

PART 2: TECHNICAL NOTES

The technical notes are the second of four parts contained in this module. They describe different types of *malnutrition*, as well as policy developments in the nutrition sector and the changing global context. The technical notes are intended for people involved in nutrition programme planning and implementation. They provide technical details, highlight challenging areas and provide clear guidance on accepted current practices. Words in italics are defined in the glossary.

Summary

This module is about malnutrition, taken here to mean both *undernutrition* and *overnutrition*; however the latter will be covered in less detail, as it is less of an issue in emergency contexts. Undernutrition can result in *acute malnutrition* (i.e. wasting and/or nutritional oedema), *chronic malnutrition* (i.e. stunting), *micronutrient malnutrition* and *inter-uterine growth restriction* (i.e. poor nutrition in the womb). The focus will be on acute malnutrition¹ and to a lesser degree micronutrient deficiencies (covered in more detail in module 4) because they manifest the most rapidly and are therefore more visible in emergencies. Chronic malnutrition and underweight are also covered as they reflect underlying nutritional vulnerability, in many emergency contexts, and are therefore important to understand. Emergency-prone populations are more likely to be chronically malnourished and repeated emergencies contribute to chronic malnutrition over the long term. Thus, effective emergency response is also important for the overall prevention of undernutrition. Certain groups may be more vulnerable to malnutrition and this is covered briefly. Finally the nutrition sector is rapidly evolving, and a number of key developments are outlined towards the end of this module.

Underweight, as a composite measure of acute and chronic malnutrition, is important in emergency contexts, for understanding all forms of undernutrition, and is used as a measure of the Millennium Development Goals (MDGs).

More detail on micronutrients, causes of malnutrition, and measuring malnutrition can be found in modules 4, 5, 6 and 7 respectively. Treatment of malnutrition is addressed in modules 11-18.

These technical notes are based on the following references:

- United Nations System Standing Committee on Nutrition (UNSCN) (2010). Progress in nutrition – 6th report on the World Nutrition Situation. Geneva.
- The Lancet (2008). Maternal and Child Undernutrition 1: global and regional exposures and health consequences. Maternal and Child Undernutrition Series.
- The Sphere Project (2011). Sphere Handbook. 'Chapter 3: Minimum Standards in Food Security and Nutrition.' Geneva.
- Black et al, (2008). Maternal and child undernutrition: global and regional exposures and health consequences. The Lancet Maternal and Child Undernutrition Series.
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- Horton, S., Shekar, M., McDonald, C., Mahal, A., Krystene Brooks, J. (2009). Scaling Up Nutrition: What will it cost? Washington DC. The World Bank.
- Department for International Development (2010). The neglected crisis of undernutrition: DFID's Strategy.
- ACF International (2010). Taking Action, Nutrition for Survival, Growth and Development, White paper.
- WHO/UNICEF (2009). WHO child growth standards and the identification of severe acute malnutrition in infants and children. A Joint Statement by the World Health Organization and the United Nations Children's Fund.

¹ Acute malnutrition will often include some forms of micronutrient deficiencies and occurs over a shorter time frame than chronic malnutrition

Key messages

1. Malnutrition encompasses both overnutrition and undernutrition. The latter is the main focus in emergencies and includes both acute and chronic malnutrition as well as micronutrient deficiencies.
2. Underweight, which is a composite indicator of acute and chronic malnutrition, is used to measure progress towards the target 1c of MDG1, "Halve, between 1990 and 2015, the proportion of people who suffer from hunger"
3. Undernutrition is caused by an inadequate diet and/or disease.
4. Undernutrition is closely associated with disease and death
5. Chronic malnutrition is the most common form of malnutrition and causes 'stunting' (short individuals). It is an irreversible condition after 2 years of age.
6. Acute malnutrition or 'wasting' and/or nutritional oedema is less common than chronic malnutrition but carries a higher risk of mortality. It can be reversed with appropriate management and is of particular concern during emergencies because it can quickly lead to death.
7. There are two clinical forms of acute malnutrition: *marasmus*, which may be moderate or severe wasting; and *kwashiorkor* which is characterised by bilateral pitting oedema and is indicative of *severe acute malnutrition (SAM)*. *Marasmic-kwashiorkor* is a condition which combines both manifestations. SAM is associated with higher mortality rates than *moderate acute malnutrition (MAM)*.
8. Low birth weight (LBW) babies, young children 0-59 months, adolescents, pregnant and breastfeeding mothers, older people, people with chronic illness and people living with disability are most vulnerable to undernutrition.
9. In general, children are more vulnerable than adults to undernutrition due to their exceptional needs during active growth, and their immature immune and digestive systems (infants 0-6 months).
10. The burden of undernutrition (total numbers of combined acute and chronic levels) is greatest in South Asia, whereas the highest rates of acute malnutrition are found in Africa
11. Global nutrition learning, research, policy and guidelines are constantly changing and it is important to stay updated.

- UNICEF (2009) Tracking progress on Child and Maternal Nutrition
- Save the children, UK (2009). Hungry for Change, An eight step, costed plan of action to tackle global child hunger.

Introduction

'Child hunger and undernutrition are persistent problems worldwide: one child in three in developing countries is stunted and undernutrition accounts for 35% of annual deaths for under 5 year olds. Children who survive are more vulnerable to infection, don't reach their full height potential and experience impaired cognitive development. This means they do less well in school, earn less as adults and contribute less to the economy. Without intervention undernutrition can continue throughout the life cycle. There is a crucial window of time during which undernutrition can be prevented – the 33 months from conception to a child's second birthday. If action is not taken during this period the effects of undernutrition are permanent.'²

Children suffering from acute malnutrition have generally been the focus of nutritional concern during emergencies. This is because severe wasting can quickly lead to death, especially among children under 5 years old who are most vulnerable to disease and malnutrition. In recent years, however, maternal undernutrition, micronutrient deficiency and chronic malnutrition have received more focus. Repeated or protracted emergencies contribute to a rise in chronic malnutrition over the long term, as well as increasing the likelihood of micronutrient deficiencies and maternal malnutrition. It is therefore important to be aware of all types of undernutrition. Emergencies that result in high acute malnutrition rates tend to be in the poorest countries that already have raised rates of chronic malnutrition.

Undernutrition reduces gross domestic product (GDP) by an estimated 3-6% and costs billions of dollars in lost productivity and healthcare spending. Save the Children's, Hungry for Change paper, states that, 'Malnutrition reduces the impact of investments in key basic services: it holds back progress in education, in mortality reduction and in treatment of HIV and AIDS.'³ Effective response to nutrition emergencies is essential

² Save the children, UK (2009). Hungry for Change, An eight step, costed plan of action to tackle global child hunger.

³ Save the children, UK (2009). Hungry for Change, An eight step, costed plan of action to tackle global child hunger.

Double burden of malnutrition

Evolving dietary practices can result in a shift away from traditional diets towards more 'globalised foods'. These can include: increased intakes of processed foods, animal products, sugar, fats and sometimes alcohol. These foods are sometimes described as foods of minimal nutritional value. Such diets may be inadequate in micronutrients but contain high levels of sodium, sugar and saturated or trans fats, excessive amounts of which are associated with increased risk of non-communicable diseases. For a number of developing countries, high rates of undernutrition can be accompanied by an increasing prevalence of overweight or obesity and associated non-communicable diseases (cardiovascular disease, diabetes and hypertension) resulting in a 'double burden' of malnutrition.

There is evidence that this burden is shifting towards low-income groups, especially when combined with trends such as urbanisation. At the household level, women working outside of the home, exposure to mass media and increasingly sedentary working patterns encourage the consumption of convenience foods. These are fast to prepare and consumed at home or as street foods. This can easily lead to the presence of both undernutrition and overnutrition within the same household. Causal analysis of malnutrition is even more important in such contexts, in order to identify who is affected by undernutrition and overnutrition due to consumption of unhealthy diets.⁴

Recent emergencies in Gaza, Iraq, India, Philippines, Kazakhstan, Lebanon and Algeria, have highlighted cases of malnutrition in infants and children due to low *exclusive breastfeeding* rates and poor infant feeding practices (amongst other causes), where the mother, father or elders within the household are overweight or obese.⁵

to tackling this burden of undernutrition. It should, however, be part of a broader strategy that aims to prevent and manage all forms of undernutrition in both emergency and non-emergency contexts.

What is Malnutrition?

Malnutrition includes both undernutrition – acute malnutrition (i.e. wasting and/or nutritional oedema), chronic malnutrition (i.e. stunting), micronutrient malnutrition and inter-uterine growth restriction (i.e. poor nutrition in the womb) – and **overnutrition** (*overweight and obesity*⁶). Overnutrition will be covered in less detail, as it is less of an issue in emergency contexts. Undernutrition is common in low-income groups in developing countries and is strongly associated with poverty. However, in many developing countries, under- and overnutrition occur simultaneously. This phenomenon is referred to as the *double burden of malnutrition*.

Acute malnutrition

Acute malnutrition or wasting (and/or oedema) occurs when an individual suffers from current, severe nutritional restrictions, a recent bout of illness, inappropriate childcare practices or, more often, a combination of these factors. It is characterised by extreme weight loss, resulting in low weight for height, and /or bilateral oedema⁷, and, in its severe form, can lead to death.⁸ Acute malnutrition reduces resistance to disease and

impairs a whole range of bodily functions. Acute malnutrition may affect infants, children and adults. It is more commonly a problem in children under-five and pregnant women, but nonetheless this varies and must be properly assessed in each context. Levels of acute malnutrition tend to be highest in children from 12 to 36 months of age when changes occur in the child's life such as rapid weaning due to the expected birth of a younger sibling or a shift from active breastfeeding to eating from a family plate, which may increase vulnerability.

The most visible consequences of acute malnutrition are weight loss (resulting in moderate or severe wasting) and/or nutritional oedema (i.e. bilateral swelling of the lower limbs, upper limbs and, in more advanced cases, the face). Acute malnutrition is divided into two main categories of public health significance: **severe acute malnutrition** (SAM) and **moderate acute malnutrition** (MAM). MAM is characterised by moderate wasting. SAM is characterised by severe wasting and/or nutritional oedema.

The term *global acute malnutrition* (GAM) includes both SAM and MAM. Mild acute malnutrition also has consequences but is not widely used for assessment or programming purposes.

Acute malnutrition increases an individual's risk of dying because it compromises immunity and impairs a whole range of bodily functions. When food intake or utilisation (e.g. due to illness) is reduced, the body adapts by breaking down fat

⁴ United Nations Standing Committee on Nutrition (UNSCN) (2010). Progress in Nutrition – 6th report on the world nutrition situation.

⁵ FAO (2006). The double burden of malnutrition. Case studies from six developing countries. Food and Nutrition Paper 84, FAO.

⁶ Defined as: Overweight among non-pregnant women aged 15 to 49 years (26-30) and Obesity among non-pregnant women aged 15 to 49 years (>30 BMI)

⁷ Kwashiorkor described later in the text

⁸ ACF International (2010) Taking Action, Nutrition for Survival, Growth and Development, White paper.

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and muscle reserves to maintain essential functions, leading to wasting. The body also adapts by decreasing the activity of organs, cells and tissues, which increases vulnerability to disease and mortality. For reasons not completely understood, in some cases, these changes manifest as nutritional oedema. A vicious cycle of disease and malnutrition is often observed once these adaptations commence.

SAM can be a direct cause of death due to related organ failure. More often, however, acute malnutrition works as a driver of vulnerability, while the actual, final cause of death may be a common illness, such as diarrhoea, respiratory infection or malaria. Despite operating as a less visible 'underlying cause', acute malnutrition is responsible for a shocking 14.6% of the total under-five death burden each year.⁹

Acute malnutrition differs from chronic malnutrition in three important ways which explain why it is traditionally prioritised in emergencies. First, it progresses and becomes visible over a much shorter time period. Hence, the prevalence of GAM among under-fives in a population is often a criterion to declare a nutritional emergency in the first place. Second, the mortality risk associated with acute malnutrition is roughly double that for chronic malnutrition (although chronic malnutrition is more prevalent). Third, wasting and nutritional oedema have a much greater potential to be reversed within a few months of treatment if detected early enough. In contrast, chronic malnutrition is difficult to reverse, particularly in children older than two years. This is because chronic malnutrition reflects past growth failure (i.e. failure to add height) due to the cumulative effects of poor diet and care that may have even begun in the womb (see chronic malnutrition and intra-uterine growth restriction).

Because acute malnutrition presents a more immediate and potentially reversible public health problem, its *management* or *treatment* is generally prioritised in emergencies when case loads are often high. Nonetheless, prevention of chronic malnutrition, micronutrient deficiencies and, indeed, future cases of acute malnutrition are essential complementary strategies, particularly in protracted emergencies. There is a strong link between acute and chronic malnutrition, as a single or repeated bouts of acute malnutrition will contribute to growth failure during the first five years of life.

Roughly 55 million children in the world suffer from acute malnutrition at any one time; this is 10% of all children under 5 years of age. Although more children suffer from chronic malnutrition (178 million, or 32% of children under 5 years), the higher mortality risk associated with acute malnutrition

mean the actual contribution to global death burden is similar.¹⁰

Measuring acute malnutrition is addressed in Modules 6 and 7 and the treatment of acute malnutrition is discussed in Modules 12 and 13.

Moderate Acute Malnutrition (MAM)

The burden of MAM (wasting) globally is considerable. Moderate wasting affects 11% of the world's children, with a risk of death 3 times greater than that of well-nourished children. Around 41 million children are moderately wasted worldwide and the management of MAM is finally becoming a public health priority, given this increase in mortality and the context of accelerated action towards achievement of Millennium Development Goals (MDGs) 3 and 4. Children with MAM have a greater risk of dying because of their increased vulnerability to infections as well as the risk of developing SAM, which is immediately life threatening.¹¹

Some children with MAM will recover spontaneously without any specific external intervention; however the proportion that will spontaneously recover and underlying reasons are not well documented.

Severe Acute Malnutrition (SAM)

There are an estimated 19 million children with SAM in low and middle-income countries. A child suffering from SAM is 9.4 times more likely to die than a well-nourished child. This means that SAM accounts for at least 4% of the global under-five deaths each year.¹²

Acute malnutrition is distinguished by its clinical characteristics of wasting and/or bilateral pitting oedema¹³

- **Marasmus** – severe wasting presenting as both moderate and severe acute malnutrition
- **Kwashiorkor** – bloated appearance due to water accumulation (nutritional bilateral pitting oedema)
- **Marasmic kwashiorkor** – is a condition which combines both manifestations.

Marasmus¹⁴ is characterized by severe wasting of fat and muscle, which the body breaks down to make energy leaving 'skin and bones'. A child with marasmus is extremely thin with a wizened 'old man' appearance. This is the most common form of acute malnutrition in nutritional emergencies.

⁹ Black et al (2008). Maternal and child undernutrition: global and regional exposures and health consequences, Lancet Series on maternal and child undernutrition.

¹⁰ Black et al (2008). Maternal and child undernutrition: global and regional exposures and health consequences, Lancet Series on Maternal and child undernutrition.

¹¹ HTP Module 12, Management of Acute Moderate Malnutrition

¹² Black et al (2008). Maternal and child undernutrition: global and regional exposures and health consequences, Lancet Series on Maternal and child undernutrition

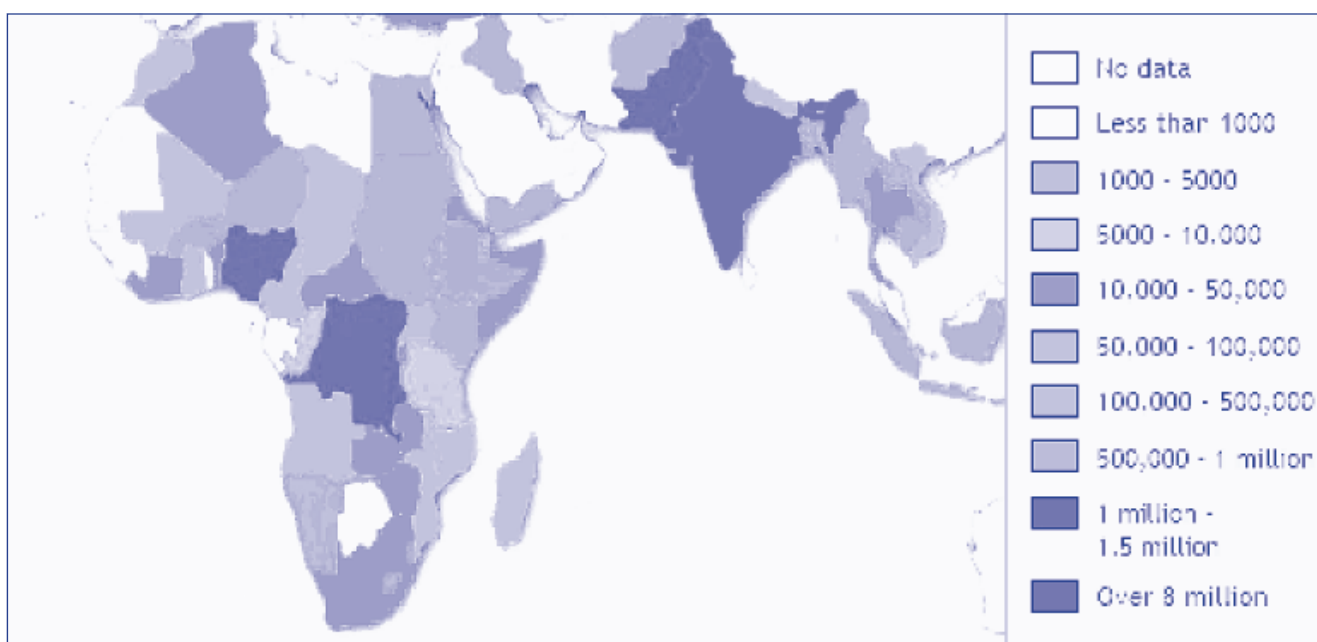
¹³ This is based on the 1970 Wellcome Classification.

¹⁴ weight-for-height <70% of the median, or below -3 Z scores, and/or made up arm circumference (MUAC) <115mm in children 6-59 months.

Kwashiorkor is characterised by bilateral pitting oedema¹⁵ (affecting both sides of the body). The child may not appear to be malnourished because the body swells with the fluid, and their weight may be within normal limits. In its severe form, Kwashiorkor results in extremely tight, shiny skin, skin lesions and discoloured hair¹⁶.

The map below shows SAM prevalence in children under-5 years, by country in the two most affected regions – Africa and Asia. Countries with the highest SAM prevalence include Democratic republic of Congo (DRC), Burkino Faso, Sudan, India, Cambodia and Djibouti¹⁷. In India alone there are an estimated 8 million severely wasted children.

Figure 1: Prevalence (n) of SAM in South-central Asia and sub-Saharan Africa



Source: ACF International (2010). *Taking Action, Nutrition for Survival, Growth and Development, White paper.*

Case example 1 highlights an example of where rates of acute malnutrition have risen gradually over 9 years, and then more sharply following floods in 2010. Rates of SAM are high as a proportion of the total GAM. Chronic malnutrition has also risen, demonstrating that the same factors cause chronic and acute malnutrition, in this context, over a different time frame.

Chronic malnutrition

Chronic malnutrition or stunting results from the same underlying causes as acute malnutrition but occurs more gradually over a longer-term. Chronic malnutrition is most critical during childhood when it inhibits growth and essential cognitive development. The result is childhood stunting, where the child is too short for his/her age. Unfortunately, childhood stunting is irreversible after two years of age, and stunted children grow up to be stunted adults with reduced physical and cognitive capacity. As a result, stunting is associated with poverty, poor health, impaired educational attainment, reduced work productivity and lower wage earning potential throughout one's

life. Chronic malnutrition is often referred to as 'silent malnutrition' or 'invisible malnutrition' largely because stunted children are short but proportional and because it is so prevalent in some regions it is accepted as 'normal'.

The most effective strategy for tackling chronic malnutrition is to prevent it and critically this must be done within the first 33 months, from conception (-9 months) to 2 years of age (+24 months). Although it is difficult to 'treat' chronic malnutrition, actions taken in emergencies are critical to preventing shocks to child growth, which eventually result in chronic malnutrition. This includes providing access to quality foods, micronutrient supplements, timely and effective treatment of acute malnutrition, safe water and good quality health care. In protracted emergencies, chronic malnutrition can increase without any significant increase in the level of acute malnutrition. In such contexts, chronic malnutrition may be as important a nutritional indicator as acute malnutrition; even if it is slower to change at the population level. It should, therefore, not be discounted in humanitarian responses (see case example 2).

¹⁵ Oedema is present when the leg is pressed with the thumb just above the ankle, and a definite pit remains after three seconds on both sides of the body.

¹⁶ ACF International (2010) *Taking Action, Nutrition for Survival, Growth and Development, White paper.*

¹⁷ ACF International (2010) *Taking Action, Nutrition for Survival, Growth and Development, White paper.*

Case example 1: Acute malnutrition in Pakistan 2010

Following the devastating floods in July/August, a nutrition survey was carried out in October 2010 in the flood-affected provinces of Pakistan. The highest rates of malnutrition were found in northern Sindh. Very little nutritional data exists in Pakistan. The last national nutrition survey, in 2001-2 found a GAM of 13.1%, SAM of 3.1% and a chronic malnutrition rate of 36.8%. There is no Sindh-wide data but a survey in one district of Sindh in 2007 showed 16.7% GAM and 2.2% SAM.

In Oct 2010, Acute malnutrition: rates of wasting among under-five-year-olds were found to be 22.9% GAM and 6.1% SAM. The highest rates of MAM were found in the 6-17 month age group, and the highest rates of SAM were in the 18-29 month age group. Women were also found to be moderately malnourished (11.2% Mid-upper arm circumference (MUAC) \geq 185 mm <210 mm) and severely malnourished (1.9% MUAC <185 mm).

Acute malnutrition was significantly associated with high prevalence of illnesses, mainly *diarrhoea*, *malaria* and *acute respiratory infections* and poor *infant and young child feeding* (IYCF) practices, as well as poor sanitation and use of unsafe drinking water. Vitamin A deficiency was identified through clinical symptoms and yet measles vaccination coverage and Vitamin A supplementation was very low (<30% coverage). No mortality data was available, as the government had not agreed to its collection. Six months post-floods the economic access to food is poor, and household food security is not predicted to return to pre-flood levels until April 2012.

In Oct 2010, Chronic malnutrition: rates of stunting were 54% (up from 36.8% in 2001) reflecting the poor sanitation, use of unsafe drinking water, high rates of diarrhoea, poor infant feeding and breast feeding practices, low purchasing power and chronic food insecurity. Basic causes included low age of marriage, high parity, high rates of low birth weight (21%), poor governance, low rates of female education, high household debts, and a landlord system that functioned like bonded labour.

This demonstrates the importance of understanding the historical and contextual picture of malnutrition and poverty in order to understand the inter-relationship between chronic and acute malnutrition. **Chronic and acute malnutrition are not mutually exclusive but often overlapping and are particularly crucial in the vulnerable under-2 year-olds.** The immediate and underlying causes are often the same, but are more acute in the period of recovery after a shock such as the floods. In this case, the household food insecurity, inadequate care practices, unhealthy environment and poor service provision all contributed to rising levels of both acute and chronic malnutrition, and care practices were considered to be the most significant factor in the cause of malnutrition for the children less than two years old.

Source: Nutrition Causal Analysis, Pakistan, March 2011, Laura Phelps, Oxfam GB

Stunting affects approximately 178 million children¹⁸ under 5 years old in the developing world, or about one in three. Africa and Asia have high stunting rates of 40% and 36% respectively, and more than 90% of the world's stunted children live on these two continents. Of the 10 countries that contribute most to the global burden of stunting in terms of absolute number of stunted children, 6 are in Asia. The countries with the highest prevalence of stunting (50% and over) include: Bangladesh, Angola, India, Zambia, Afghanistan, Niger, Malawi, Madagascar, Nepal, Ethiopia, Yemen, Guatemala and Burundi. Due to the high prevalence of stunting (48%) in combination with a large population, India alone has an estimated 61 million stunted children.¹⁹

Case example 2 demonstrates the risk of chronic malnutrition and micronutrient deficiencies developing in protracted emergencies.

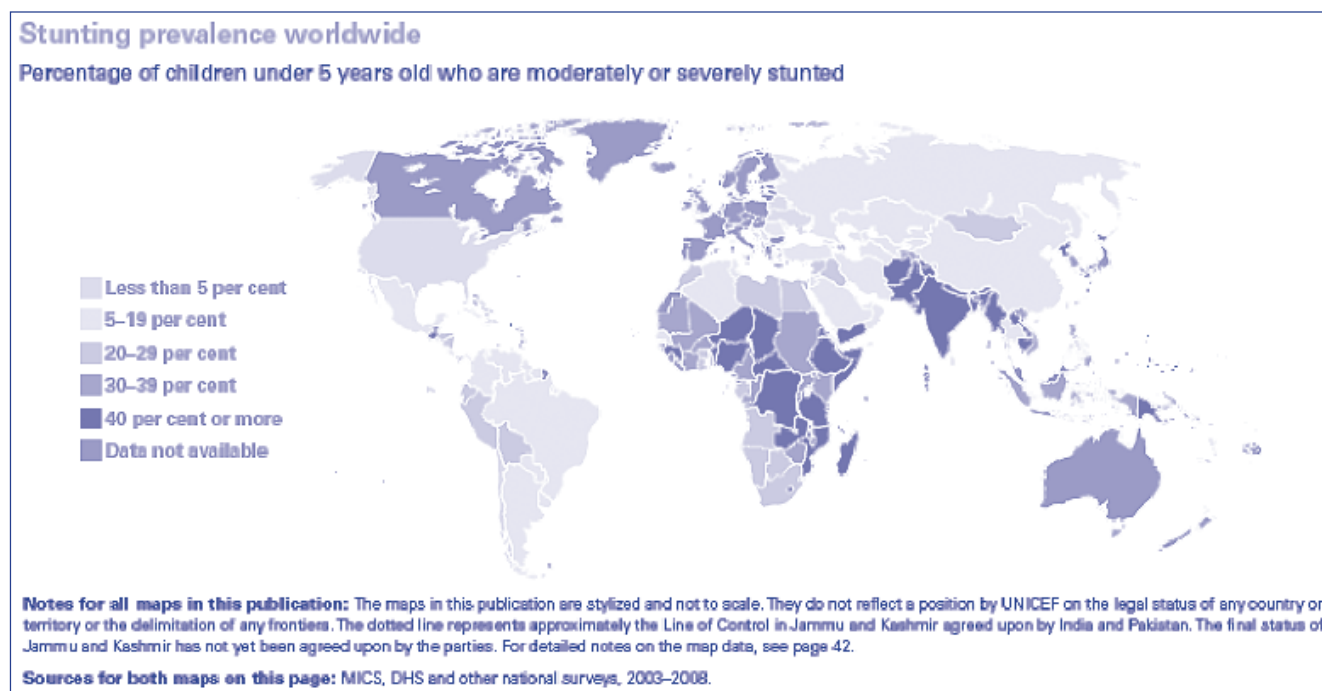
Underweight

Underweight is a general measure that captures the presence of wasting and/or stunting. It is therefore a composite indicator, reflecting either acute or chronic undernutrition without distinguishing between the two. The index does not indicate whether the child is 'underweight' due to reduced fat/ muscle mass (wasting) or due to unattained height for his or her age (stunting). As such, its utility as an indicator for assessment or programming is limited because it does not indicate the nature of the problem or the timeframe for the required response. At the population level it does not indicate if an immediate emergency therapeutic response or longer term prevention programme is needed. At the individual level, it does not allow immediate detection and referral of acute malnutrition for appropriate treatment. It is advantageous, however, because it is easier to measure than stunting or wasting, for which an additional height measurement is required. It is also one of the key indicators for MDG 1.

¹⁸ Black et al (2008). Maternal and child undernutrition: global and regional exposures and health consequences, Lancet Series on Maternal and child undernutrition.

¹⁹ UNICEF (2009) Tracking progress on Child and Maternal Nutrition

Figure 2: Stunting prevalence worldwide



Source: MICS, DHS and other national surveys (2003-2008), via UNICEF (2009) Tracking progress on Child and Maternal Nutrition

Case example 2: Chronic malnutrition in Occupied Palestinian Territory (OPT): 2008

Since the second intifada in 2000, living conditions for refugee and non-refugee populations in both rural and urban areas of the West Bank and Gaza Strip have deteriorated. Lack of access to land to grow food and to neighbouring Israel for employment in building and agricultural sectors have left many Palestinian families with depleted household assets. In addition, there has been sporadic violence between warring factions. As a result, there are indications that the diet has become more monotonous and there is an increased dependency on food aid.

Acute malnutrition rates amongst children under 5 have remained low, but the rate of **chronic malnutrition** has risen over the last few years, from 8.3% in 2000, to 13.2% in 2006, and reaching 14% in 2008, in Shijaia, Eastern Gaza. However, there is a high rate of low birth weight (7%) and 'alert level' micronutrient deficiency rates (iron deficiency anaemia >40%, vitamin A deficiency >20% in certain age groups, and a rickets prevalence of 4.1% in 6-36 month olds). These have been attributed to poor dietary diversity (due to a reliance on food aid and a lack of purchasing power) and a decline in good infant and breastfeeding practices. Only 2.7% of mothers surveyed practiced exclusive breastfeeding, and only 77.7% met the minimum dietary diversity. Ninety-nine per cent of the mothers who stopped breastfeeding felt that they were unable to produce enough milk as the result of breast problems, stress or fear.

This low level food insecurity, poor dietary diversity, and poor breastfeeding and infant feeding practices are resulting in a steady rise in the rate of chronic malnutrition and micro-nutrient deficiencies. This case demonstrates the importance of analysing the causes and changes in rates of both chronic and acute malnutrition, especially in protracted emergencies such as this.

Source: Thurstan, S., Sibson, V. (2008), Assessing the intervention on infant feeding in Gaza. Field Exchange, issue 38, p 23-25 and Abu Hamad, Bassam., Johnson, E. (2008). Experiences and addressing malnutrition and anaemia in Gaza. Field Exchange, issue 38, p 26-29.

An estimated 112 million children under-five are underweight²⁰ – nearly one in four – and 10% of under-fives in the developing world are severely underweight. The prevalence

of underweight among children is higher in Asia than in Africa, with rates of 27% compared to 21%. This is mainly due to stunting rather than wasting.

²⁰ Black et al (2008). Maternal and child undernutrition: global and regional exposures and health consequences, Lancet Series on Maternal and child undernutrition.

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Underweight is used to assess progress towards the MDG 1 hunger target. Underweight cases are responsible for up to a 3-6% reduction in GDP at country level.²¹

Micronutrient deficiencies²²

Micronutrients are minerals and vitamins that are needed in tiny quantities (and are therefore known as micronutrients). Micronutrient deficiencies account for roughly 11% of the under-five death burden each year.²³ It is now recognised that poor growth in under-fives results not only from a deficiency of protein and energy but also from an inadequate intake of vital minerals (e.g., zinc), vitamins, and essential fatty acids²⁴.

Vitamins are either water-soluble (e.g. the B vitamins and vitamin C) or fat-soluble (e.g. vitamins A, D, E and K). Essential minerals include iron, iodine, calcium, zinc, and selenium. There are internationally accepted dietary requirements for many micronutrients. Sphere standards state that people affected by emergencies have a right to a diet that is nutritionally adequate. Therefore, there should be no cases of clinical micronutrient disease. In particular there should be no cases of *scurvy* (vitamin C deficiency), *pellagra* (niacin deficiency), *beriberi* (thiamine deficiency) or *ariboflavinosis* (riboflavin deficiency). The rates of *xerophthalmia* (vitamin A deficiency) and *iodine deficiency disorders* should be below levels of public health significance. Despite the existence of international standards for dietary requirements there have been recent outbreaks of many of these diseases. Micronutrient malnutrition continues to affect populations in emergencies and is a significant cause of morbidity, mortality, and reduced human capital²⁵. See below for key micronutrient deficiencies²⁶:

- Iron deficiency leads to iron deficiency anaemia
- Vitamin C deficiency leads to scurvy
- Vitamin A deficiency leads to xerophthalmia
- Niacin or Vitamin B3 deficiency leads to pellagra
- Iodine deficiency leads to goitre and cretinism (in infants born to iodine deficient mothers)
- Thiamin or B1 deficiency leads to beriberi
- Riboflavin deficiency leads to ariboflavinosis
- Vitamin D deficiency leads to rickets

The main cause of micronutrient malnutrition is usually an inadequate dietary intake of vitamins and/or minerals. Food

aid rations have often failed to meet Sphere standards for micronutrient adequacy. Intakes lacking dietary diversity are strong predictors of micronutrient deficiency disease (MDD). Equally, infections are an additional and important cause of micronutrient malnutrition, and can negatively affect nutritional status by increasing nutrient requirements and reducing nutrient absorption.

Globally, iron deficiency anemia is the most common micronutrient disorder. Large numbers are also affected by iodine and vitamin A deficiencies. These endemic deficiencies often affect populations in emergencies. In addition, epidemics of MDD such as pellagra, scurvy, beriberi, ariboflavinosis and rickets occur in populations affected by severe poverty or experiencing crisis.

Ensuring that micronutrient deficiency diseases are monitored as part of the health information system is an important part of effective surveillance. Specialist approaches may be required to accurately identify and quantify the extent of a deficiency problem. However, high rates of acute malnutrition often indicate the presence of micronutrient deficiencies within the under-5 child population. Proxy indicators may also be used. For example Vitamin A deficiency initially presents as night blindness, which if untreated may progress to bitots spots and gradually to xerophthalmia. Night blindness can be roughly assessed through interviews and the progressive symptoms through the clinical signs. When such micronutrient-related deficiencies become widespread they can present themselves as epidemics within the population group.

Intrauterine growth restriction

Weight at birth is a good indicator not only of a mother's health and nutritional status but also of the newborn's chances of survival, growth, long-term health and psychosocial development. Low birth weight (LBW) (less than 2.5 kg) carries a range of grave health risks for children. Babies who were undernourished in the womb face a greatly increased risk of dying during their early months and years. Those who survive have impaired immune function and increased risk of disease; they are likely to remain undernourished, with reduced muscle strength, throughout their lives, and suffer a higher incidence of diabetes and heart disease in later life. Children born underweight also tend to have a lower IQ and reduced cognitive development, affecting their performance in school and their job opportunities as adults.²⁷

²¹ Save the children, UK (2009). Hungry for Change, An eight step, costed plan of action to tackle global child hunger.

²² For more information about micronutrients refer to Module 4 and 14.

²³ Black et al (2008). Maternal and child undernutrition: global and regional exposures and health consequences, Lancet Series on Maternal and child undernutrition.

²⁴ Not a micronutrient

²⁵ Module 4 Micronutrient Malnutrition

²⁶ See Module 4 for more detail on each deficiency

²⁷ UNICEF/WHO (2004). Low Birth weight: Country, regional and global estimates, UNICEF, New York.

Case example 3: Sub-optimal breastfeeding and infant feeding in Haiti: 2010

Following the massive earthquake that struck Haiti in January 2010, there was an urgent need to understand: a) the types and causes of malnutrition that were present before the earthquake; b) how and among which population groups the earthquake was likely to increase vulnerability; c) the type of response required to immediately address and reduce these vulnerabilities. While this type of analysis is essential when responding to any emergency, it was particularly important during the Haiti crisis due to its overwhelming scale, rapid onset and the unique urban context. At the time of the earthquake, the most recent nutrition assessments available came from the 2005 Demographic Health Survey (DHS) and an ACF survey in 2008/09.

The DHS showed a considerable level of stunting pre-earthquake (24% of under-fives <-2 height-for-age Z-scores), a relatively low level of global wasting (9% were <-2 weight-for-height Z-scores) and a somewhat high level of severe wasting (2% were <-3 weight-for-height z-scores). Stunting and wasting levels were traditionally higher in rural versus urban areas. There was general agreement that the prevalence of acute malnutrition could rapidly escalate given the poor food security and hygiene conditions, and as a result services for the community-based management of acute malnutrition (CMAM) were scaled up.

It was also agreed, however, that one of the greatest risks to nutritional status and child survival was poor infant feeding practices. Before the earthquake, only 40% of children under six months were exclusively breastfed (DHS 2005) this rate was only 22% in Port-au-Prince (Enquêtes nutritionnelle 2007-2009, Action Contre la Faim). Based on this understanding of the situation pre-earthquake and the danger posed by the deterioration in the hygiene environment post-earthquake, infant feeding promotion in the form of 'baby tents' was established across the city, where infant feeding assessment, counselling and where necessary, safe infant formula were provided.

South-central Asia has the highest proportion of LBW at 27% of babies born, compared with a 14.3% rate in Africa²⁸. African children's higher birth weight and lower underweight prevalence is partly due to the greater body size of their mothers when pregnant. There is a strong association of low birth weight with low body mass index (BMI) or MUAC in women. This has implications for sustained nutritional improvement in women from childhood, through adolescence and then pre-, during and post pregnancy.

Increased birth weight contributes to a reduction in growth faltering by two years of age, resulting in less stunting, which is eventually reflected in increased adult height. Improved cognitive function and intellectual development is an outcome of this improved nutritional status.

Improving birth weights is not just the responsibility of development actors, as birth weights can be rapidly improved, even in populations with short adult women (with small pelvises), by improving dietary quantity and quality during or preferably before the first trimester of pregnancy.²⁹

Suboptimal breastfeeding

Inadequate breastfeeding is a potentially serious threat to nutritional status in newborns and young infants under the age of six months. Babies should be breastfed immediately (within

1 hour) after birth, exclusively breastfed for the first six months and ideally continue breastfeeding into the second year of life to maximise their survival and development. However, exclusive breastfeeding is rarely practised in more than half of the children less than 6 months of age receiving breast milk. Dilution and displacement of breast milk with other fluids such as water, tea or gruel both reduce the nutritional and immunological support from the breast milk and increase the risk of infection from unclean water, cups or bottles. This can result in malnutrition extremely early in life or directly to death. Barriers to optimal breastfeeding include cultural barriers, women's work burden – especially in urban environments where infants and mothers may be separated due to wage labour circumstances.

Increasing the number of babies who are breastfed optimally could result in a dramatic reduction in child mortality. Evidence of the benefits of breastfeeding has formed the basis for the three breastfeeding goals³⁰:

- All babies should be put to the breast immediately after birth (known as early initiation). The first milk (colostrum) provides an unequalled boost to the baby's immune system
- For the first six months baby should only be given breast milk and no other food or liquids (including water) – this practice is called 'exclusive' breastfeeding

²⁸ UNICEF (2009) Tracking progress on Child and Maternal Nutrition

²⁹ United Nations System. Standing Committee on Nutrition (UNSCN) (2010). Progress in nutrition – 6th report on the World Nutrition Situation. UNSCN, Geneva.

³⁰ Indicators for assessing infant and young child feeding practices: conclusions of a consensus meeting held 6-8 November 2007 in Washington D.C., USA.

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- Young children should continue to be breastfed until they are at least two years old

Case example 3 highlights the relationship between infant and young child feeding (IYCF) and acute malnutrition.

Food and nutrition security

The concept of nutrition security has emerged to give greater emphasis to considerations of consumption patterns within the household, and include a critical element of caring practices. *'Nutrition security exists when food security is combined with the sanitary environment, adequate health services and proper care and feeding practices to ensure a healthy life for all household members'*.³¹ Undernutrition can only be addressed if the three underlying causes – household food insecurity, inadequate care and unhealthy environment/lack of health services – are addressed (see conceptual framework of malnutrition below).

In recent years nutrition interventions have become somewhat compartmentalised due to the specialised nature of anthropometric surveys or therapeutic treatment protocols. This has, in some cases, led to a reduction in integrated programme approaches, as agencies specialising in nutrition are not always able to, or do not feel accountable for addressing all of the elements of food and nutrition security. Improved understanding of the conceptual framework for undernutrition and improved coordination is one step to ensuring nutrition security is assured. In emergencies, the cluster coordination system is one mechanism³² that is aiming to improve coordination and response analysis for this purpose.

When applying the universally accepted definition of **food security**, *'when all people, at all times, have physical and economic access to sufficient safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life'*, to programming the main responses are often focused on households, their resilience and access to assets, income and food energy. This approach ignores two elements of the accepted food security definition: *'all people'* i.e. each individual within the household; and *'nutritious food'* i.e. including protein, micronutrients (minerals and vitamins), etc. The result is that huge opportunities for integrated programming are lost.³³

It is important that food security programming is not only concerned with meeting the cost of the food basket, or providing 2100 kcal; but that it also considers the intra-household distribution of food (which may prioritise men and elders), and

the quality of food to ensure macro- and micronutrient needs are met. It is therefore important to monitor and analyse dietary diversity and food consumption patterns so that this understanding can facilitate appropriate programme, policy and advocacy approaches.

Conceptual Framework of Malnutrition

Insufficient access to food, poor dietary diversity, poor quality healthcare services, poor environmental sanitation, inadequate care of children, gender inequalities, and low educational levels of caregivers, are among the key causes of malnutrition. Food, health and care must all be available for survival, optimal growth and development³⁴. Module 5 looks in more detail at the causes of malnutrition which are outlined in the conceptual framework below³⁵:

Morbidity

Undernutrition is the result of inadequate dietary intake, disease or both. Disease contributes through loss of appetite, malabsorption of nutrients, loss of nutrients through diarrhoea or vomiting. If the body's metabolism is increased due to illness then there is a greater risk of malnutrition. An ill person needs more nutrients to rehabilitate and if they do not meet their needs they become malnourished.

Undernutrition makes people more susceptible to infections and disease in general and slows recovery. There is evidence that the severity of illness is worse among malnourished populations than among healthy populations. Infections can result in a borderline nutritional status turning into a clear case of malnutrition, particularly in young children. Disease patterns are affected by seasonal changes. Increased rainfall and changes in temperature all have an impact on disease. In emergencies, factors such as overcrowding, inadequate sanitation, poor water quality / supply and lack of health care also increase risks of diseases proliferating. The following bullet points describe the impact of malnutrition in infants, children and women:

Infants and children:

- Reduces the ability to fight infection
- Impairs the immune system and increases the risk of some infections
- Impairs growth
- Increases the chance of infant and young child mortality

³¹ Shakir, M. (2006) Repositioning Nutrition as central to development. Washington DC, World Bank

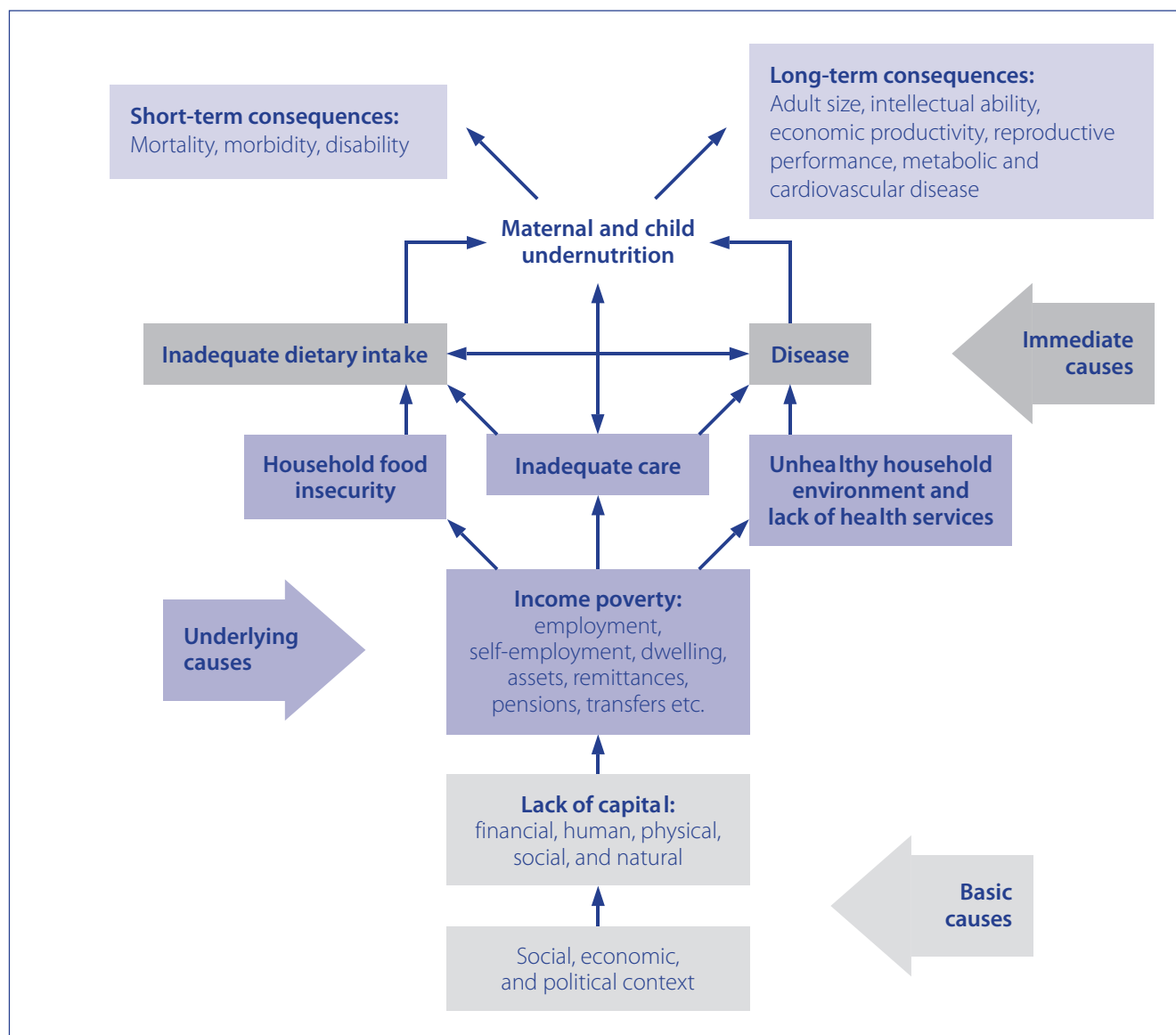
³² The Nutrition Cluster, with UNICEF as the lead agency, is one of 12 sectoral clusters, Cluster lead objectives, include providing sectoral leadership, strengthening preparedness and technical capacity and enhancing partnerships.

³³ Chastre, C, Levine, S. (2010). Nutrition and food security response analysis in emergency contexts

³⁴ ACF International (2010). Taking Action, Nutrition for Survival, Growth and Development, White paper, p 27

³⁵ Chastre, C, Levine, S. (2010) Nutrition and food security response analysis in emergency contexts

Figure 3: Nutrition conceptual framework (adapted from UNICEF)³⁶



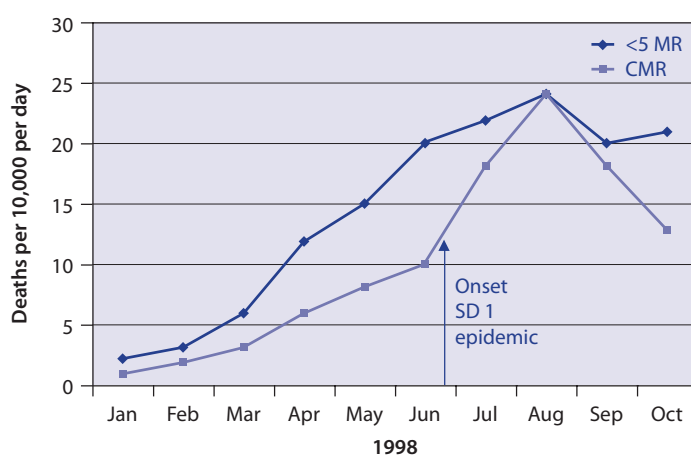
- Increases fatigue and apathy
 - Impaired cognitive development
 - Reduces learning capacity
- In women:**
- Increases the risk of complications during pregnancy
 - Increases the risk of spontaneous abortions, stillbirths, impaired foetal brain development and infant deaths
 - Increases the risk of maternal death from spontaneous abortion, stress of labour and other delivery complications
 - Increases the chance of producing a *low birth weight* baby
 - Reduces work productivity
 - Increases the risk of infection including HIV and reproductive tract infections
 - Results in additional sick days and lost productivity

³⁶ Chastre, C, Levine, S. (2010) Nutrition and food security response analysis in emergency contexts

Case example 4: Mortality rates in Awok, Southern Sudan: 1998

This graph shows both crude mortality rates (CMR)³⁷ and under-five mortality rates (U5MR)³⁸ in Awok over a 10-month period in 1998. First, U5MR rose faster than CMR, probably because children were more vulnerable to malnutrition. However, in July there was an outbreak of dysentery (bloody diarrhoea), and CMR caught up with the U5MR. These are extremely high mortality rates which were coupled with high rates of acute malnutrition. In July a nutritional survey revealed a prevalence of acute malnutrition in children 6 to 59 months of 80 per cent (<-2 z-score, weight for height). By October this was still 48 per cent and partially explained the extremely high levels of U5MR even when the dysentery epidemic was under control.

Mortality rates in Awok



Source: World Food Programme and Feinstein International Famine Centre, *WFP Food and Nutrition Training Toolbox*, WFP and Feinstein International Famine Centre, Tufts University, 2001

Undernutrition negatively impacts on health and economic development by reducing productivity and increasing health costs³⁹. Children who suffer SAM or MAM between conception and the age of two are likely to pay the price of reduced cognitive development and subsequently lower income-earning potential as adults⁴⁰. Equally links between malnutrition survival in childhood and an increased susceptibility to adult onset of chronic disease have been identified, especially where there has been rapid weight gain in later childhood⁴¹. This chronic disease includes obesity, coronary heart disease, diabetes and hypertension, and can significantly add to the health burden of poor households.

Mortality

Malnutrition is a major global public health problem. It is estimated that undernutrition is responsible for 11% of the total disease burden globally and for approximately 35%⁴² of under-5 year old mortality.⁴³ Acute malnutrition can be a direct cause of death, however more commonly; it weakens the immune system, increasing the chance of death from infectious diseases. Children who suffer from MAM are 3 times more likely to die than those who are not malnourished, and children with SAM are 9.4 times more likely to die than a child who is not malnourished. The increased mortality risk associated with

³⁷ the total number of deaths/ 10,000 people/day. The average baseline is 0.38deaths/10,000 people/day. Agencies should aim to maintain the CMR at below 1.0/10,000/day

³⁸ the total number of deaths/10,000 children under the age of 5 years/day. The average baseline is 1.03/ 10,000 children under 5 years/day. Agencies should aim to maintain the level at 2.0/10,000/day

³⁹ Taking Action, Nutrition for Survival, Growth and Development, White paper (2010), ACF International, p 13, adapted from Baker J et al, A time to act: woman are nutrition and its consequences for child survival and reproductive health in Africa. SARA, 1996

⁴⁰ Scaling Up Nutrition. What will it cost? (2010) Horton, S., Shekar, M., McDonald, C., Mahal, A., Krystene Brooks, J. The World Bank.

⁴¹ Victora et al (2008). Maternal and child undernutrition, consequences for adult health and human capital. Lancet Series on Maternal and child undernutrition.

⁴² Black et al (2008). Maternal and child undernutrition: global and regional exposures and health consequences, Lancet Series on Maternal and child undernutrition.

⁴³ Black et al (2008). Maternal and child undernutrition: global and regional exposures and health consequences, Lancet Series on Maternal and child undernutrition.

chronic malnutrition is roughly half that for acute malnutrition (moderately stunted children are 1.6 times more likely to die than well-nourished children, and severely stunted children 4.1 times more likely). However, the prevalence of chronic malnutrition is higher than acute malnutrition, and as a result they both account for roughly the same proportion of child deaths in high burden countries: 14.6% and 14.5% respectively.⁴⁴ Furthermore, maternal short stature and iron deficiency anaemia increase the risk of death of the mother at delivery, accounting for at least 20% of maternal mortality⁴⁵, due to higher risk of obstructed labour and haemorrhage, respectively.

The relationship between malnutrition and mortality is complex. Although there are some emergencies where malnutrition and mortality rates have increased hand in hand, there are other examples where there is little relationship. Many factors affect mortality rates in addition to malnutrition. For example, epidemics of infectious diseases will affect both the well-nourished and the poorly-nourished.

Case example 4 illustrates the importance of interpreting mortality data in combination with malnutrition and health information.

Who is most vulnerable to malnutrition during an emergency?

There are different types of vulnerability to malnutrition:

- Physiological vulnerability refers to those with increased nutrient losses and those with reduced appetite
- Geographical vulnerability, which reflects their harsh or difficult living environment which may be exacerbated by distance, creating problems of access or availability of foods e.g. desert or mountain communities living in extremes of temperature.
- Political and economic vulnerability, which reflects the community status, lack of representation or isolation
- Internally Displaced People (IDPs) or refugees may temporarily or permanently be unable to access services or support, increasing their vulnerability
- Those who were vulnerable prior to the emergency due to food insecurity, poverty, gender, race, religion, land rights etc.

The groups that are physiologically vulnerable include:

- Low birth weight babies (born < 2500 grams or 5 lb 8oz) – see earlier section
- 0-59-month-old children, with 0-24 months being particularly vulnerable
- Pregnant and lactating women
- Older people and people living with disability
- Adolescents
- People with chronic illness e.g. people living with HIV and AIDS, tuberculosis

0-6 months

Infants under six months are a unique group due to their feeding needs, physiological and development needs, which makes them at a much higher risk of morbidity and mortality compared to older children. Exclusive breastfeeding⁴⁶ is recommended from birth to 6 months followed by the introduction of appropriate complementary food at 6 months along with continued breastfeeding up to 24 months of age.

6-24 months

A child has food, health and care needs that must all be fulfilled if he or she is to grow well. Most growth faltering occurs between the ages of 6 and 24 months, when the child is no longer protected by exclusive breastfeeding. At this time the child is more exposed to infection through contaminated food or water and is dependent on the mother or caregiver for frequent complementary feeding. Unfortunately, even a child adequately nourished from 24 months of age onwards is unlikely to recover growth 'lost' in the first two years as a result of malnutrition. The consequences of malnutrition on this young age group are the most serious.

Pregnant and Lactating women

There are increased nutrient needs during pregnancy to ensure adequate foetal growth and to build up the body in preparation for breastfeeding. Inadequate food intake during pregnancy can increase the risk of delivering a low birth weight baby. When mothers are breastfeeding they require extra energy, which they can get from the reserves they have built up during pregnancy and from eating extra food after birth. This way they can ensure the quality of breast milk for optimal growth of their infant.

⁴⁴ Black et al (2008). Maternal and child undernutrition: global and regional exposures and health consequences, Lancet Series on Maternal and child undernutrition.

⁴⁵ Black et al (2008). Maternal and child undernutrition: global and regional exposures and health consequences, Lancet Series on Maternal and child undernutrition.

⁴⁶ Breast milk with no other food or drink given to the infant

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Women and girls are more likely to be malnourished than men in most societies due to their reproductive role (often with little or no time for nutritional replenishment between pregnancies), in addition to their lower socioeconomic status, and their lack of education. Social and cultural views about foods and caring practices further exacerbate this. Around half of all pregnant women are anaemic and 100 million women in developing countries are underweight. This reduces their productivity and makes them vulnerable to illness and premature death. If they are stunted there are higher risks of complications during childbirth, and each week up to 10,000 women die from treatable complications related to pregnancy and childbirth. Infants without a mother are significantly more likely to become malnourished and die⁴⁷.

The 2008 food price crisis demonstrated the negative nutritional impact on the mother⁴⁸, who is often the last to benefit in a food secure household and the first to suffer in a food insecure household. This clearly influences survival, growth and development of her offspring. **The prevalence of low maternal body mass index (<18.5) has fallen in South Asia, but is still double that of African women.**⁴⁹

Adolescence

Girls' nutritional requirements increase during adolescence due to both a growth spurt and loss of iron during menstruation. Girls who become pregnant during adolescence are at an even greater risk of producing a low birth weight baby, and if they are stunted or underweight they are more vulnerable to complications during delivery.

Adolescent and child marriage continues to be a strong social norm in the developing world, particularly in Central and West Africa and South and South East Asia. Age at marriage is highly correlated with age at first birth, so naturally, raising the marriage age, means later births, and a reduced proportion of low birth weight infants. Policies and programmes to support continued education and prevent underage marriage have a significant role to play in reducing adolescent pregnancies. If rates of teenage pregnancies continue to be high, tackling anaemia and dietary intake pre-pregnancy could have significant benefits to birth outcomes.

Older people and people living with disability

Adults with reduced appetites due to illness, psychosocial stress, age or disability often face a range of nutritional risks that can be further exacerbated by an emergency. Loss of appetite and difficulties in eating may also be common in patients suffering from motor-neurone problems. This may lead to an inadequate energy and micronutrient intake at a time when the body needs it most. Difficulties in chewing and

swallowing mean less food is eaten. Reduced mobility affects access to food and to sunlight (important for maintaining a healthy level of vitamin D status). Disabled individuals may be at particular risk of being separated from immediate family members (and usual care givers) in a disaster and it may not be easy for them to find foods they can easily eat.

People living with chronic illness such as HIV/AIDS and tuberculosis

Malnutrition and HIV/ AIDS and/or tuberculosis can lead to:

- Weight loss, especially loss of muscle tissue and body fat
- Vitamin and mineral deficiencies
- Reduced immune function and competence
- Increased susceptibility to secondary infections
- Increased nutritional needs because of reduced food intake and increased loss of nutrients leading to rapid disease progression

People already infected with HIV/ AIDS and TB are at greater risk of physically deteriorating in an emergency because of a number of factors. These include reduced food intake due to appetite loss or difficulties in eating; poor absorption of nutrients due to diarrhoea; parasites or damage to intestinal cells; changes in metabolism; acute or chronic infections and illness and a break in supply of medications for management of disease and symptoms. There is evidence to show that the energy requirements of people living with HIV and AIDS increase according to the stage of the infection. Micronutrients are particularly important in preserving immune system functions and promoting survival. Malnutrition and HIV affect the body in similar ways. Both conditions affect the capacity of the immune system to fight infection and keep the body healthy. See Module 18 for more details.

The intergenerational cycle of growth failure

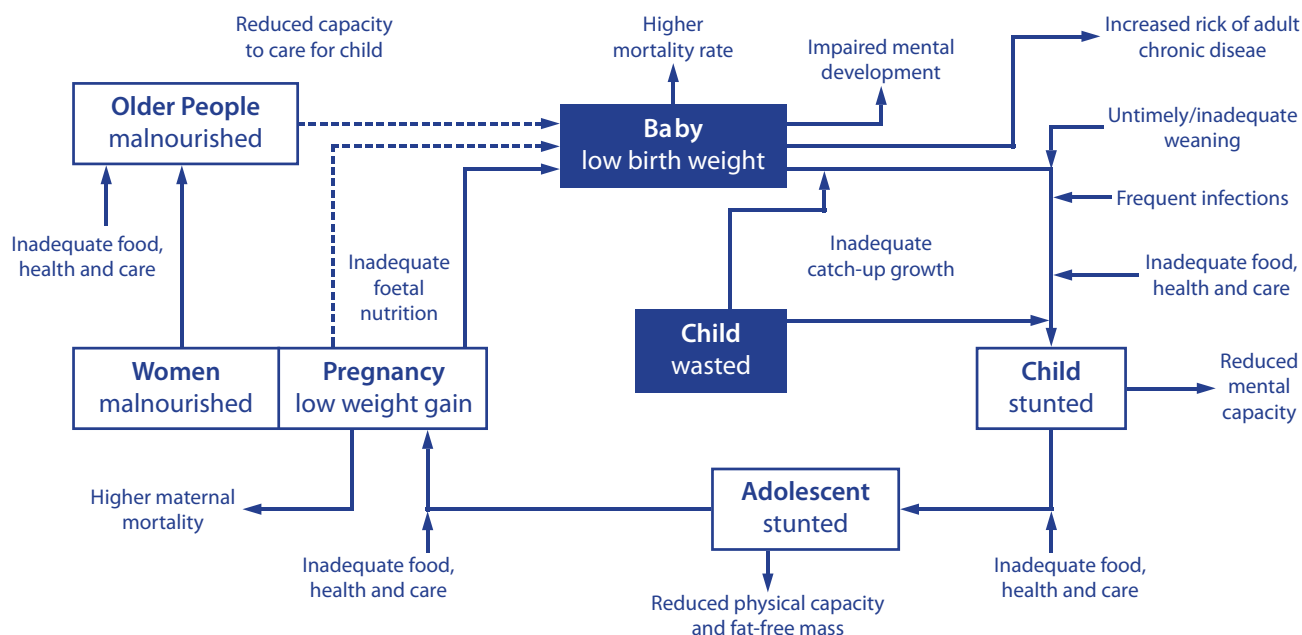
There is an inter-generational component of malnutrition, which means that poor growth can be transmitted from one generation to the next. This is known as the cycle of malnutrition. Small women tend to give birth to LBW babies who, in turn, are more likely to become small children, small adolescents and, ultimately, small adults, who later gain too little weight in pregnancy and give birth to LBW babies. See **Figure 4**. While smallness may be genetically inherited, the vast majority of small individuals in most poor countries are small because they have suffered, or are currently suffering, from chronic and/or acute undernutrition. An important way of reducing malnutrition in the long-term, therefore, is to improve the nutritional status of girls and women so that they give birth to normal weight, healthier babies, so halting the cycle of malnutrition.

⁴⁷ ACF International (2010). Taking Action, Nutrition for Survival, Growth and Development, White paper, p 28

⁴⁸ Shrimpton, R, (2009). The impact of high food prices on maternal and child intrusion. SCN News, 37: 60-68.

⁴⁹ Shrimpton, R, (2009). The impact of high food prices on maternal and child intrusion. SCN News, 37: 60-68.

Figure 4: The impact of hunger and malnutrition throughout the life cycle



Source: ACF International (2010). Taking Action, Nutrition for Survival, Growth and Development, White paper.

Changing nutrition context

Nutrition is an evolving field that needs to be understood in the context of the changing global environment. The following sections reflect the focus of the international development community.

Food and Fuel price increase

The World Bank estimates that the food and fuel price crises since 2007 have pushed as many as 130-155 million more people into poverty and hunger⁵⁰. These economic causes of malnutrition are predicted to worsen, with food prices remaining high or fluctuating and slow economic recovery. Globally, malnutrition has been gradually declining (albeit at a pace far too slow to achieve MDG 1), but this trend could be reversed by food price rises and the economic downturn.⁵¹

The proportion of undernourished people globally began rising in 2004, three years before the food and financial crisis which started in 2007. So the crisis did not create the current situation, but significantly exacerbated an existing problem. Global economic downturn resulting in soaring food prices, reduced remittances, contracting trade, reduced capital and overseas development assistance has had, and will continue to have, an impact on household purchasing power and economic stability. The trickle-down effect from reduced

government funding for health and social welfare further increases the risks of food insecurity and malnutrition in already vulnerable areas.

Households cope by reducing the quality and quantity of food that they eat, replacing foods with cheaper high carbohydrate staples, which may sustain their energy intake above the minimum requirement, but reduce their protein and micro-nutrient intakes, resulting in an increased risk of malnutrition.

From mid-2010, extreme weather events (too much or too little rainfall and drought), political turmoil, the weakening dollar and an increase in the overall demand for food and fuel have had an impact on both the stocks and buffers that protect food and fuel prices. High food prices are a major concern for low income and food deficit countries where poor households spend a large proportion of their income on food⁵². These food-insecure households are nutritionally vulnerable, and food shortages can trigger unrest, leading to humanitarian crises.

In 2008 the, High-Level Task Force on the Global Food Security Crisis was formed and a Comprehensive Framework for Action (CFA) was developed and driven by the UN.⁵³ To meet the immediate needs of vulnerable populations, the CFA proposed four key outcomes to be advanced through a menu of different actions: 1) emergency food assistance, nutrition interventions

⁵⁰ The World Bank (2009). Global Economic Prospects 2009 – Commodities at the Crossroads

⁵¹ Save the children, UK (2009). Hungry for Change, An eight step, costed plan of action to tackle global child hunger.

⁵² An average of 40-60% for the poorest households

⁵³ UN (2008). Comprehensive Framework for Action, High-Level Task Force on the Global Food Security Crisis, July 2008.

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and safety nets to be enhanced and made more accessible; 2) smallholder farmer food production to be boosted; 3) trade and tax policies to be adjusted; and 4) macroeconomic implications to be managed.

To build resilience and contribute to global food and nutrition security in the longer-term, four additional critical outcomes were put forward: 1) social protection systems to be expanded; 2) smallholder farmer-led food availability growth to be sustained; 3) international food markets to be improved; and 4) international biofuel consensus to be developed. The framework proposes that the increased needs are funded through developing countries increasing their budget allocations and developed countries increasing their development assistance to 0.7% Gross National Income.

Climate change and nutrition security

Climate change negatively affects nutrition security by directly impacting upon the immediate, underlying and basic causes of undernutrition. Undernutrition in turn, undermines the resilience to shocks and coping mechanisms of vulnerable population groups, reducing their capacity to resist and adapt to the consequences of climate change⁵⁴. Climate change leads to food shortages, which in turn lead to rising food prices and an increased risk of political turmoil, threatening national and regional security, as seen recently in the Middle East.

Climate change directly affects the food and nutrition security of millions of people, and yet there is still little cohesion between the nutrition and food security communities and those working on climate change and disaster risk reduction (DRR). Multi-sectoral, nutrition-sensitive approaches to sustainable and climate-resilient agriculture, health and social protection schemes will strengthen DRR, and increase the focus on nutritionally vulnerable mothers and young children⁵⁵.

Urbanisation

The proportion of the global population living in urban areas surpassed the population living in rural areas in 2009. By 2050 the urban population is predicted to reach 6.3 billion and globally 69% of the population will be urbanised. Although South and East Asia have the highest urban populations, the largest growth in urbanisation is predicted in Africa⁵⁶.

Urban food security is typified by higher food costs, due to the need to purchase the majority or all of the household food and non-food needs, as well as insecure, often informal employment, with little or no support from social networks. A

higher dependency ratio of children to adults reflects the lack of extended family and is exacerbated by the need for women to be involved in income-generating activities. This vulnerability is often exacerbated by the increased frequency and scale of climatic shocks, spikes in food and fuel prices, and displacement, which further erode assets, coping mechanisms and the potential to recover from shocks.

Experience in both 2008 and recently in the Middle East/North Africa demonstrates the strategic sensitivity of urban settlements to civil unrest in times of food insecurity. However, while such instances have helped to focus attention on the situation of the urban poor, it has remained difficult for the humanitarian sector to respond to urban crises.

Urban malnutrition has typically been considered less concerning than rural malnutrition, due to availability of food in urban areas. The scale of the problem of malnutrition in urban contexts is largely hidden, given that few wide-scale anthropometric surveys are undertaken in these contexts. Disparities in economic status between groups can also be obscured through anthropometric surveys with only a single estimate of GAM for the population, while sampling to get estimates of GAM for separate groups can be resource intensive. Population density, issues of overcrowding and disease transmission, along with higher HIV and TB levels, poor sanitation and limited capacity for household level agricultural production, exacerbate the underlying causes of malnutrition. For example, food access is often more of an issue than food availability⁵⁷.

There is some indication⁵⁸ that levels of acute and chronic malnutrition in 'pockets' of urban informal settlements are as high as in rural areas. These high rates are due to a poor public health environment, poor care practices (infants breastfed for a shorter duration, and less time spent with the mother), high levels of food and income insecurity and a poor quality diet (low micronutrient and protein intake).

Gender

Evidence shows that a reduction in gender inequality is an important part of the solution in addressing global hunger. When women are given the opportunity to control resources and income, it has repeatedly been shown to have positive influences on household health and nutrition. As expected, there are positive associations between female primary school attendance and a reduction in country level poverty rates, and subsequently malnutrition. Empowering women in terms of education, political participation and control and access to assets and resources has the potential to improve purchasing

⁵⁴ United Nations System. Standing Committee on Nutrition (2010) Climate change and nutrition security, Cancun.

⁵⁵ United Nations System. Standing Committee on Nutrition (2010) Climate change and nutrition security, Cancun.

⁵⁶ United Nations, Department of Economic and Social Affairs (2010) Revision of World Urbanisation Prospects.

⁵⁷ HTP module 12 Management of Acute Moderate Malnutrition

⁵⁸ Personal communication with Lynnnda Kiess (WFP/HKI) indicates that urban surveys in informal settlements in East Asia showed high rates of chronic and acute malnutrition in the urban informal settlements

Table 1: World's hungry⁵⁹ people, in millions, 1990-2015⁶⁰

Year	1990	1995	2005	2007	2008	2009	2015 goal
Hungry people in the world (millions)	842	832	848	854	923	1,000	600

power, knowledge of nutrition and ultimately a defeminisation of malnutrition.⁶¹

Policy and programmes aimed at improving women's access to land (heritage entitlements, legislation), credit, agricultural inputs, technology, and training all help to reduce the cultural, traditional and sociological constraints women in developing countries are faced with, and all support change for the better.

At the household level it is important to understand the gender dynamics and disaggregate data in order to identify which age groups or gender, are more vulnerable. An example of this might be intra-household allocation of food, which can favour maturity and gender in some cultures.

Nutrition policy, initiatives, goals and guidelines

The last 3 years have seen a surge in nutrition-related policies and initiatives, which aim to redress the 'medicalization' of nutrition over the previous 10 years and instead find a balance between treating malnutrition and addressing the immediate, underlying and basic causes through integrated programme and policy approaches.

The **Millennium Development Goals (MDGs)** were adopted by 189 countries in 2000. The eight goals are interrelated, and progress in any of them will play a role in ending acute and chronic undernutrition. One of the key targets under MDG 1 (1c) is 'to reduce by half the proportion of people who suffer from hunger⁶² by 2015 (as compared with 1990). This MD target is measured against the percentage of children under-five years who are underweight, and the proportion of the population below the minimum level of dietary energy consumption (i.e. who are 'hungry').

Although the portion of undernourished children under-five has dropped from 33% in 1990 to 26% in 2006, the worldwide number of undernourished people is continuing to rise due to population growth in countries⁶³. MDGs 2 to 6 all have direct

or indirect impacts on malnutrition if achieved, and vice versa. Eighty per cent of the world's stunted children live in just 20 countries. Fourteen of these countries are not on track to achieve MDG 1 and nine of them are in Africa. The table below outlines the goal of reducing the world's hungry people to 600 million by 2015. Given that the figures from 2009 greatly exceed this goal it currently looks unachievable.

Humanitarian reform in 2005 led to a new structure, which includes the Inter-agency standing committee (IASC) **cluster approach**. The Nutrition Cluster, with UNICEF as the lead agency, is one of 12 sectoral clusters, Cluster lead objectives include providing sectoral leadership, strengthening preparedness and technical capacity and enhancing partnerships.

Important advocacy papers have led to strategy changes and ultimately new programme and donor guidance.

Save the Children UK's Hungry for Change paper,⁶⁴ (2009) argues the importance of addressing malnutrition in the first 33 months of life and the costs related to this in 8 focus countries. Importantly for British Government funding, **DFID's nutrition strategy** 'The neglected crisis of undernutrition'⁶⁵ (February 2010), acknowledges the lack of MDG 1 progress and aims to address this through investing in multiple sectors to deliver improved nutrition. The ACF white paper (May 2010) added ACF International's voice to a number of other publications in advocating for increased attention to the problem of undernutrition, focusing on acute malnutrition, and intended to influence policy makers, both nationally and globally. **The EU Humanitarian Food Assistance Communication**⁶⁶ (2010) recognises that adequate food consumption does not in itself ensure adequate nutrition and that there need to be complementary interventions to address the underlying causes of malnutrition. The American **USAID/OFDA guidelines** (2008) for unsolicited proposals emphasise a complementary approach, and have a strong focus on education in infants and young child feeding⁶⁷; and the **Food for Peace** title II food aid programmes (2011) have shifted towards

⁵⁹ FAO does an annual calculation of calories produced and imported/exported per country and total needs. Based on population size 'hunger' is calculated.

⁶⁰ FAO (2009). The state of Food Insecurity in the World 2002-2009

⁶¹ United Nations Standing Committee on Nutrition (UNSCN) (2010). Progress in Nutrition – 6th report on the world nutrition situation.

⁶² Hunger is measured using the proportion of underweight children under 5 years of age and the proportion of the population below the minimum level of dietary energy consumption in a given country.

⁶³ United Nations System. Standing Committee on Nutrition (UNSCN) (2010). Sixth report on the World Nutrition Situation: Progress in nutrition. UNSCN, Geneva.

⁶⁴ Save the children, UK (2009). Hungry for Change, An eight step, costed plan of action to tackle global child hunger.

⁶⁵ Department for International Development (2010). The neglected crisis of undernutrition: DFID's Strategy.

⁶⁶ Communication from the Commission to the Council and the European Parliament, Humanitarian Food Assistance, European Commission, Oct 2010.

⁶⁷ USAID / OFDA (2008) Guidelines for unsolicited proposals and reporting.

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using nutrition indicators as well as measurements of metric tonnage delivered⁶⁸. Although small shifts these are important changes in American donor guidance.

The UNSCN and other agencies are supporting the Scaling-Up Nutrition (SUN) framework for action and subsequent road map⁶⁹, which has identified actions and investments required to scale up nutrition programming and highlights key working principles for getting there. The **World Bank's paper 'Scaling up Nutrition – what will it cost?'⁷⁰** (2010), analyses the financial burden of undernutrition. It calculates the cost of addressing this with various interventions in the 36 countries with the highest burden of undernutrition. They calculate that an additional \$10.3 billion US dollars per year is required from public resources to successfully reduce undernutrition on a world-wide scale.

Integrated food security Phase Classification (IPC) is a standardised tool for early warning that aims at providing a 'common currency' for classifying food security, developed by the FAO Food Security and Nutrition Analysis Unit (FSNAU)⁷¹. Using a common scale, which is comparative across countries, makes it easier for donors, agencies and governments to identify and prioritise countries for intervention. The tool includes nutrition, health, water, sanitation and food security data, as well as chronic and acute level malnutrition cut-offs, and is an increasingly useful indicator for defining emergency response⁷².

The evolving nature of the treatment of severe acute malnutrition for both infants and children has led to the development of important analyses and nutrition guidelines.

These include the Community-based therapeutic care (CTC) manual⁷³ from which many national governments have developed new guidelines (or revised existing inpatient-only guidelines) to promote the community-based management of acute malnutrition approach (CMAM, the new name for CTC). The joint statement by WHO, WFP, UNSCN and UNICEF in 2007 on community-based management of severe acute malnutrition⁷⁴ outlined the evidence of the community-based approaches, and identified the role of each of these agencies in supporting partners during emergencies. Furthermore, the Management of Acute Malnutrition in Infants (MAMI)⁷⁵ project in 2009 reviewed existing evidence on the often difficult management of acute malnutrition in infants under-six months' old and provided interim guidance while highlighting gaps for essential research. Treatment of malnutrition is addressed in modules 12, 13 and 14.

The WHO child growth standards (2006)⁷⁶ were developed using data collected in the WHO Multicentre Growth Reference Study. These new standards demonstrate for the first time that children born in different regions of the world, when given the optimum start in life, have the potential to grow and develop to within the same range of height and weight for their age. The standards are also used for detecting children not growing to full capacity or those who are under- or overweight on average. The new standards establish breastfeeding as the biological norm and the breastfed infant as the standard for growth and development. Previous reference charts were based largely on the growth of infants in the USA fed formula milk; in contrast, the WHO Child Growth Standards are global, and for all children.

⁶⁸ Food for Peace 2011 Title II Development Food Aid Programs

⁶⁹ Scaling Up Nutrition (SUN), 2010. Scaling up nutrition: a framework for action.

⁷⁰ Horton, S., Shekar, M., McDonald, C., Mahal, A., Krystene Brooks, J. (2010). Scaling Up Nutrition. What will it cost? The World Bank.

⁷¹ Supported by FSNAU technical and managerial support is provided by FAO

⁷² <http://www.ipcinfo.org/attachments/ReferenceTableEN.pdf>

⁷³ Valid International (2006). CTC: Community based therapeutic care – A field manual.

⁷⁴ WHO, WFP, UNSCN, UNICEF (2007) Community based management of severe acute malnutrition, a joint statement.

⁷⁵ ENN, UCL-CIHD, ACF (2009). Management of acute malnutrition in infants (MAMI) project. A retrospective review of the current field management of moderately and severely malnourished infants under six months of age.

⁷⁶ WHO (2006). WHO child growth standards.