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Food security and nutrition: current and likely future issues

Dr. Steve Wiggins and Rachel Slater
*Overseas Development Institute*¹

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¹ This essay, however, does not necessarily reflect the views of reviewers, nor those of the Overseas Development Institute: it represents the views of the authors who are responsible for whatever errors and omissions it contains.

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Summary

Scope, concepts

This essay is about food security and nutrition and their converse, loosely termed 'hunger'. Given that most of those suffering from food insecurity and malnutrition live in developing countries, the focus is on these countries. Food security is often defined as follows:

"Food security exists when all people at all times have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life." (FAO 1996)

In this definition, food security concerns the welfare of individuals, rather than the other frequent use of the term as national self-sufficiency in food.

Being food insecure implies hunger. Hunger varies by time and degree: chronic and transitory conditions may usefully be distinguished; as may be severe and moderate degrees. Although transitory food crises that sometimes become outright famine attract more attention on account of the numbers quickly affected and often by the severity of their plight, chronic hunger is more common.

Food security may usefully be seen as the result of three factors: people will be food secure when there is sufficient food available, when people have access to it, and when it is well utilised – and some would add as a fourth condition, when availability and access are reliable. From the perspective of nutrition, the utilisation factor has equal weight with food availability and access, since under the heading are matters of food preparation, feeding practices – especially of weaned infants – and of the health of individuals, itself a function of sanitation and health services.

Current state of food security and nutrition in the developing world

In 2009 FAO estimated that no less than 1.02 billion persons were undernourished, 15% of the world's population (FAO, 2009a). Undernourishment is overwhelmingly found in developing countries, heavily concentrated in parts of Asia and Africa south of the Sahara. The situation is getting worse: even if the share of the population undernourished had been falling until 2004/06, the absolute numbers have been rising

since 1995/97. Reaching the Millennium Development Goal (MDG) of halving the proportion of persons undernourished between 1990 and 2015 would require some dramatic improvements over the next five years that seem unlikely to happen.

Assessing nutrition of infants, UNICEF estimates that 129 million children under five years in the developing world, 23%, are underweight. Most of these children live in South Asia and parts of Africa south of the Sahara. Some progress is being made on improving child nutrition, but not enough to reach the MDG target for the developing world as a whole unless the rate of progress improves. It also seems that Asian countries are making faster gains than those in Africa, albeit from a higher initial level. That said, there are great variations between countries in levels and rates of progress.

In addition, around two billion persons suffer from deficiencies in ***micronutrients***, primarily of vitamin A, iodine and iron, making these the most common, and often under-appreciated, nutrition problems.

Since 2000, FAO has logged at least 50 ***food crises and emergencies*** every year. The incidence, moreover, has been rising since the early 1980s. In the past most of these had their origins in natural disasters, but increasingly human causes – war, conflict, economic chaos – are becoming just as important.

Outright ***famines***, where large numbers of people experience extreme food shortages and death, are fortunately rare, and apparently on the wane, at least in many parts of the developing world. Contemporary famines are almost entirely confined to Africa, and even within Africa, these have been concentrated in the Horn, the Sahel and some pockets of southern Africa.

Improving food security and nutrition: what is needed?

Lack of ***available*** food is not the problem: in 2003 the world produced enough food to provide every person with 2,800 kcal a day of energy on average, way in excess of the 2,100 kcal that would be a conservatively high estimate of actual needs. For at least the last quarter century and probably longer, hunger has not been caused by a sheer lack of food.

Access is more important – a function of incomes and other entitlements that households have – including savings, assets and transfers from individuals, charities

and governments, the price of food, and on decisions on how to spend household budgets. Improving food access is largely a matter of the relief of poverty on the one hand, and the price of basic food on other. Three sets of measures can thus combat food insecurity:

Reducing poverty through growth where the benefits are broadly shared and the incomes of the poor rise substantially. In poor countries where the majority of the population – and usually the overwhelming majority of the poor – live rurally, agricultural development can be a powerful way to reduce poverty since it can raise the incomes of farmers, generate jobs on the land for those with too little land, stimulate the rural non-farm economy through links in production and consumption, and push down the real costs of food.

Interest in agriculture has ebbed and flowed through time, but currently is high on the development agenda. Owing to disappointments in agricultural development, Africa is the centre of this attention. While there is general agreement that past neglect of the sector needs to be remedied by more investment, there is considerable debate over the role of the state compared to the market, trade liberalisation, the technology needed to raise productivity and the prospects for small farms. While some see large farms as a way to stimulate investment and bring know-how to African farming, this ignores the good record of small farms in expanding production when the conditions are right.

But would farming benefit from the greater investment and know-how that large corporations can mobilise? Yes, but whether that is done by offering large-scale farmers land concessions, or whether it is through forms of contract farming and co-operation that link large firms in the supply chain to small farm suppliers, is a key question. There are reasons to continue to prefer small farms. They have technical and economic advantages in the management of household labour that is effectively self-supervising.

Moreover, as far as using agricultural development as way to reduce poverty and hunger is concerned, smallholder development may be especially effective since it tends to be intensive in labour, both of the family and also of neighbours who lack land and who are generally poor, thereby generating jobs and some income for those who need it. When small farmers spend extra income, they tend to spend locally so that jobs are created in the rural economy off the land.

Ensuring that no-one goes without a basic income, no matter that they cannot work or whatever misfortune they have suffered. Forms of such social protection vary from universal benefits paid in cash such as pensions for the elderly or child benefits, to those where entitlement is conditional upon working, or on ensuring that children of the household go to school and that infants attend health clinics for vaccination and other primary health measures.

These forms of public entitlement not only protect people from chronic deprivation, but some can also be used to combat sudden and transitory shocks. For example, having a rural public works programme in place potentially means that when harvests fail and rural people face hardship and hunger, the programme can be expanded to cope with the increased demand for work and incomes.

Lowering the real prices of staple food. This might be done by price controls, although this robs farmers of the incentive to produce more. It could be done by subsidising the price of staple food, but this can be costly. The ideal way to lower food prices is through improving agricultural productivity so that farmers see their unit costs decline and can market more at lower prices while maintaining or enhancing their incomes. This is what has happened on a global scale over the last 40 years when world prices of cereals have fallen by more than half in real terms.

While ensuring that all have access to food will do much to reduce undernourishment, it may not be sufficient to reduce malnutrition significantly. For this, attention has to be paid to other determinants of nutrition that are loosely labelled as utilisation, including: care of children, clean water and sanitation, and primary health care. Providing education, primary health care, clean water and sanitation are straightforward: technically relatively simple and well known. So are specific programmes for nutrition that include monitoring the growth of infants, providing mineral and food supplements to those at risk of malnutrition, and educating mothers on breastfeeding, preparation of weaning foods, and nutrition in general.

The 'hidden hunger' of micronutrient deficiency can readily be tackled through fortifying staple foods where these are commonly processed (e.g. bread and salt); by providing supplements to young mothers and infants; and by encouraging dietary diversification through home gardens, raising chickens, fish ponds and the like. There is also the

potential, now being realised, of increasing the vitamin A content of some staple crops through crop breeding.

Most of the above measures are not technically difficult, hard to implement, or even that costly. Most are not specific to food security and nutrition either: reducing poverty, investing in schooling and health care, and mitigating shocks, are central to development. Fighting food insecurity does not require major investments that would otherwise not be made.

So why has, in too many developing countries, so little progress been made towards reducing hunger? Two problems stand out.

One is awareness and information about hunger: too many individuals, communities and nations take the malnutrition of children as normal, see the chronic hunger of some groups, and the repeated incidence of food crises when weather hits the crops, as more or less natural – or at least, unavoidable for the levels of national income and development pertaining. But this ignores that there are great differences in levels of hunger between neighbouring countries similar in wealth, history and geography.

The other point is political will. Some countries have taken action to reduce hunger and malnutrition to great effect, while others have not.

Prospects for improved food security and nutrition from 2010 to 2030

The medium-term prospects for improved food security are probably good, so long as incomes rise in the developing world allowing people to access the food they need. With matching improvements in sanitation and education – along with raising the participation of girls in secondary schooling, and some basic health programmes, great inroads on food insecurity and malnutrition could be made.

That said, there are **threats** that are likely to materialise over the next two decades. The cost of food may rise in line with likely increases in the price of oil which drives up costs of machinery and nitrogen fertiliser and may induce more cultivation of biofuels. Water scarcity may make irrigation less possible or more expensive. Climate change is also likely to reduce production potential and raise unit costs of food production.

There is the danger that poverty is not reduced significantly in the near future, either owing to failing economic growth, or to patterns of growth that marginalise the poor.

Pandemics may emerge suddenly and unpredictably, much as HIV/AIDS did 30 years ago, undermining health and livelihoods.

On the other hand there are opportunities. Some ***technical advances*** are likely, above all, in agricultural research and innovation where food security may benefit indirectly from better farm technology to raise yields or reduce risks of harvest failure; and directly through breeding into staples higher concentrations of vitamins and nutrients to offset micronutrient deficiencies.

But perhaps the main opportunities lie with better information and its use by civil society to hold leaders to account where too little is done to reduce hunger.

There is also the promise of early-start programmes that guarantee the nutrition and health of pregnant mothers and their infants through to age three: these could make major inroads on infant malnutrition, with long-term pay-offs in producing a new generation that has the physical and mental development to realise its full potential.

Final comment

Hunger and malnutrition remain a major problem in the 21st century. Yet the means to eradicate both are simple and straightforward. The food exists. The health, care and sanitation measures to protect infants from malnutrition are well known. All it takes is political will and resources.

Threats to increased food production can probably be met, although the future cost of food may rise – albeit by less than incomes can be raised.

Hence in looking forward, the breakthroughs that would do most to realise the dream of a world without hunger are political. Gathering information, raising awareness, and holding leaders to account can and will make the difference.

1. Scope and concepts

This essay is about food security and nutrition and their converse, hunger and malnutrition. Given that most of those suffering from food insecurity and malnutrition live in developing countries, the focus is on these countries.

Reducing hunger forms part of the Millennium Development Goals that set out specific targets and indicators to measure progress towards them. Under the first goal of eradicating extreme poverty and hunger, there is a target to halve, between 1990 and 2015, the proportion of people who suffer from hunger. There are two indicators against which progress is mapped: halving the prevalence of underweight children under five years of age; and halving the proportion and number of people below a minimum level of dietary energy consumption in developing regions (UN 2008, Statistical Annex). In the baseline years of 1990-1992, 31% of children under five were underweight and there were 817 million people in developing regions suffering from undernourishment

Food security is often defined as follows:

“Food security exists when all people at all times have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life.” (FAO. 1996)

In this definition, food security concerns the welfare of individuals. It is not about national self-sufficiency in food production or otherwise about national control over food supplies. That is not to say that these matters are not important, but simply that these considerations are conceptually distinct. They will not be referred to again in this review.

In developing countries, being food insecure implies hunger, either now or in the future. Hunger varies by time and degree: chronic and transitory conditions may usefully be distinguished; as may be severe and moderate degrees.

Chronic hunger typically affects very poor people who cannot afford to eat sufficiently well to nourish themselves. For most of these, hunger manifests itself in eating fewer meals a day, or skipping meals altogether some days. It often means eating staples – grains, roots and tubers – with very few additional foods,

and may result in a diet that is deficient in protein, or more likely, in micronutrients. Chronic hunger is often seasonal as well (Devereux *et al.* 2009): in farming villages, typically the hungry season occurs in the run-up to the main harvest, when farmers' supplies from the last harvest have dwindled, when prices of food on local markets rise, and when there is little work to be had locally.

The hungry are mainly made up of farmers with too little production to assure staple food supply for the year; and those land-poor and landless who depend on low-paid casual work – farm labouring, gathering firewood and water, etc. – and who have to buy all or a substantial share of their staple foods from the market (FAO, 2002; 2010).

Transitory food insecurity can arise suddenly and plunge large sections of the population into hunger. When this affects districts, provinces or whole countries, the event may be termed a 'food crisis' or 'emergency': in very severe cases, outright famine, marked by starvation and mass death, may result². Famines are relatively rare compared to food crises, almost entirely confined to Africa during the last 30 years.

Temporary shocks attract political and media attention, understandably given the numbers who are visibly affected and the severity of the crises. Yet in terms of actual numbers affected, and the consequences for both the individuals and society as a whole, chronic conditions that are often less visible and under-appreciated are probably more important.

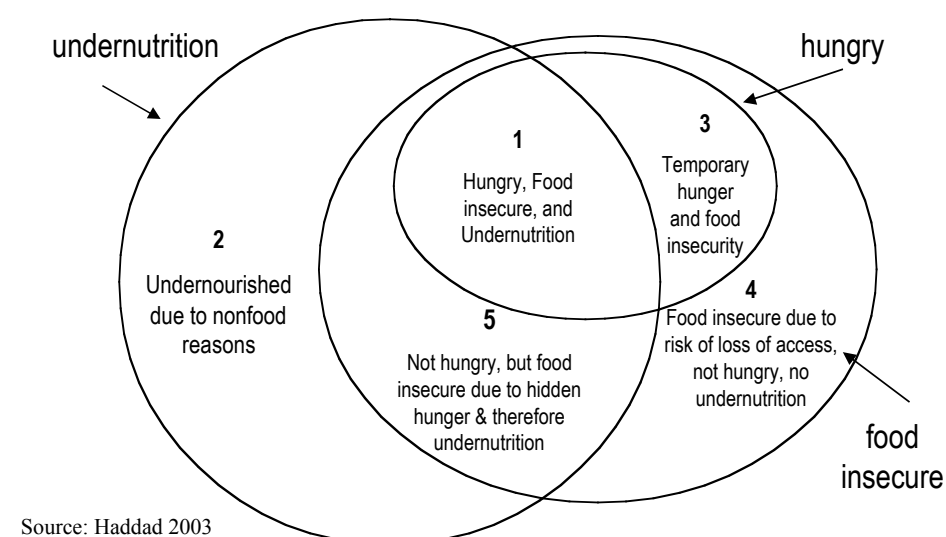
Prolonged hunger results in **undernutrition**. For adults, the lowest-level manifestation will be lack of energy to go about normal work, potentially affecting the ability to earn a living. Even more seriously, **malnutrition** shows in two widespread conditions. One, for children and especially infants, malnutrition can result in impaired physical and mental development that imposes a lifetime penalty on the child. At worst, malnutrition can be associated with illness that leads to early death.

² Mortality during famines, however, results more from health crises than it does from outright starvation (Dyson, 1993, de Waal, 1989).

Two, malnutrition may be experienced in deficient intake of micronutrients, above all of iodine, iron and vitamin A which lead to illness and disability.

Figure 1 is a way to appreciate the way in which these conditions and concepts relate to one another.

Figure 1: Overlapping concepts of hunger, food insecurity and undernutrition



The determinants of these conditions are several. For food security, a widely used framework proposes that people will only be food secure when there is sufficient food **available**, when people have **access** to it, and when it is well **utilised** – and some would add as a fourth condition, when availability and access are **reliable**. Food availability is influenced by the production of food, modified by movement and trade. Food access is related in large part to incomes including implicit incomes from own production, and other entitlements such as gifts, loans and transfers from government. Food utilisation comprises all those factors that intervene between having food and this translating into adequate nutrition: it includes the way that food is distributed within households, how it is prepared, care of infants and their feeding, and the health of those consuming, which is itself influenced by sanitation and health services.

Since this last factor consists of important aspects that perhaps deserve separate mention, UNICEF has produced a framework for thinking about the

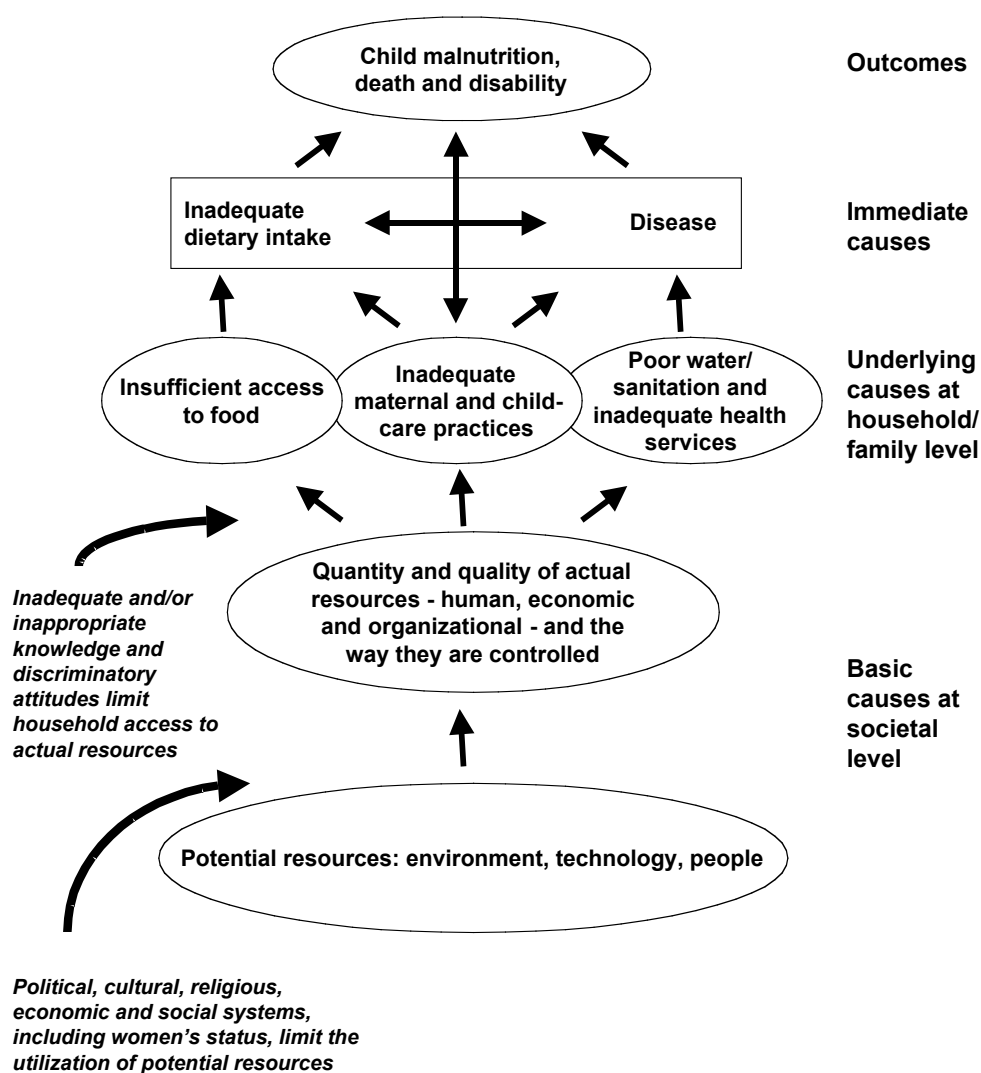
causes of child malnutrition, mortality and disability, see Figure 2. This is similar to the above scheme for food security, but it puts the role of disease on a par with dietary intake in producing malnutrition. Access to food is one of three underlying causes of malnutrition, the other two being child-care practices and health conditions. These latter two make up the utilisation dimension of food security. Food availability is not mentioned as such in the UNICEF framework, although it may be inferred from the factors listed as 'basic causes'. Nutrition is thus the outcome of multiple factors interacting in complex systems³.

Before moving on, another concept needs to be mentioned: that of the **right to food**. Food has been recognised as one of the economic and social rights to which all are entitled. Many countries have signed to respect this right. Making it a reality, however, requires astute public intervention. (See FAO, 2009a for more discussion of this.)

The remainder of this paper sets out the current extent of food insecurity and what is known about how it may be reduced. Future issues are then considered.

³ How important are the various underlying causes to malnutrition? Smith and Haddad (2002) examined the relation between income and child underweight rates from 1970 to 1995 across countries. Almost 60% of reduced prevalence of underweight infants could be attributed to rising incomes. But higher incomes did not affect nutrition directly through access to food and consumption alone. Instead incomes affected malnutrition through interactions with increased food availability, more female schooling, better access to safe water, and through improvements in the ratio of female to male life expectancy (a proxy for female status) – factors that responded in part to higher incomes, but only in part. In order of their contribution to reducing malnutrition, female schooling was the strongest factor followed by food availability, safe water and the life expectancy ratio.

Figure 2: Causes of child malnutrition



Source: *The State of the World's Children*, reproduced in Pelletier, 2002

2. Current state of food security and nutrition in the developing world

The main indicators used to measure the extent of food insecurity are: the numbers and proportions of all people estimated to be undernourished, that is, without access to sufficient food to meet their energy requirements for an active life (MDG indicator 1.9); and the numbers and proportions of infants who are considerably below the norms of height for their age, weight for their height, or

weight for their age – this last being the MDG indicator 1.8. Box A provides more details of the statistics commonly recorded.

Box A: Measuring undernutrition/undernourishment and malnutrition

Undernutrition/undernourishment is a measure of access to food. FAO estimates those not getting access to enough food by the following computation:

- Assess the calories available in a country, through drawing up food balances showing production, net trade, losses, use for seed, feed and industry.
- Distribute the available food energy log-normally across households – according to surveys of household income or expenditure.
- Compare the distribution seen to a threshold of calories, based on a consideration of needs of individuals by age and sex. Thresholds are set for each country, the median for most developing countries being 1,820 kcal per person a day. (The range runs from 1,680 to 1,990 kcal/day. FAO estimates for 2004/06.)

The measure is indirect: individuals are not observed. Much depends on the quality of the data on food production, trade and use; assumptions about the distribution of food; and the thresholds adopted to define nutritional adequacy. In many developing countries, data on food availability are unreliable and the FAO measures are broad estimates at best. Since the estimation method has been consistent through time, however, trends in the statistics may be more reliable than the estimates themselves. (Svedberg 1999 is particularly critical of the results for Africa.)

Malnutrition is generally measured by weighing and taking the heights and ages of individuals sampled from populations. Four sets of statistics are commonly reported.

1. For infants, aged below either five or three years, the following three measures are computed:

- Height for age – low scores indicate stunting, the long-term cumulative result of inadequate nutrition or health or both.
- Weight for height – low scores indicate wasting, the consequence of recent acute starvation or severe disease or both.
- Weight for age – low scores indicate underweight, a combination of stunting and wasting.

In all cases, scores that are two standard deviations below the international reference median indicate moderate problems, more than three standard deviations below the reference point indicates severe conditions.

2. Adult nutrition, although less commonly surveyed than that of infants, is usually reported in terms of body mass indices, or thinness, computed as weight (kg) divided by height (m) squared. These indices are particularly important for pregnant women since their nutrition affects that of the unborn child.

3. The percentages of population suffering from micronutrient deficiencies, the most common ones surveyed being those of iodine, iron, vitamin A and zinc.

4. The percentages of babies with birth weights considered low at less than 2.5 kg.

In addition, two indices to capture more than one dimension of hunger have been proposed:

IFPRI (2008) has constructed a *Global Hunger Index* that: “combines three equally weighted indicators:

1. The proportion of undernourished as a percentage of the population (reflecting the share of the population with insufficient dietary energy intake).
2. The prevalence of underweight in children under the age of five (indicating the proportion of children suffering from weight loss and/or reduced growth).
3. The mortality rate of children under the age of five (partially reflecting the fatal synergy between inadequate dietary intake and unhealthy

environments).”

This thus combines MDG indicators 1.8 and 1.9 and adds 4.1 from Goal 4, to reduce child mortality.

More ambitiously, Gentilini and Webb (2008) propose a *Poverty & Hunger Index* which measures progress on five dimensions:

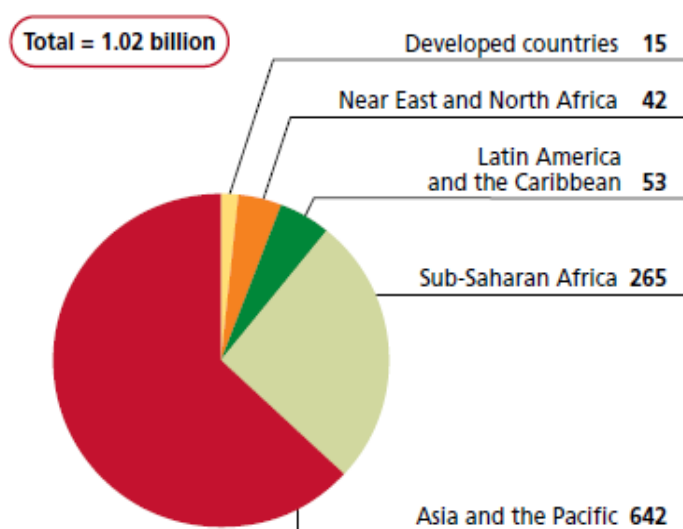
1. The proportion of population living on less than US\$1/day.
2. Poverty gap ratio.
3. Share of the poorest quintile in national income or consumption.
4. Prevalence of underweight children (under five years of age).
5. Proportion of population undernourished.

This includes the two hunger indicators from the MDGs and adds in measures of poverty and inequality, Indicators 1.1, 1.2, and 1.3 in the MDGs.

Sources: Allen & Gillespie (2001) ; Gentilini and Webb (2008); IFPRI (2008); Svedberg (1999); UN SCN (2004).

FAO (2009a) estimated that no less than 1.02 billion persons were undernourished, 15% of the world's population. Undernourishment is overwhelmingly found in developing countries, heavily concentrated in parts of Asia and Africa south of the Sahara, see Figure 3.

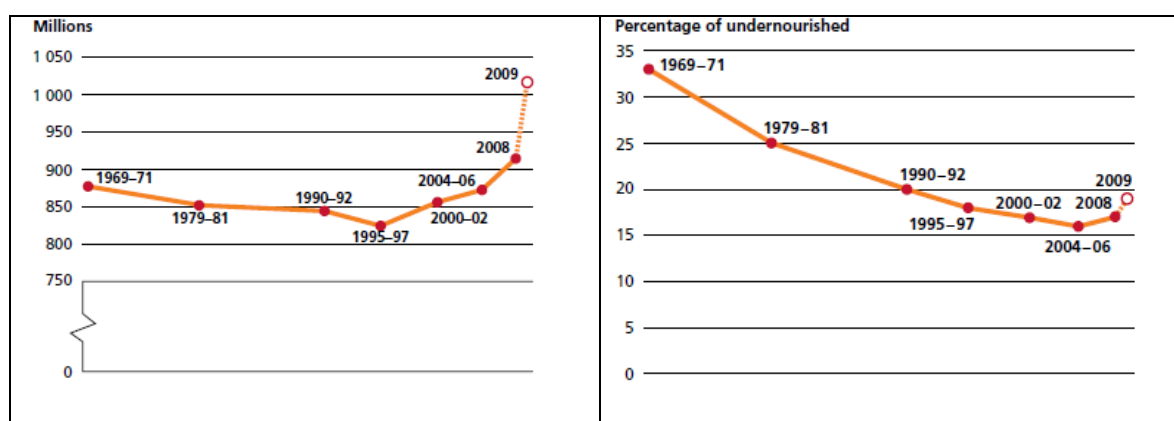
Figure 3: Undernourishment in 2009, by region (millions)



Source: FAO, 2009a

The situation is getting worse (Figure 4): even if the share of the population undernourished had been falling until 2004/06, the absolute numbers have been rising since 1995/97. Reaching the MDG for undernourishment would require some dramatic improvements over the next five years that seem unlikely to happen.

Figure 4: Numbers and percentages of undernourished, 1969/71 to 2009

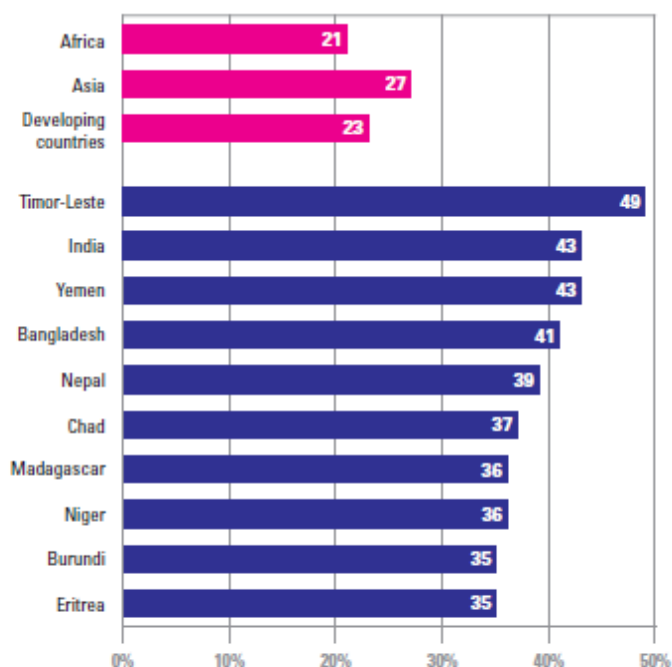


Source: FAO, 2009a

Looking at nutrition of infants, UNICEF (2009) estimates that 129 million children under five years in the developing world, 23%, are underweight. Most of these children live in South Asia and parts of Africa south of the Sahara, see Figure 5.

Figure 5: Underweight infants in the developing world, 2009

Percentage of children under five years old who are moderately or severely underweight (based on WHO Child Growth Standards)



Note: Estimates are calculated according to the WHO Child Growth Standards except for Chad and Timor-Leste, where estimates are available only according to the NCHS/WHO reference population. Estimates are based on data collected in 2003 or later with the exception of Eritrea (2002).

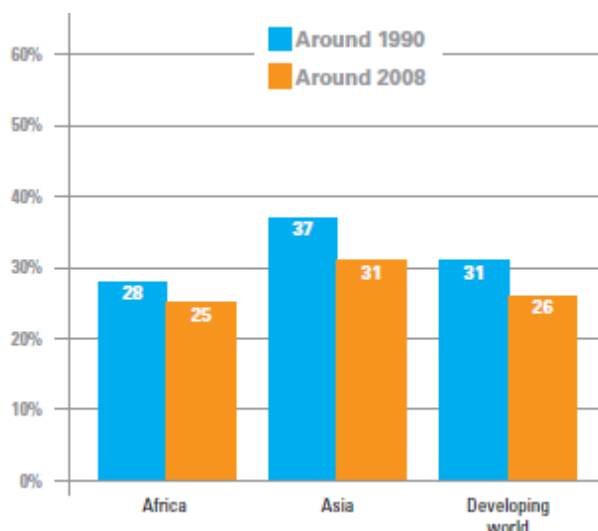
Source: MICS, DHS and other national surveys, 2003–2008.

Source: UNICEF (2009).

Some progress is being made on improving child nutrition, see Figure 6, but not enough to reach the MDG target for the developing world as a whole unless the rate of progress improves. It also seems that Asian countries are making faster gains than those in Africa, albeit from a higher initial level of children underweight. That said, there are great variations between countries in levels and rates of progress. Sixty-three countries are on track to reach the target of halving the proportion of infants underweight in 1990 by 2015, most of them in Latin America, East and Central Asia, Eastern Europe and the Near East.

Figure 6: Changes in fractions of children underweight, 1990 to 2008

Percentage of children under five years old who are moderately or severely underweight (based on NCHS/WHO reference population)



Note: The trend analysis is based on a subset of 86 countries with trend data, including 81 developing countries, covering 89% of the under-five population in the developing world. All trend estimates are based on the NCHS/WHO reference population.

Source: UNICEF (2009), based on MICS, DHS and other national surveys, around 1990 to around 2008.

Around two billion persons suffer from deficiencies in **micronutrients**, primarily of vitamin A, iodine and iron (UN SCN, 2004) making these the most common, and often under-appreciated, nutrition problems. UNICEF (2009) reports the following situation:

An estimated 33% (190 million) of preschool-age children and 15% (19 million) of pregnant women do not have enough vitamin A in their daily diet ... The highest prevalence and numbers are found in Africa and some parts of Asia, where more than 40% of preschool-age children are estimated to be vitamin A-deficient.

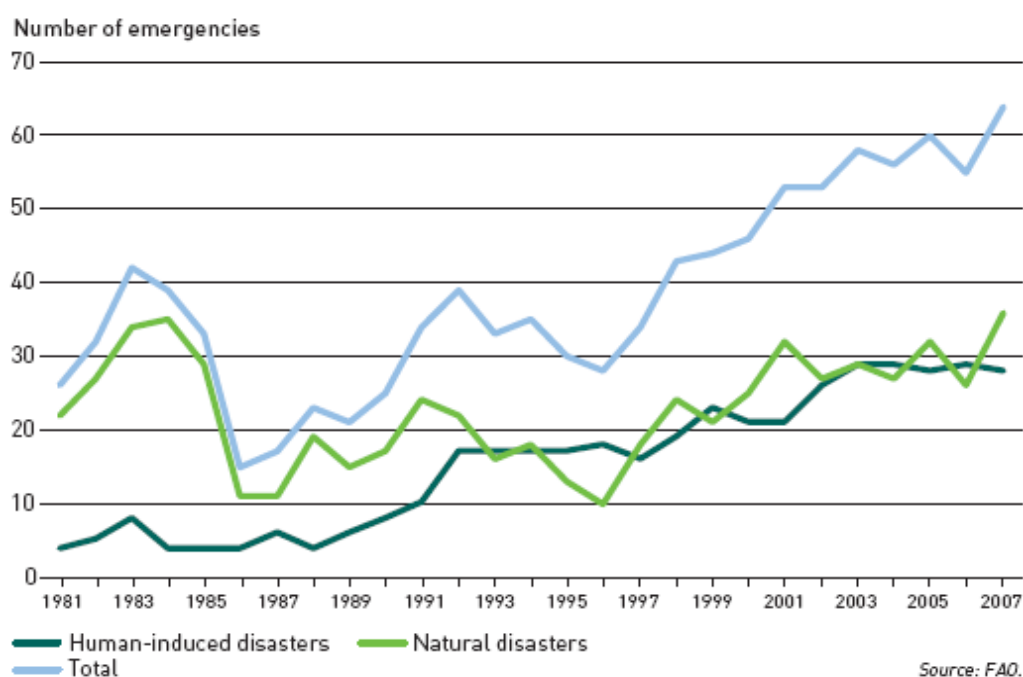
Iron deficiency affects about 25% of the world's population, most of them children of pre-school age and women. It causes anaemia, and the highest

proportions of pre-school-age children suffering from anaemia are in Africa (68%).

Although most people are now protected (from iodine deficiency) through the consumption of iodised salt, the proportion of the population affected by iodine deficiency is highest in Europe (5%). Africa is also affected, with 42% of the population assessed as deficient.

Since 2000, FAO (2008) has logged at least 50 **food crises and emergencies** every year. The incidence, moreover, has been rising since the early 1980s, see Figure 7. The origin of these seems to be shifting. In the early 1980s most food crises stemmed from natural disasters, whereas by the 1990s human causes were equally problematic. Of the natural disasters, those with slower onset, principally drought, make up the majority, although sudden-onset disasters – floods, hurricanes, earthquakes, etc – are gaining in importance through time: by the 2000s FAO reckoned they made up just over a quarter of such disasters. Human causes are mainly war and conflict, although economic and social causes are becoming more important, and by the early 2000s represented just over one-quarter of human-induced disasters.

Figure 7: Trends in food emergencies and their causes, 1981 to 2007



Source: FAO 2008, Figure 18.

The numbers affected by food crises can be large, although compared to those suffering from chronic undernutrition, they are lower. For example, even in one of the regions of the world most frequently beset by food crises, the Horn of Africa, the average number of persons affected by chronic undernutrition is around 20 million. This can be compared to 35 million people who are chronically undernourished in East Africa as a whole.

Outright **famines** are fortunately rare, and apparently on the wane, or at least in many parts of the developing world. For example, some regions that regularly experienced famine in the past are probably unlikely to see a repetition, barring catastrophe. South Asia is the prime example where the last famine seen was that of Bangladesh in 1974. Indeed, contemporary famines are mostly in Africa, and even within Africa, these have been concentrated in the Horn, the Sahel and some pockets of southern Africa such as the south of Malawi.

Recent famines in Africa have often been closely linked to conflict. War and strife can comprehensively and suddenly close down livelihoods, destroy savings and assets, and force people to move with little means of support. Deprived of incomes and savings, refugees from war are vulnerable to both hunger and health crises, leading to mass mortality.

3. Improving food security and nutrition: what is needed?⁴

The framework that sees food security as the result of availability, access and utilisation is used to look at evidence of the problem, and how it may be resolved.

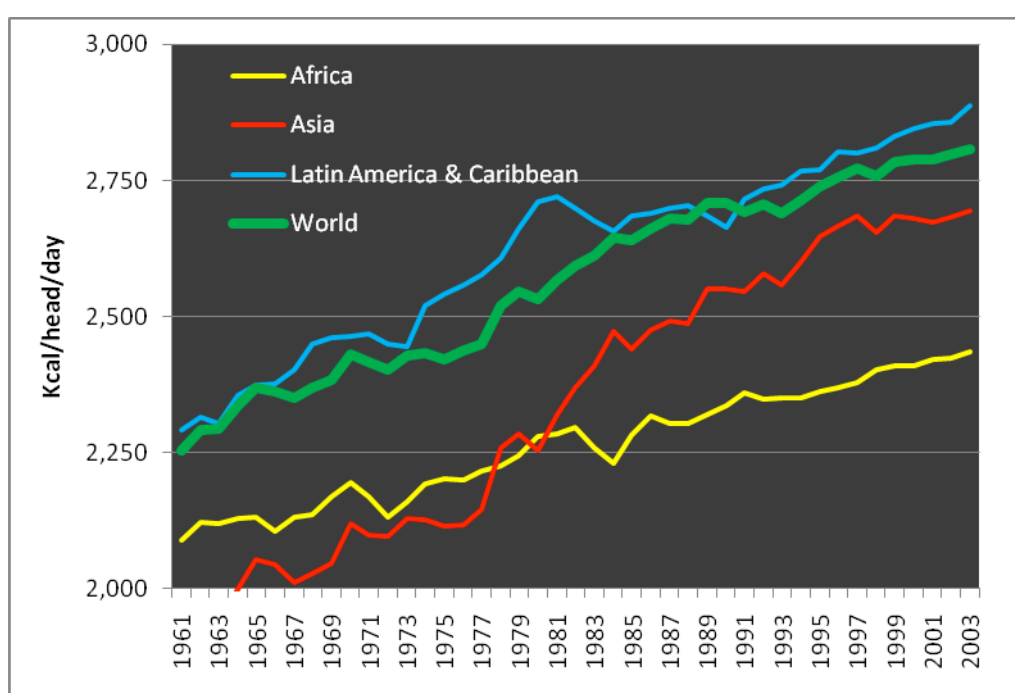
3.1 Food availability

A first and important point is that **availability** of food at global level is rarely the problem. Currently the world produces over 2,000 million tonnes of cereals for a

⁴ This section omits, mainly in the interests of brevity, an important set of considerations for warning of impending food crises, averting them and dealing with their consequences. There is a substantial body of knowledge in this specific field.

population of 6.8 billion: almost 300kg of cereals per person every year. This is more than sufficient to meet average energy requirements, without counting the roots and tubers, fruit and vegetables, pulses, oils, animal products⁵ and fish that are produced. Moreover, as Figure 8 shows, the total energy in food consumed has been rising for most of the last 40 years. With a world average of more than 2,800 kcal per person a day in 2003, there was more than enough to feed everyone well, given the guideline of an average 2,100 kcal to support the average person⁶.

Figure 8: Food consumption in energy equivalents, 1961 to 2003, by region



Source: FAOSTAT

Nor does world production of staples vary that much: the recent price spike saw two consecutive years – 2006/07 and 2007/08 – where grain harvests fell short of consumption. The deficit for those two years was only 70 million tonnes against production levels of over two billion tonnes.

⁵ This exaggerates since some animal products and fish are produced by feeding them grains and others crops, but there are still large tonnages of animal produce that are mainly produced from grazing and farm residues and by-products, as well as many fish that come from capture fisheries.

⁶ This figure is a little larger than the median needs estimated by FAO of 1,820 Kcal/day for developing countries. This reflects the slightly higher needs in industrialised countries where adults make up a large share of the population. WHO set a figure of just over 2,100 kcal/day/person when planning disaster relief supplies.

Hence it would seem that it is not necessary at a global level to produce more food to alleviate hunger. That would, however, overstate the case, since food availability does influence hunger less directly through two mechanisms: one, when more food is produced, prices tend to fall, thereby improving the access of poor people to food; and, two, many of the world's poor are engaged in producing food so that increased production can mean more jobs and incomes for them. These points will be discussed below.

A qualification is the geographical distribution of food: areas of production and consumption do not always coincide. Given free trade and low transport costs this would not matter, provided of course that consumers have the incomes to constitute an effective demand. These conditions were notably breached during the 2007–08 spike in prices of cereals on world markets, when some grain exporters banned or restricted their deliveries, thereby driving prices still higher. Hence precaution would indicate that countries should not become overly reliant on imports.

3.2 Food access

More important for nourishment than food production is **access** to food. That is a function of incomes and other entitlements that households have – including savings, assets and transfers from individuals, charities and governments, the price of food, and on decisions⁷ on how to spend household budgets.

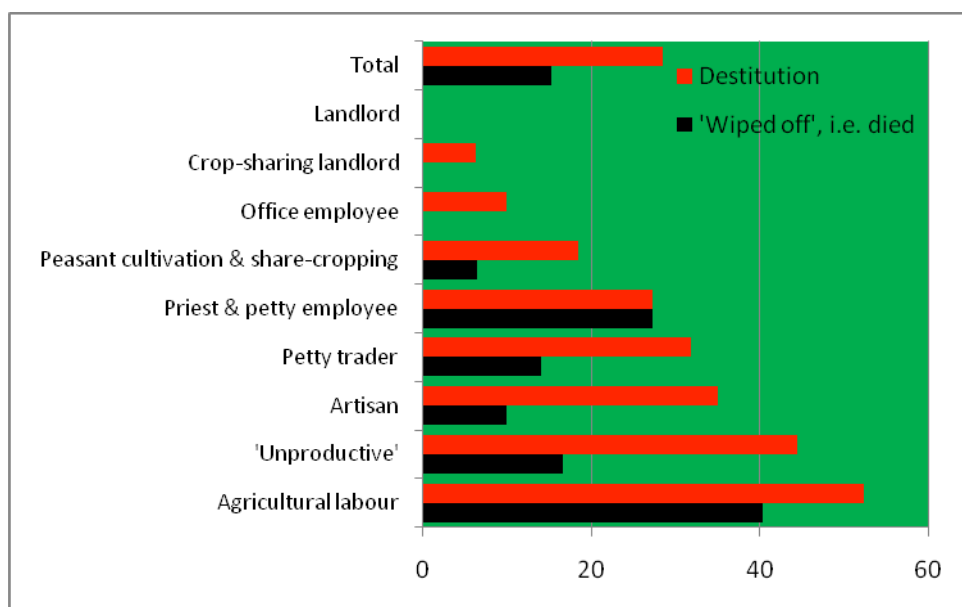
The importance of access was graphically described in Sen's (1981) analysis of famines, especially the Bengal famine of 1943, where famine mortality was highly concentrated amongst the households of those who lost incomes while facing sharp increases in food prices. Figure 9 shows the pattern registered in one part of the province: mortality levels are highest for groups with high levels of

⁷ Relatively little has been written about decisions on use of budgets, although it is commonly thought – with some evidence to support it – that when mothers have control of funds they are more likely to spend this on food than when men have control. It is for this reason that some cash transfer programmes deliver to mothers and child carers rather than heads of household who are mainly men (Barrientos, 2008; OECD, 2009).

It is also known that under famine conditions, scarce income may not be allocated first and foremost to buying in food: preserving livelihoods and preventing outright destitution may be the priorities with hunger accepted as the price of dignity and preserving the hope of returning to normal life in the future (de Waal, 1989).

destitution. The more prosperous – landlords, office employees, and the like – suffered no deaths.

Figure 9: Destitution and death in five surveyed villages in Faridpur, Bengal, 1943



Source: Table 6.8 Sen (1981), based on Mukerji (1965), Table 63.

Improving food access is largely a matter of the relief of poverty on the one hand, and the price of basic food on other. Three sets of measures can thus combat food insecurity:

1. **Reducing poverty through growth where the benefits are broadly shared** and the incomes of the poor rise substantially. In poor countries where the majority of the population, and usually the overwhelming majority of the poor, live rurally, agricultural development can be a powerful way to reduce poverty. This occurs through four pathways, as follows:

- Many poor people farm, so increased farm output usually means rising farm incomes with direct benefits to poor farmers.
- Agriculture employs more workers per unit of output than most other sectors, so agricultural development tends to create jobs for poor rural people who lack land.

- Farming can have strong links to the rural non-farm economy. More farm output means more jobs in supplying inputs, processing, and transport. Even more important, farmers tend to spend much of their additional income locally on construction, services, and local manufactures such as furniture, so that links through consumption can be strong.
- When farmers market more staples, this tends to push down their prices, to the immense benefit of the poor in urban areas who have to buy in most of their food, and even to many rural households that are net buyers of staples. This was one of the main benefits of the green revolution in Asia.

Of course, when the prices of staples fall, farmers who are often poor potentially lose income. If, however, they can improve their productivity faster than prices fall, farm incomes can rise at the same time. This is possible, as the discussion under point 3 below shows (Hossain *et al.*, 2003).

2. ***Ensuring that no-one goes without a basic income, whatever misfortune they may have faced.*** Forms of such social protection vary from universal benefits paid in cash such as pensions for the elderly or child benefits, to those where entitlement is conditional upon working, or on ensuring that children of the household go to school and that infants attend health clinics for vaccination and other primary health measures. Examples of social protection schemes that are widely admired for the benefits delivered and the reduction of food insecurity and poverty include the following:

- In the mid-1970s the State of Maharashtra in India introduced a guaranteed employment scheme which provides jobs for the poor on a massive scale. A legally-enshrined scheme, funded half by a tax on professional and formal jobs and half by general revenues, it entitles any group of 50 jobseekers to public work. Unemployed poor women have been major beneficiaries of the scheme. (Joshi and Moore, 1999). It has been sufficiently successful and influential to form the template for the recently-introduced all-India National Rural Employment Guarantee programme.
- South Africa's pension scheme and child support grant provide non-contributory means-tested support to millions of households. Morphometric data

show measurable impacts on food security and nutrition in beneficiary households. For example, the child support grant increases the height of children who receive it by 3.5 cm if it is received in their first year and for two of the first three years. The pension increases the height of girls in the household by more than 2 cm (Augero *et al.* 2007).

- In 1997 Mexico introduced cash transfers under the *Oportunidades* (formerly *Progres*a) programme, made conditional to ensure that the rural poor make full use of basic health services, primary and secondary education. The programme offers cash transfers paid to mothers or carers to targeted poor rural households, on condition that their school-age children attend school through until the end of secondary education, and that infants and mothers enrol in health programmes. By 2004, no less than 5 million households were covered.

Evaluations of *Oportunidades* show more children in secondary education, fewer drop-outs, more use of health facilities, less disease, and better nutrition.

Controlling for unobserved heterogeneity, Behrman and Hoddinott (2005) find that for children aged 12–36 months, the transfer implied an increase of about a sixth in mean growth per year and a lower probability of stunting. Not surprisingly, the model has been imitated by other countries in Latin America. (Nigenda and González-Robledo, 2005; Bando *et al.* 2005; Skoufias and di Maro, 2006)

These forms of public entitlement not only protect people from chronic deprivation, but some can also be used to combat sudden and temporary shocks. For example, having a rural public works programme in place potentially means that when harvests fail and rural people face hardship and hunger, the programme can be expanded to cope with the increased demand for work and incomes. Zimbabwe, for example, was able to do this, albeit at high public cost, when the very bad drought of 1990/91 led to heavy harvest failures: conditions that could have led to famine were averted and hardship substantially mitigated.

3. **Lowering the real prices of staple food.** Care is needed here. Simply dictating that staples be sold at low prices is likely to lead food shortages as farmers see little incentive in delivering food to market if prices do not cover costs of production. Subsidising the price of staple foods would avoid this

problem, but could be very expensive, while many of those benefiting would have adequate incomes to pay higher prices. Restricting entitlements to subsidised foods to those below the poverty line can be done, but administratively this may be complicated and expensive, and leakages are more or less inevitable. For low-income countries, even targeted subsidies may not be affordable. This option probably only applies to countries at or approaching middle-income status, where the state has the means to do so both financially and administratively, and where poverty has been reduced so that the numbers targeted are not such a large share of the population.

The ideal way to lower food prices is through improving agricultural productivity so that farmers see their unit costs decline and can market more at lower prices while maintaining or enhancing their incomes. This is not wishful thinking. On world markets, the real cost of cereals between 1960 and 2000 fell by 56% for maize, 59% for wheat and 63% for rice⁸. Similar trends have been seen nationally as well. In Bangladesh, for example, between the 1980s and 2000 the real price of rice on the wholesale markets of Dhaka roughly halved as a green revolution took place in rice production⁹. At the same time, productivity gains meant that farmers' incomes increased, despite falling prices: between 1987 and 2000, Hossain *et al.* (2003) report from farm survey data that unit costs of rice production fell from US\$140 to US\$81 a tonne, while profits rose from US\$31 to US\$61 a tonne.

3.3 Food utilisation

While ensuring that all have access to food will do much to reduce undernourishment, it may not be sufficient to reduce malnutrition significantly. For this, attention has to be paid to other determinants of nutrition that are loosely labelled as **utilisation**, including: care of children, clean water and sanitation, and primary health care.

⁸ UNCTAD data on crop prices, adjusted by the US GDP deflator.

⁹ From price data collected by the Food Planning and Monitoring Unit (FPMU) of the Ministry of Food and Disaster Management (MoFDM), deflated by national consumer price index. Provided by Paul Dorosh, IFPRI.

Providing education, primary health care, clean water and sanitation are straightforward: technically relatively simple and well known. So are specific programmes for nutrition that include monitoring the growth of infants, providing mineral and food supplements to those at risk of malnutrition, and educating mothers on breastfeeding, preparation of weaning foods, and nutrition in general (see, for example, Allen and Gillespie (2001) on nutrition interventions). Young mothers and children under three are particularly vulnerable to malnutrition. Health programmes are needed to monitor their nutrition, immunise infants, provide oral rehydration to treat diarrhoea, de-worm children, combat malaria through measures such as use of treated bed-nets, and to deliver safe water and sanitation. Vaccination can reduce incidence of diseases which exacerbate or prompt malnutrition. Not only would such programmes help achieve the MDG for hunger, but of course they would also meet other equally important goals 4, 5, and 6 which deal with the health of children, mothers and epidemic diseases including HIV/AIDS, malaria and tuberculosis.

The 'hidden hunger' of **micronutrient deficiency** can readily be tackled through fortifying staple foods where these are commonly processed (e.g. vitamin A in maize meal and iodine in salt); by providing supplements to young mothers and infants; and by encouraging dietary diversification through home gardens, raising chickens, fish ponds and the like. There is also the potential, now being realised, of increasing the vitamin A content of some staple crops through crop breeding.

Comment: how hard is it to reduce food insecurity and malnutrition?

Most of the above measures are not technically difficult, hard to implement, or even that costly. The returns to some of these interventions are some of the highest in the world. In considering development priorities, the Copenhagen Consensus (Behrman *et al.* 2004) invited specialists to identify policies with the highest returns to investment. Their findings included no less than four nutrition actions amongst the top half-dozen: supplements of Vitamin A and zinc for children; iron fortification and salt iodisation; bio-fortification of staples; and de-worming and school nutrition programmes.

Most are not specific to food security and nutrition either: reducing poverty, investing in schooling and health care, and mitigating shocks, are central to

development. Fighting food insecurity does not require major investments that would otherwise not be made.

Two inter-connected things are needed above all others to make a difference:

- **Awareness and information.** Too many individuals, communities and nations take the malnutrition of children as normal, see the chronic hunger of some groups, and the repeated incidence of food crises when weather hits the crops, as more or less natural – or at least, unavoidable for the levels of national income and development pertaining.

But statistics show very different levels of hunger and malnutrition across countries similar in wealth, history and geography. For example, in the following neighbouring countries of Africa, the proportion of children under five years underweight in the mid-2000s was 14% in Ghana, yet 23% in Togo; 14.5% in Senegal, but 28% in Mali; 16.5% in Kenya, yet 37% in Tanzania; and 21% in Mozambique, yet 37% in Madagascar (WHO Global Database on Child Growth and Malnutrition www.who.int/nutgrowthdb). It seems there is much scope for reducing hunger at any given level of development, and equally much scope for learning across countries in similar circumstances.

- **Political will.** Some countries have taken action to reduce hunger and malnutrition to great effect, while others have not.

4. Prospects for improved food security and nutrition from 2010 to 2030

The medium-term prospects for improved food security are probably good, so long as incomes rise in the developing world allowing people to access the food they need. With matching improvements in sanitation and education – along with raising the participation of girls in secondary schooling, and some basic health programmes, great inroads on food insecurity and malnutrition could be made.

On the other hand, the pace of nutritional improvement in many parts of Africa and South Asia has been too slow over the last two decades; not least in India

where economic growth has made little difference to some of the worst nutritional indicators in the world.

In assessing the future, two factors need to be borne in mind: threats and opportunities.

4.1 Threats to food security and nutrition in the near future

Following the 2007/08 food price spike, there is considerable awareness that future levels of food production may not be taken for granted. For some observers, the end of an era of ever-larger harvests that match population growth and ever-cheaper staple foods is coming to an end. Three things in particular prompt such fears:

- **Oil prices** have risen from the low levels of the early years of the new century. Given the prospect of economic growth and rising demand, viewed against the uncertainty of finding economically-accessible new reserves, there are fears that oil prices will never again fall below US\$60 a barrel and may rise well beyond this level. This affects farming and the costs of producing food in several ways: nitrogen fertiliser is derived from oil and gas, so its cost is directly related to their prices; farm machinery is often powered by diesel; transport costs are part of the costs of food, a relatively bulky good, delivered to consumers; and as oil prices rise the incentives to divert land and capital to producing biofuels grows. Indeed, on this last point, it seems that agriculture and the energy market may increasingly be linked. It is thus highly likely that higher oil prices will raise the costs of food production.
- **Water** is becoming increasingly scarce in some parts of the world. Most of the fresh water used by humans goes on irrigation. There will be increasing pressure to use that water for human and industrial uses. Moreover, some groundwater aquifers are being overdrawn, calling into question the long-term sustainability of current levels of irrigation. Water scarcity may thus either restrict production or increase its cost.
- **Climate change** will affect food production by raising temperatures, changing rainfall belts, and increasing the variability of the weather with more frequent extreme events. A warmer world will see raised seas levels threatening

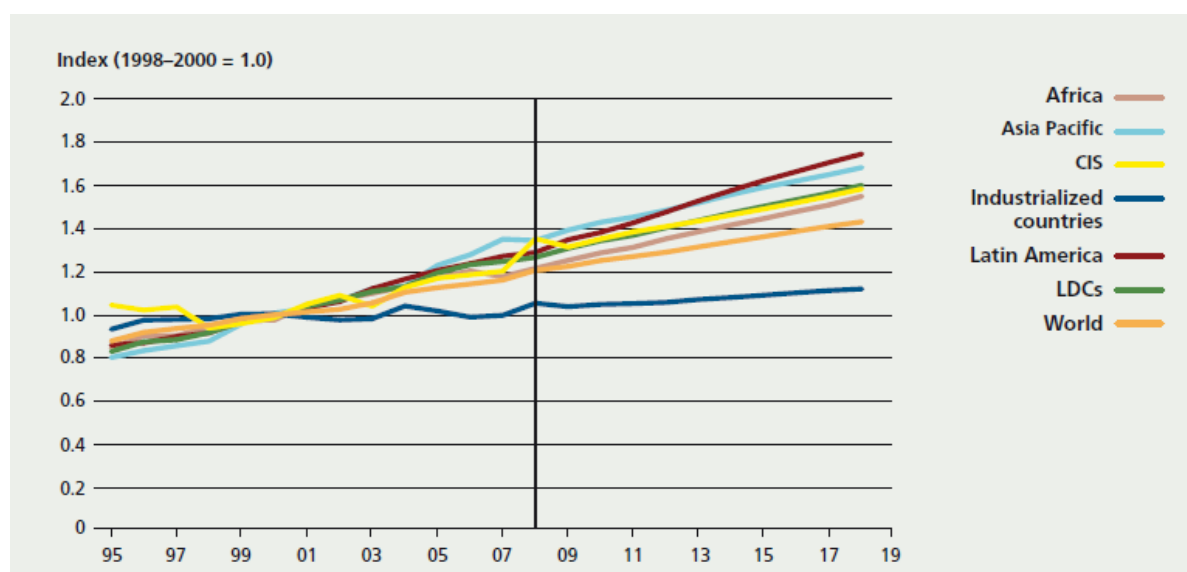
coastal farmlands, and changed incidence of pests and diseases affecting crops and livestock. Predictions, albeit subject to considerable uncertainty, see many regions and especially the developing world having lower agricultural potential in 2050.

In addition, there is the challenge of raising food production to meet the needs and demand from a larger world population, expected to reach 8.3 billion by 2030 and 9.2 billion by 2050. FAO believes that future needs can be met, see, for example Figure 10, although it is not clear that such assessments take enough account of the impacts of climate change and of measures to mitigate emissions that will probably be needed¹⁰. Others are more concerned that it may not be possible, see Funk and Brown (2009), Lutz and Samir (2010).

It is broadly agreed that even if sufficient increases in food production can be achieved, it will be at some cost, so staple food prices are likely to rise in real terms. How large the increase in cost may be depends on how effective counter measures may be, and above all, how successful efforts to mitigate climate change are. If the increase in the cost of the main cereals can be limited, to say 30% or less, these changes will not necessarily increase hunger, so long as incomes grow by a larger margin – growth at 2.7% a year over a decade would match such a price rise – and poverty is reduced.

¹⁰ There are regional dimensions to increases in production. FAO notes that there will be growth in Eastern Europe and the former Soviet States and in Latin America. Elsewhere the picture is less positive. Stagnation in industrialised countries hides the diversion of agricultural production towards feedstocks to meet increasing demand for meat and dairy and for biofuels – there may be fewer cereals available for human consumption. FAO suggests that the already significant food deficit of developing countries will increase in real terms by more than 50% in the next 10 years, thus increasing their dependence on imports (FAO, 2009b).

Figure 10: Long-term trends in agricultural production, by region



Source: FAO (2009b).

But here is the second major threat: that **poverty is not reduced**. Much depends here on how much broad-based economic growth can be induced in low-income countries. This in turn depends hugely on imponderables such as the health of the global financial system, trade rules, and not least progress in making the transition away from fossil fuels to renewable energy sources and in mitigating climate change.

Outside of the low-income countries, poverty reduction also depends on how much countries are prepared to invest in social protection to eliminate destitution and alleviate poverty. For countries in Asia with rapid rates of economic growth, the capacity to implement ambitious programmes such as universal pensions for the elderly has been created; but will it be used? In Latin America, as well, the success of the conditional cash transfer programmes has produced a wave of optimism that determined state action can make inroads on longstanding and seemingly intractable problems of poverty and inequality. Across much of Asia and Latin America, levels of poverty are thus a political choice rather than an inevitable concomitant of national income.

A third set of threats comes from **pandemics** which, in the light of HIV/AIDS, can emerge with little warning. HIV/AIDS remains the principal relatively new pandemic facing humanity, but there are fears that other viral diseases could

develop with similar impacts. It seems there has been some success in the last few years in limiting the spread of HIV and in containing its effects through anti-retroviral therapies; yet for some countries in East and Southern Africa, it has taken a heavy toll.

4.2 Opportunities and scope for initiatives

Some ***technical advances*** are likely, above all in agricultural research and innovation where food security may benefit indirectly from better farm technology to raise yields or reduce risks of harvest failure; and directly through breeding into staples higher concentrations of vitamins and nutrients to offset micronutrient deficiencies.

But it may be that the main opportunities lie in ***information and its use***. With better information on hunger and malnutrition, it will be easier for professionals to plan investments to combat them, but above all there is the potential to raise awareness of the problems. While more regular nutrition surveys would help¹¹, there may be scope for more innovative means of capturing information and disseminating it. For example, Lawrence Haddad¹² has proposed that states of hunger could be recorded very quickly by use of texts from mobile phones with the data geo-referenced so that maps of the changing incidence of hunger could be compiled rapidly¹³. Information transmitted could respond to questions about local food consumption, in particular on diversity of diet – which correlates reasonably well with food intake – and the extent of reduced portions or skipping meals (Hoddinott. 1999).

If this information were made available to the public, then the media and civil society groups could use it to hold political leaders and government officers to account. Hunger commitment indices that include policies, spending and legislation could act as scorecards. Linked to legislation that enshrines the right

¹¹ Some of the most food-insecure countries in the world have seen few national surveys of nutrition since 1990. Indeed, there are only 31 countries in Africa for which there were two or more such surveys between 1990 and 2007. For the other 24 countries there are insufficient surveys to show trends.

¹² Ideas put forward in conferences at SOAS London 26 January 2009, and at the DFID Annual Conference, 9 March 2009.

¹³ Such ideas are now being tried out in parts of Africa.

to food in law, such information could give civil society powerful means to hold government to account.

Given the disparity between the need to alleviate hunger and the relative inaction of some governments, enabling whistle-blowers could do much good. This could apply not just nationally but internationally. For example, India's levels of malnutrition are high, and especially so given recent economic growth: this should be an embarrassment to the country's leaders.¹⁴

Early-start programmes that guarantee the nutrition and health of pregnant mothers and their infants through to age three should be encouraged throughout the developing world, financed in very low-income countries by donors¹⁵. These programmes will pay off (see Behrman *et al.*, 2004), perhaps more than any other spending in education and health. The benefits will be felt at all levels, from villages to districts to nations and the world as a whole. The dream of a new generation of citizens in a world free from the burdens of early infant malnutrition can be realised.

Lastly, perhaps neither threat nor opportunity, **food systems are changing** in most parts of the world as urbanisation, technology and industrialisation alter the way food is produced, marketed and consumed (Maxwell and Slater, 2003). Food businesses, such as supermarkets, play increasing roles in moving food between countries and in establishing new kinds of supply chains within developing countries. The implications of these changes are potentially far-reaching – above all, in issues of over-nutrition, obesity and food-related disease that affect affluent consumers in both OECD and developing countries, but extend beyond the remit of this paper. These changes could affect hunger, but they are limited compared to the issues set out here¹⁶.

¹⁴ “India is an economic powerhouse and a nutritional weakling,” Lawrence Haddad, quoted in the *New York Times*, India's Malnutrition Dilemma, by David Rieff, October 8, 2009.

¹⁵ Once again, Professor Haddad's ideas, see earlier note.

¹⁶ Some would argue that hunger in the world is exacerbated by liberalisation of trade, commoditisation of food, and the apparently increasing control of the food chain both upstream and downstream of the farm by large (usually transnational) corporations. This could happen if such changes involved poor people losing assets such as land, or suffering as producers from reduced prices for their output or increased costs of inputs, without compensation in terms of more jobs or higher farm productivity.

5. Final comment

Hunger and malnutrition remain a major problem in the 21st century. Yet the means to eradicate both are simple and straightforward. Sufficient food exists. The health, care and sanitation measures to protect infants from malnutrition are well known. All it takes is political will and resources.

There are future threats to achieving this: rising oil prices, water scarcity, and climate change will make it more difficult to raise production to meet future needs, probably raising the unit cost of food. But there are reasons to believe that the threats can be overcome and price rises limited.

Hence in looking forward, the breakthroughs that would do most to realise the dream of a world without hunger are political. Gathering information, raising awareness, and holding leaders to account can and will make the difference.

This paper implicitly rejects these hypotheses for the most part, arguing that most of the hunger in the world arises from causes at local and national levels. India, for example, has more hungry people than any other country in the world, a situation that persisted for decades, yet few countries have imposed more controls on trade in food, limited international investment in the food chain, and actively intervened in domestic markets for staples.

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