is more than 2 standard deviations below the WHO Child Growth Standards median.\*

**Universal salt iodization:** a safe, cost-effective, and sustainable strategy to ensure sufficient intake of iodine by all. Recommended in all countries with iodine deficiency, the most common cause of preventable mental impairment.

**Vitamin A supplementation:** during the first five years of life, two vitamin A doses fully protect from vitamin A deficiency. Vitamin A is necessary to support immune system response.

**Wasting:** weight for height is more than 2 standard deviations below the WHO Child Growth Standard median; a symptom of acute under nutrition.

Source: Adapted from WHO and UNICEF: Improving Child Nutrition Report April 2013; UNICEF: Review of National Legislation for Universal Salt Iodization: South Asia and East Asia and the Pacific March 2013; WHO: Multiple micronutrient powders for home (point of use) fortification of foods in pregnant women: a systematic review 2011; 2014 World Food Programme Hunger Glossary; 2006 WHO, UNICEF, and SCN Food and Nutrition Bulletin.

## References

1. UNICEF. The right to food: Beyond rhetoric. *FAO Corp Doc Repos*. <http://www.fao.org/docrep/x0262e/x0262e18.htm>. Accessed October 5, 2015.
2. Food and Agriculture Organization of the United Nations, World Food Programme, International Fund for Agricultural Development. *The State of Food Insecurity in the World. Meeting the 2015 International Hunger Targets: Taking Stock of Uneven Progress*. Rome: Food and Agriculture Organization of the United Nations; 2015.
3. IFAD, WFP, FAO. The State of Food Insecurity in the World: The multiple dimensions of food security. 2013. <http://www.fao.org/docrep/018/i3458e/i3458e.pdf>.
4. UNFAO. The State of Food Insecurity in the World. 2012.
5. UNSCN. 5th Report on the World Nutrition Situation - Nutrition for Improved Development Outcomes. March 2004. <http://www.unsystem.org/scn/Publications/AnnualMeeting/SCN31/SCN5Report.pdf>.
6. Tran M. Malnutrition identified as root cause of 3.1 million deaths among children. *The Guardian*. <http://www.theguardian.com/global-development/2013/jun/06/malnutrition-3-million-deaths-children>. Published June 5, 2013.
7. Semba RD. Iron-deficiency anemia and the cycle of poverty among human immunodeficiency virus-infected women in the inner city. *Clin Infect Dis Off Publ Infect Dis Soc Am*. 2003;37 Suppl 2:S105-S111. doi:10.1086/375892.
8. Cegielski J, McMurray D. The relationship between malnutrition and tuberculosis: evidence from studies in humans and experimental animals. *Int J Tuberc Lung Dis Off J Int Union Tuberc Lung Dis*. 2004;8(3):286-298.
9. Food and Agriculture Organization of the United Nations. *The State of Food and Agriculture: Food Systems for Better Nutrition*. Rome; 2013. <http://www.fao.org/docrep/018/i3300e/i3300e.pdf>.
10. The World Bank. *Repositioning Nutrition as Central to Development*. 1st ed. Washington D.C.: World Bank; 2006. <http://siteresources.worldbank.org/NUTRITION/Resources/281846-1131636806329/NutritionStrategy.pdf>.
11. Horton S. Opportunities for investments in nutrition in low-income Asia. *Asian Dev Rev*. 1999;17(1,2):246-273.
12. The Socio-economic Impact of Child Malnutrition in Africa. <http://www.carmma.org/update/socio-economic-impact-child-malnutrition-africa>. Accessed July 18, 2014.
13. Shetty P. Malnutrition and undernutrition. *Medicine (Baltimore)*. 2003;31(4):18-22. doi:10.1383/medc.31.4.18.27958.
14. Diane Holland. The Harmonised Training Package (HTP): Resource Material for Training on Nutrition in Emergencies. Tamsin Walters, ed. 2011. [http://www.unscn.org/en/gnc\\_http/](http://www.unscn.org/en/gnc_http/).
15. United Nations Standing Committee on Nutrition. Module 3: Understanding malnutrition. In: *Harmonized Training Package Modules*. New York: United Nations; 2011. [http://www.unscn.org/en/gnc\\_http/modul.php?modID=5&docID=15](http://www.unscn.org/en/gnc_http/modul.php?modID=5&docID=15).
16. Action Against Hunger. What is acute malnutrition? 2012. <http://www.actionagainsthunger.org.uk/what-we-do/about-acute-malnutrition/what-is-acute-malnutrition/>. Accessed July 1, 2014.
17. Prendergast AJ, Humphrey JH. The stunting syndrome in developing countries. *Paediatr Int Child Health*. 2014;34(4):250-265. doi:10.1179/2046905514Y.0000000158.
18. Harris G. Poor Sanitation in India May Afflict Well-Fed Children With Malnutrition. *The New York Times*. <http://www.nytimes.com/2014/07/15/world/asia/poor-sanitation-in-india-may-afflict-well-fed-children-with-malnutrition.html>. Published July 13, 2014. Accessed July 18, 2014.

19. Action Against Hunger. Types of acute malnutrition. <http://actioncontrelafaim.ca/what-is-acute-malnutrition/types-of-acute-malnutrition/>. Accessed October 9, 2015.
20. World Health Organization, United Nations Children's Fund. *WHO Child Growth Standards and the Identification of Severe Acute Malnutrition in Infants and Children*. Geneva: WHO; 2009. [http://apps.who.int/iris/bitstream/10665/44129/1/9789241598163\\_eng.pdf?ua=1](http://apps.who.int/iris/bitstream/10665/44129/1/9789241598163_eng.pdf?ua=1).
21. WHO | Children: reducing mortality. WHO. <http://www.who.int/mediacentre/factsheets/fs178/en/>. Accessed August 21, 2014.
22. Caulfield LE, Onis M de, Blössner M, Black RE. Undernutrition as an underlying cause of child deaths associated with diarrhea, pneumonia, malaria, and measles. *Am J Clin Nutr*. 2004;80(1):193-198.
23. UNICEF. Progress for Children. December 2007. [http://unicef.dk/sites/default/files/mediafiles/Progress\\_For\\_Children\\_Vol6\\_2007.pdf](http://unicef.dk/sites/default/files/mediafiles/Progress_For_Children_Vol6_2007.pdf).
24. Save the Children. Nutrition in the First 1,000 Days. May 2012. <http://www.savethechildren.org/atf/cf/%7B9def2ebe-10ae-432c-9bd0-df91d2eba74a%7D/STATE-OF-THE-WORLDS-MOTHERS-REPORT-2012-FINAL.PDF>.
25. Coulter JBS. Nutrition and malnutrition in low- and middle-income countries. *Paediatr Int Child Health*. 2014;34(4):233-235. doi:10.1179/2046904714Z.000000000214.
26. Grantham-McGregor S, Cheung YB, Cueto S, Glewwe P, Richter L, Strupp B. Developmental potential in the first 5 years for children in developing countries. *Lancet*. 2007;369(9555):60-70. doi:10.1016/S0140-6736(07)60032-4.
27. Latham MC. *Human Nutrition in the Developing World*. Vol 29. Rome: Food and Agriculture Organization of the United Nations; 1997. <http://www.fao.org/docrep/w0073e/w0073e00.htm#TopOfPage>.
28. Latham MC. Chapter 8: Body composition, the functions of food, metabolism and energy. In: *Human Nutrition in the Developing World*. Vol 29. Food and Nutrition Series. Rome: Food and Agriculture Organization of the United Nations; 1997. [http://www.fao.org/docrep/w0073e/w0073e04.htm#P1622\\_217340](http://www.fao.org/docrep/w0073e/w0073e04.htm#P1622_217340).
29. Choices NHS. Malnutrition - Causes - NHS Choices. April 2014. <http://www.nhs.uk/Conditions/Malnutrition/Pages/Causes.aspx>.
30. Choices NHS. Malnutrition - Causes - NHS Choices. April 2014. <http://www.nhs.uk/Conditions/Malnutrition/Pages/Causes.aspx>. Accessed July 3, 2014.
31. Zoysa ID, Rea M, Martines J. Why promote breastfeeding in diarrhoeal disease control programmes? *Health Policy Plan*. 1991;6(4):371-379. doi:10.1093/heapol/6.4.371.
32. Ann Millard, Anne Ferguson, Stanley Khaila. Agricultural development and malnutrition: a causal model of child mortality. In: *Agricultural Development and Malnutrition*. ; 1990:Chapter 14. <http://htc.anu.edu.au/pdfs/Chapter14.pdf>.
33. Alderman H, Behrman JR, Glewwe P. *A Framework for Physical Growth and Child Development*. Washington, DC: International Food Policy Research Institute; 2015:1-22. <http://ebrary.ifpri.org/cdm/singleitem/collection/p15738coll2/id/129100/rec/8>. Accessed August 6, 2015.
34. Kandala N-B, Madungu TP, Emina JB, Nzita KP, Cappuccio FP. Malnutrition among children under the age of five in the Democratic Republic of Congo (DRC): does geographic location matter? *BMC Public Health*. 2011;11(1):261. doi:10.1186/1471-2458-11-261.
35. India census: Half of homes have phones but no toilets. *BBC News India*. <http://www.bbc.com/news/world-asia-india-17362837>. Published March 14, 2012. Accessed October 6, 2015.
36. WHO. Global prevalence of vitamin A deficiency in populations at risk 1995-2005. 2009.
37. WHO | Scurvy and its prevention and control in major emergencies. WHO. [http://www.who.int/nutrition/publications/emergencies/WHO\\_NHD\\_99.11/en/](http://www.who.int/nutrition/publications/emergencies/WHO_NHD_99.11/en/). Accessed July 3, 2014.

38. Thakur N, Chandra J, Pemde H, Singh V. Anemia in severe acute malnutrition. *Nutr Burbank Los Angel Cty Calif*. 2014;30(4):440-442. doi:10.1016/j.nut.2013.09.011.
39. Lenters L, Wazny K, Webb P, Ahmed T, Bhutta Z. Treatment of severe and moderate acute malnutrition in low- and middle-income settings: A systematic review, meta-analysis and Delphi process. *BMC Public Health*. 2013;13(Suppl 3:S23). doi:10.1186/1471-2458-13-S3-S23.
40. Picot J, Hartwell D, Harris P, Mendes D, Clegg AJ, Takeda A. The effectiveness of interventions to treat severe acute malnutrition in young children: a systematic review. *Health Technol Assess*. 2012;16(29):1366-5275.
41. UNICEF. A joint effort to reach Mali's malnourished children. *UNICEF Mali*. May 2014. [http://www.unicef.org/emergencies/mali\\_73505.html](http://www.unicef.org/emergencies/mali_73505.html). Accessed October 6, 2015.
42. United Nations System Standing Committee on Nutrition. *Module 6 Measuring Malnutrition: Individual Assessment*. New York: United Nations; 2011. <http://www.unscn.org/layout/modules/http/pdf/M06P1.pdf>.
43. Karaolis N, Jackson D, Ashworth A, et al. WHO guidelines for severe malnutrition: are they feasible in rural African hospitals? *Arch Dis Child*. 2007;92(3):198-204. doi:10.1136/ad.2005.087346.
44. Duggan MB. Prevention of childhood malnutrition: Immensity of the challenge and variety of strategies. *Paediatr Int Child Health*. 2014;34(4):271-278. doi:10.1179/2046905514Y.0000000139.
45. UNICEF. Promoting and protecting breastfeeding. *UNICEF West Cent Afr*. [http://www.unicef.org/wcaro/4501\\_5055.html](http://www.unicef.org/wcaro/4501_5055.html). Accessed October 6, 2015.
46. WHO, UNICEF, and SCN Informal Consultation on Community-Based Management of Severe Malnutrition in Children. Tokyo: The United Nations University; 2006. [http://www.who.int/nutrition/publications/severemalnutrition/FNB\\_0379-5721.pdf?ua=1](http://www.who.int/nutrition/publications/severemalnutrition/FNB_0379-5721.pdf?ua=1).
47. UNICEF. A successful start in life: Improving breastfeeding in West and Central Africa. August 2010. [http://www.unicef.org/cotedivoire/wcaro\\_improving\\_breastfeeding\\_en.pdf](http://www.unicef.org/cotedivoire/wcaro_improving_breastfeeding_en.pdf).
48. Angelie Singh. A Community-based Approach to Combatting Malnutrition: What it Looks Like and How to Evaluate It. *State Planet Blogs Earth Inst*. March 2011. <http://blogs.ei.columbia.edu/2011/03/11/a-community-based-approach-to-combating-malnutrition-what-it-looks-like-and-how-to-evaluate-it/>.
49. Babatunde RO, Olagunju FI, Sola-Ojo FE, Fakayode SB. Prevalence and determinants of malnutrition among under-five children of farming households in Kwara State, Nigeria. *J Agric Sci*. 2011;3(3):173-181.
50. Pridmore P, Hill RC. *Addressing the Underlying and Basic Causes of Child Undernutrition in Developing Countries: What Works and Why?* Copenhagen: Ministry of Foreign Affairs of Denmark; 2009. <http://www.oecd.org/derec/denmark/43962804.pdf>.
51. Ndiku M, Jaceldo-Siegl K, Singh P, Sabate J. Gender inequality in food intake and nutritional status of children under 5 years old in rural Eastern Kenya. *Eur J Clin Nutr*. 2011;65:26-31. doi:10.1038/ejcn.2010.197.
52. Mehanna HM, Moledina J, Travis J. Refeeding syndrome: What it is, and how to prevent and treat it. *Br Med J*. 2008;336(7659):1495-1498. doi:10.1136/bmj.a301.
53. Collins S. Treating severe acute malnutrition seriously. *Arch Dis Child*. 2007;92(5):453-461. doi:10.1136/ad.2006.098327.
54. UNICEF. *Ready-to-Use Therapeutic Food for Children with Severe Acute Malnutrition*. New York: UNICEF; 2013. [http://www.unicef.org/media/files/Position\\_Paper\\_Ready-to-use\\_therapeutic\\_food\\_for\\_children\\_with\\_severe\\_acute\\_malnutrition\\_\\_June\\_2013.pdf](http://www.unicef.org/media/files/Position_Paper_Ready-to-use_therapeutic_food_for_children_with_severe_acute_malnutrition__June_2013.pdf).
55. Steve Collins. Community-based therapeutic care - a new paradigm for selective feeding in nutritional crises. November 2004. <http://www.odihpn.org/documents/networkpaper048.pdf>.

56. Valerie Catchell, Vivienne Forsythe, Paul-Rees Thomas. The sustainability of Community-based Therapeutic Care (CTC) in non-acute emergency contexts. 2005.  
[http://www.who.int/nutrition/topics/backgroundpapers\\_The\\_sustainability.pdf](http://www.who.int/nutrition/topics/backgroundpapers_The_sustainability.pdf).
57. Latham MC. Chapter 1: International nutrition and world food problems in perspective. In: *Human Nutrition in the Developing World*. Vol 29. Food and Nutrition Series. Rome: Food and Agriculture Organization of the United Nations; 1997.  
[http://www.fao.org/docrep/w0073e/w0073e03.htm#P42\\_6264](http://www.fao.org/docrep/w0073e/w0073e03.htm#P42_6264).
58. United Nations Economic and Social Council. *Food Problems: Institutional Arrangements Relating to Nutrition, Statement of the Administrative Committee on Coordination*. New York: United Nations; 1976.  
[http://www.unsctn.org/files/mandate/ECOSOC\\_statement\\_\\_re\\_SCN\\_E5805\\_April\\_1976.pdf](http://www.unsctn.org/files/mandate/ECOSOC_statement__re_SCN_E5805_April_1976.pdf).
59. United Nations. Official list of MDG indicators. *Millenn Dev Goals Indic*. 2008.  
<http://mdgs.un.org/unsd/mdg/Host.aspx?Content=indicators/officiallist.htm>. Accessed Oct 8, 2015.
60. Longhurst R. Global Leadership for Nutrition: The UN's Standing Committee on Nutrition (SCN) and its Contributions. July 2010. <http://www.ids.ac.uk/files/dmfile/dp390.pdf>.
61. UNFAO. The State of Food Insecurity in the World 2006. 2006. <http://www.fao.org/3/a-a0750e/>.
62. Food and Agriculture Organization of the United Nations. *The State of Food Insecurity in the World 2008: High Food Prices and Food Security - Threats and Opportunities*. Rome: United Nations; 2008.  
<ftp://ftp.fao.org/docrep/fao/011/i0291e/i0291e00.pdf>.
63. Sheeran J. The challenge of hunger. *The Lancet*. 2008;371(9608):180-181. doi:10.1016/S0140-6736(07)61870-4.
64. Stuart Gillespie, Lawrence Haddad, Venkatesh Mannar, Purnima Menon, Nicholas Nisbett, The Maternal and Child Nutrition Study Group. The politics of reducing malnutrition: building commitment and accelerating progress. *The Lancet*. June 2006.  
[http://agrilinks.org/sites/default/files/resource/files/Gillespie\\_2013.pdf](http://agrilinks.org/sites/default/files/resource/files/Gillespie_2013.pdf).
65. Jagdish Bhagwati, Francois Bourguignon, Finn Kydland, et al. Copenhagen Consensus 2008 - Results. 2008. [http://www.copenhagenconsensus.com/sites/default/files/cc08\\_results\\_final\\_0.pdf](http://www.copenhagenconsensus.com/sites/default/files/cc08_results_final_0.pdf).
66. Mariella Di Ciommo. The Aid Financing Landscape for Nutrition. Ian Townsend, ed. 2013.  
<http://devinit.org/wp-content/uploads/2013/07/Development-Initiatives-Nutrition-Report-April-2013.pdf>.
67. Scaling Up Nutrition. An introduction to the Scaling Up Nutrition Movement. February 2014.  
[http://scalingupnutrition.org/wp-content/uploads/2014/04/Orange\\_Internal\\_InOutline\\_ENG\\_20140415\\_web.pdf](http://scalingupnutrition.org/wp-content/uploads/2014/04/Orange_Internal_InOutline_ENG_20140415_web.pdf).
68. SUN Movement Secretariat. *SUN Is a Global Movement to End Malnutrition*. Scaling Up Nutrition Movement; 2015. [http://scalingupnutrition.org/wp-content/uploads/2012/10/2pager\\_from4pager\\_ENG\\_20150227\\_web\\_pages.pdf](http://scalingupnutrition.org/wp-content/uploads/2012/10/2pager_from4pager_ENG_20150227_web_pages.pdf).
69. USAID. USAID Fact Sheet FY 2014 Development and Humanitarian Assistance Budget. 2013.  
[http://www.usaid.gov/sites/default/files/documents/1869/FY2014\\_DevelopmentBudgetFactSheet.pdf](http://www.usaid.gov/sites/default/files/documents/1869/FY2014_DevelopmentBudgetFactSheet.pdf).
70. Feed the Future. About. 2015. <http://www.feedthefuture.gov/about>. Accessed October 9, 2015.
71. World Health Organization. *Proposed Programme Budget 2014-2015*. Geneva: World Health Organization; 2013. [http://www.who.int/about/resources\\_planning/A66\\_7-en.pdf](http://www.who.int/about/resources_planning/A66_7-en.pdf).
72. Scaling Up Nutrition. Scaling Up Nutrition: In Practice. Effectively Engaging Multiple Stakeholders. February 2014. <http://scalingupnutrition.org/wp-content/uploads/2014/03/Sun-in-Practice-issue-1.pdf>.
73. Scaling Up Nutrition. Draft State of the SUN Movement Progress Report. September 2013.  
[http://scalingupnutrition.org/wp-content/uploads/2013/09/SUN\\_Progress\\_Report\\_2013\\_ENGLISH1.pdf](http://scalingupnutrition.org/wp-content/uploads/2013/09/SUN_Progress_Report_2013_ENGLISH1.pdf).
74. Horton S, Shekar M, McDonald C, Mahal A, Brooks JK. *Scaling Up Nutrition: What Will It Cost?* Washington, DC: The World Bank; 2010.