

2012



# The State of Food Insecurity in the World

**Economic growth is necessary but not sufficient  
to accelerate reduction of hunger and malnutrition**





# Key messages

- **The State of Food Insecurity in the World 2012 presents new estimates of the number and proportion of undernourished people going back to 1990, defined in terms of the distribution of dietary energy supply. With almost 870 million people chronically undernourished in 2010–12, the number of hungry people in the world remains unacceptably high.** The vast majority live in developing countries, where about 850 million people, or slightly fewer than 15 percent of the population, are estimated to be undernourished.
- **Improved undernourishment estimates, from 1990, suggest that progress in reducing hunger has been more pronounced than previously believed.**
- **Most of the progress, however, was achieved before 2007–08. Since then, global progress in reducing hunger has slowed and levelled off.**
- **The revised results imply that the Millennium Development Goal (MDG) target of halving the prevalence of undernourishment in the developing world by 2015 is within reach, if appropriate actions are taken to reverse the slowdown since 2007–08.**
- **Despite significant improvements this year to the FAO methodology for estimating undernourishment, further improvements and better data are needed to capture the effects of food price and other economic shocks.** Therefore, the undernourishment estimates do not fully reflect the effects on hunger of the 2007–08 price spikes or the economic slowdown experienced by some countries since 2009, let alone the recent price increases. Other indicators are also needed to provide a more holistic assessment of undernourishment and food security.
- **In order for economic growth to enhance the nutrition of the neediest, the poor must participate in the growth process and its benefits:** (i) Growth needs to involve and reach the poor; (ii) the poor need to use the additional income for improving the quantity and quality of their diets and for improved health services; and (iii) governments need to use additional public resources for public goods and services to benefit the poor and hungry.
- **Agricultural growth is particularly effective in reducing hunger and malnutrition.** Most of the extreme poor depend on agriculture and related activities for a significant part of their livelihoods. Agricultural growth involving smallholders, especially women, will be most effective in reducing extreme poverty and hunger when it increases returns to labour and generates employment for the poor.
- **Economic and agricultural growth should be “nutrition-sensitive”.** Growth needs to result in better nutritional outcomes through enhanced opportunities for the poor to diversify their diets; improved access to safe drinking water and sanitation; improved access to health services; better consumer awareness regarding adequate nutrition and child care practices; and targeted distribution of supplements in situations of acute micronutrient deficiencies. Good nutrition, in turn, is key to sustainable economic growth.
- **Social protection is crucial for accelerating hunger reduction.** First, it can protect the most vulnerable who have not benefited from economic growth. Second, social protection, properly structured, can contribute directly to more rapid economic growth through human resource development and strengthened ability of the poor, especially smallholders, to manage risks and adopt improved technologies with higher productivity.
- **To accelerate hunger reduction, economic growth needs to be accompanied by purposeful and decisive public action.** Public policies and programmes must create a conducive environment for pro-poor long-term economic growth. Key elements of enabling environments include provision of public goods and services for the development of the productive sectors, equitable access to resources by the poor, empowerment of women, and design and implementation of social protection systems. An improved governance system, based on transparency, participation, accountability, rule of law and human rights, is essential for the effectiveness of such policies and programmes.

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The 2012 edition of *The State of Food Insecurity in the World* focuses on the importance of economic growth in overcoming poverty, hunger and malnutrition. We are pleased to note that many, though not all, developing countries have enjoyed remarkable rates of growth during recent decades. High growth rates of GDP per capita are a key factor in reducing food insecurity and malnutrition. However, economic growth *per se* does not guarantee success. As Jean Dreze and Amartya Sen stated recently, it “requires active public policies to ensure that the fruits of economic growth are widely shared, and also requires – and this is very important – making good use of the public revenue generated by fast economic growth for social services, especially for public healthcare and public education.”<sup>1</sup> We fully agree.

There are still too many circumstances in which the poor do not sufficiently benefit from economic growth. This may happen because growth originates in sectors that do not generate sufficient employment for the poor, or because they lack secure and fair access to productive assets, in particular land, water and credit. Or it may happen because the poor cannot immediately make use of the opportunities provided by growth as a result of undernutrition, low levels of education, ill health, age or social discrimination.

However, one lesson that we have learned from success stories coming from all developing regions is that investment in agriculture, more so than investment in other sectors, can generate economic growth that delivers large benefits to the poor, hungry and malnourished. We recognize, nonetheless, that this is not universally true. With urbanization continuing in developing countries, future efforts to address poverty and food insecurity will have to focus also on urban areas. However, agriculture is still the dominant source of employment in the economies of many low-income countries, and the urban poor spend most of their income on food. Moreover, for the foreseeable future, the majority of the poor and hungry will continue to live in rural areas and depend directly or indirectly on investments in rural infrastructure and smallholder-based agriculture to improve their livelihoods.

This edition of *The State of Food Insecurity in the World* draws attention to the potential to invest in smallholder-centred agricultural growth. In recognition of the dual need to protect the environment and reduce hunger, poverty and malnutrition, we call on all stakeholders to promote practical solutions that aim to promote sustainable intensification of food production systems, ensure a strong involvement of smallholder farmers and other rural poor, and preserve natural resources – including by minimizing post-harvest losses and waste throughout the food chain. Higher prices of agricultural commodities provide positive incentives for increased investment in agriculture. However, better policy responses and improved governance are needed to ensure sustainability and to address the effects of increased price volatility and of higher costs of the food basket for the poor, most of whom are net food buyers.

This report provides convincing evidence that poor, hungry and malnourished people use some of their additional income either to produce or purchase more food, aiming to increase their dietary energy intake and to diversify their diets. Against this background, we are glad to note significant improvements in food security and nutrition outcomes worldwide. The trend in the prevalence of undernourishment has been declining, and we have seen some progress in key anthropometric indicators of child underweight, stunting and nutrition-related child mortality. There has also been progress in overcoming some types of micronutrient deficiencies or “hidden hunger” in a number of countries. These encouraging developments are made possible by the combined effects of increased attention to world hunger, overall economic and agricultural growth, and targeted policy interventions.

Nevertheless, as is also documented in this report, 868 million people continue to suffer from undernourishment, and the negative health consequences of micronutrient deficiencies continue to affect around 2 billion people. In today’s world of unprecedented technical and economic opportunities, we find it entirely unacceptable that more than 100 million children under the age of five are underweight, and therefore unable to realize their full socio-economic and human potential, and that childhood malnutrition is a cause of death for more than 2.5 million children every year. Hunger and malnutrition can be a significant obstacle to economic growth.

We are concerned that most rural people do not enjoy decent working conditions or adequate and effective social protection. We call on national governments to use the additional public resources

<sup>1</sup> All notes and references are provided at the end of the report, see pages 58–61.

generated by economic growth, *inter alia*, to build comprehensive social protection systems to support those who cannot help themselves in their efforts to secure adequate nutrition. This report devotes a section to recent experience of social protection as a foundation for both agricultural growth and food security. Such approaches should be human rights-based, target the poor, promote gender equality, enhance long-term resilience and allow sustainable graduation out of poverty.

While *The State of Food Insecurity in the World 2012* recognizes the potential of economic growth to accelerate reductions in hunger, poverty and malnutrition, it also draws attention to the association of globalization and economic growth with the trend towards overnutrition, even in low-income countries. The societal transformations that have been observed in the process of economic growth, modernization and urbanization, have led a growing number of people to adopt lifestyles and diets that are conducive to overweight and related non-communicable diseases. The negative implications for public health systems are already significant in many countries. Together with post-harvest losses, excessive consumption and waste draw on scarce resources that could be used to improve the nutrition of the poor and hungry while reducing the food system's environmental footprint.

Working with national governments and the international community, our three organizations are committed to developing better-integrated approaches to food security and nutrition and promoting cooperation among all relevant stakeholders. In order to contribute to improving all dimensions of food insecurity, policies, strategies and programmes must not only be "pro-poor," they also must be "nutrition-sensitive," by promoting positive and sustainable interactions among all three key sectors that need to be involved: agriculture, nutrition and health.

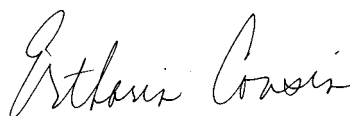
In view of the importance of economic growth for today's low-income countries, we note with particular concern that the recovery of the world economy from the recent global financial crisis remains fragile. We nonetheless appeal to the international community to make extra efforts to assist the poorest in realizing their basic human right to adequate food. The world has the knowledge and the means to eliminate all forms of food insecurity and malnutrition. We therefore consider no ambition in achieving this aim too high, and warmly welcome the recent "Zero Hunger Challenge" announced by United Nations Secretary-General Ban Ki-moon.



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*The State of Food Insecurity in the World 2012* was prepared under the overall leadership of Jomo Kwame Sundaram, Assistant-Director-General, and the guidance of the management team of the Economic and Social Development Department. The technical coordination of the publication was carried out by David Dawe and Hartwig de Haen (who were also technical editors of the report), Kostas Stamoulis and Keith Wiebe, all of the Agricultural Development Economics Division (ESA). Michelle Kendrick provided coordination for all the editorial, graphics, layout and publishing services. Anna Doria Antonazzo provided excellent administrative support, and the staff of the Statistics Division (ESS) generated the underlying data on undernourishment.

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# Undernourishment around the world in 2012

## Undernourishment around the world

### Key messages

- ***The State of Food Insecurity in the World 2012* presents new estimates of the number and proportion of undernourished people going back to 1990, defined in terms of the distribution of dietary energy supply. With almost 870 million people chronically undernourished in 2010–12, the number of hungry people in the world remains unacceptably high.** The vast majority live in developing countries, where about 850 million people, or slightly fewer than 15 per cent of the population, are estimated to be undernourished.
- **Improved undernourishment estimates, from 1990, suggest that progress in reducing hunger has been more pronounced than previously believed.**
- **Most of the progress, however, was achieved before 2007–08. Since then, global progress in reducing hunger has slowed and levelled off.**
- **The revised results imply that the Millennium Development Goal (MDG) target of halving the prevalence of undernourishment in the developing world by 2015 is within reach, if appropriate actions are taken to reverse the slowdown since 2007–08.**
- **Despite significant improvements this year to the FAO methodology for estimating undernourishment, further improvements and better data are needed to capture the effects of food price and other economic shocks.** Therefore, the undernourishment estimates do not fully reflect the effects on hunger of the 2007–08 price spikes or the economic slowdown experienced by some countries since 2009, let alone the recent price increases. Other indicators are also needed to provide a more holistic assessment of undernourishment and food security.

**A**bout 870 million people are estimated to have been undernourished (in terms of dietary energy supply) in the period 2010–12. This figure represents 12.5 percent of the global population, or one in eight people. The vast majority of these, 852 million, live in developing countries, where the prevalence of undernourishment is now estimated at 14.9 percent of the population (Table 1).

The updated figures emerging as a result of improvements in data and methodology indicate that the number of undernourished people in the world is estimated to have declined more steeply than previously estimated until 2007, although the rate of decline has slowed thereafter (Figure 1). As a result, the developing world as a whole is found to be much closer to achieving the MDG target of reducing by half the percentage of people suffering from chronic hunger by 2015. The current assessment pegs the undernourishment estimate for developing countries at slightly more than 23.2 percent of the population in 1990–92 (substantially higher than previously estimated), thus implying an MDG target of 11.6 percent for 2015. If the average annual decline of the past 20 years continues to 2015, the prevalence of undernourishment in developing countries would reach 12.5 percent, still above the MDG target, but much closer to it than previously estimated.

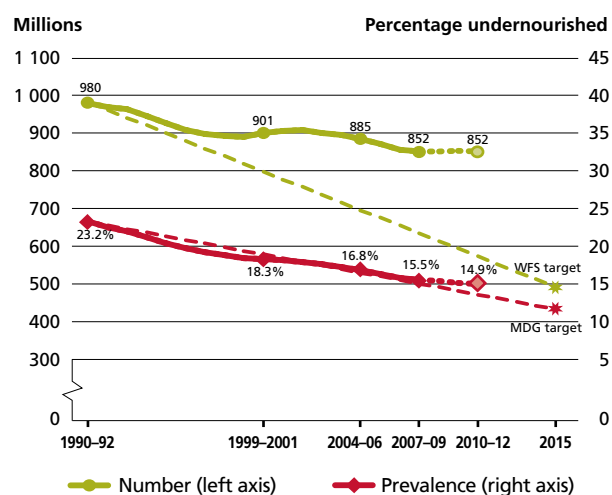
Regionally, the rate of progress in the reduction of undernourishment has been higher in Asia and the Pacific and in Latin America and the Caribbean (Figure 2, page 10). Considerable differences among regions and countries remain, however, and some have moved even further away from their MDG trajectory. A reduction in both the number and proportion of undernourishment in Asia and the Pacific has continued in recent years, meaning that the region is almost on track for achieving its MDG hunger target. The same holds true for Latin America and the Caribbean. South-Eastern Asia has shown the most rapid reduction (from 29.6 to 10.9 percent), followed by Eastern Asia and Latin America (Figure 3, page 10). Undernourishment in sub-Saharan Africa has improved, but less rapidly, while Western Asia has seen an increase in the prevalence of undernourishment over this period.

Different rates of progress have led to significant changes in the distribution of the undernourished in the world between 1990–92 and 2010–12 (Figure 4, page 11). The share of the world's undernourished people has declined most rapidly in South-Eastern Asia and Eastern Asia (from 13.4 to 7.5 percent and from 26.1 to 19.2 percent, respectively), while declining from 6.5 to 5.6 percent in Latin America. Meanwhile, the share has increased from 32.7 to 35.0 percent in Southern Asia, from 17.0 to 27.0 percent in sub-Saharan Africa and from 1.3 to 2.9 percent in Western Asia and Northern Africa.

Trends in undernourishment presented in this report are broadly consistent with those of other food security and development indicators (Figure 5, page 11). Particularly interesting in this context is the evolution of the new undernourishment estimates in comparison with poverty and child mortality, which suggests that undernourishment has evolved in line with global and regional poverty estimates: for developing countries as a whole, the prevalence of undernourishment has fallen from 23.2 to 14.9 percent over the period 1990–2010, while the incidence of poverty has declined from 47.5 to 22.4 percent, and that of child mortality from 9.5 to 6.1 percent.

**FIGURE 1**

## Undernourishment in the developing world



Note: Data for 2010-12 in all graphics refer to provisional estimates.  
Source: FAO.

**TABLE 1**

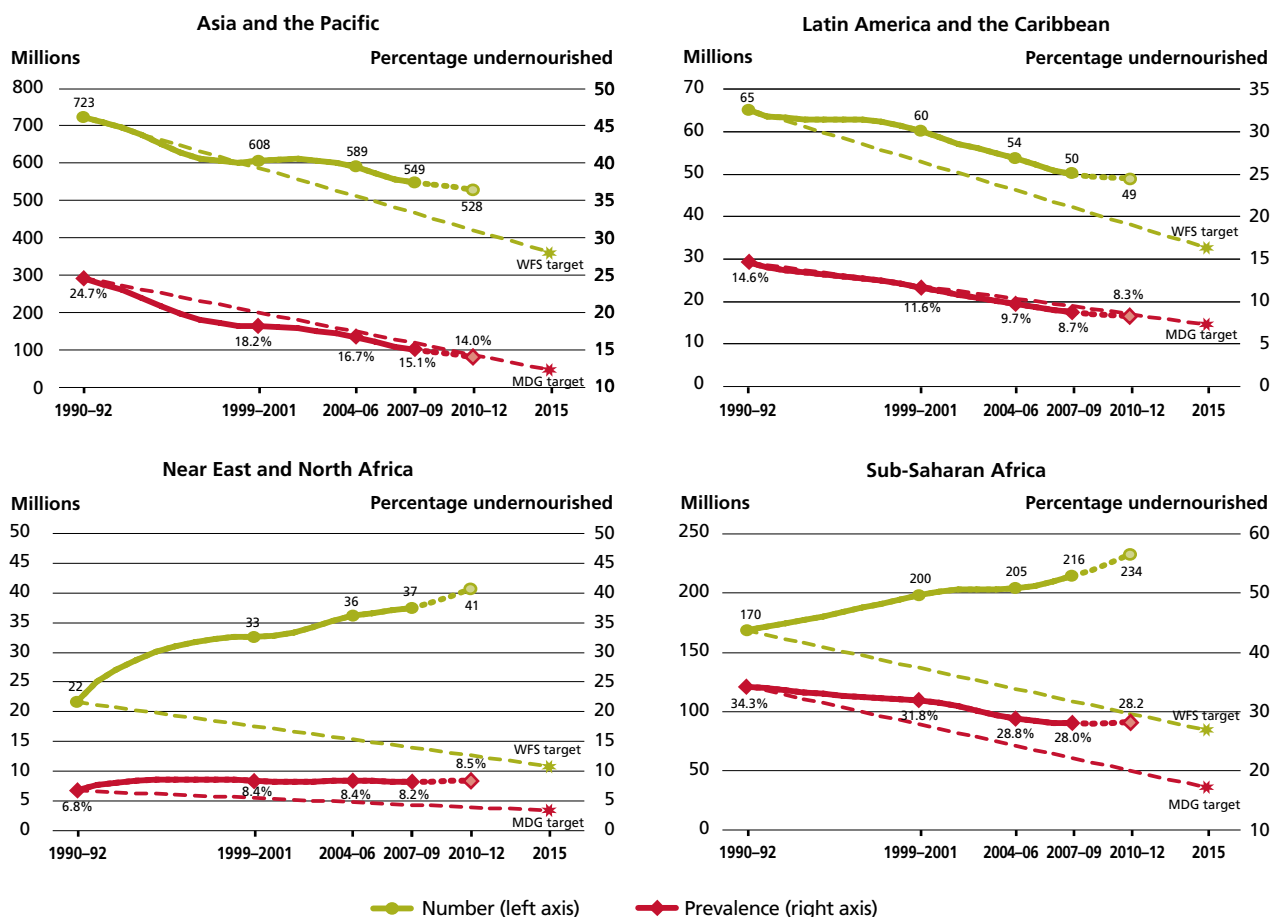
## Undernourishment in the developing regions, 1990–92 to 2010–12

	Number (millions) and prevalence (%) of undernourishment				
	1990–92	1999–2001	2004–06	2007–09	2010–12*
<b>WORLD</b>	<b>1 000</b>	<b>919</b>	<b>898</b>	<b>867</b>	<b>868</b>
	<b>18.6%</b>	<b>15.0%</b>	<b>13.8%</b>	<b>12.9%</b>	<b>12.5%</b>
<b>DEVELOPED REGIONS</b>	<b>20</b>	<b>18</b>	<b>13</b>	<b>15</b>	<b>16</b>
	<b>1.9%</b>	<b>1.6%</b>	<b>1.2%</b>	<b>1.3%</b>	<b>1.4%</b>
<b>DEVELOPING REGIONS</b>	<b>980</b>	<b>901</b>	<b>885</b>	<b>852</b>	<b>852</b>
	<b>23.2%</b>	<b>18.3%</b>	<b>16.8%</b>	<b>15.5%</b>	<b>14.9%</b>
<b>Africa</b>	<b>175</b>	<b>205</b>	<b>210</b>	<b>220</b>	<b>239</b>
	<b>27.3%</b>	<b>25.3%</b>	<b>23.1%</b>	<b>22.6%</b>	<b>22.9%</b>
Northern Africa	5	5	5	4	4
	3.8%	3.3%	3.1%	2.7%	2.7%
Sub-Saharan Africa	170	200	205	216	234
	32.8%	30.0%	27.2%	26.5%	26.8%
<b>Asia</b>	<b>739</b>	<b>634</b>	<b>620</b>	<b>581</b>	<b>563</b>
	<b>23.7%</b>	<b>17.7%</b>	<b>16.3%</b>	<b>14.8%</b>	<b>13.9%</b>
Western Asia	8	13	16	18	21
	6.6%	8.0%	8.8%	9.4%	10.1%
Southern Asia	327	309	323	311	304
	26.8%	21.2%	20.4%	18.8%	17.6%
Caucasus and Central Asia	9	11	7	7	6
	12.8%	15.8%	9.9%	9.2%	7.4%
Eastern Asia	261	197	186	169	167
	20.8%	14.4%	13.2%	11.8%	11.5%
South-Eastern Asia	134	104	88	76	65
	29.6%	20.0%	15.8%	13.2%	10.9%
<b>Latin America and the Caribbean</b>	<b>65</b>	<b>60</b>	<b>54</b>	<b>50</b>	<b>49</b>
	<b>14.6%</b>	<b>11.6%</b>	<b>9.7%</b>	<b>8.7%</b>	<b>8.3%</b>
Latin America	57	53	46	43	42
	13.6%	11.0%	9.0%	8.1%	7.7%
Caribbean	9	7	7	7	7
	28.5%	21.4%	20.9%	18.6%	17.8%
<b>Oceania</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>
	<b>13.6%</b>	<b>15.5%</b>	<b>13.7%</b>	<b>11.9%</b>	<b>12.1%</b>

\* Projections  
Source: FAO.

FIGURE 2

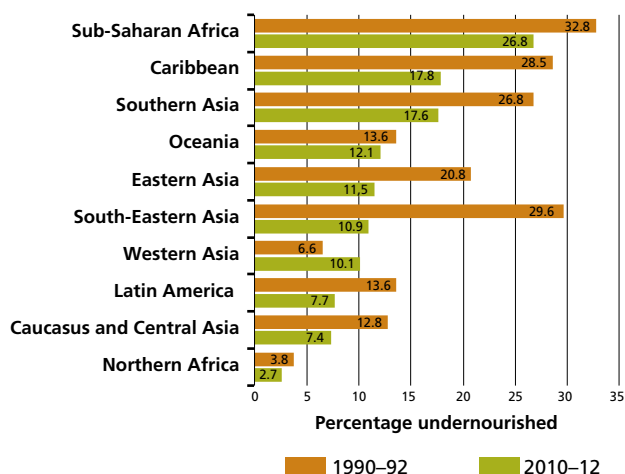
Hunger trends in the developing regions



Source: FAO.

FIGURE 3

Progress towards meeting the MDG target across regions



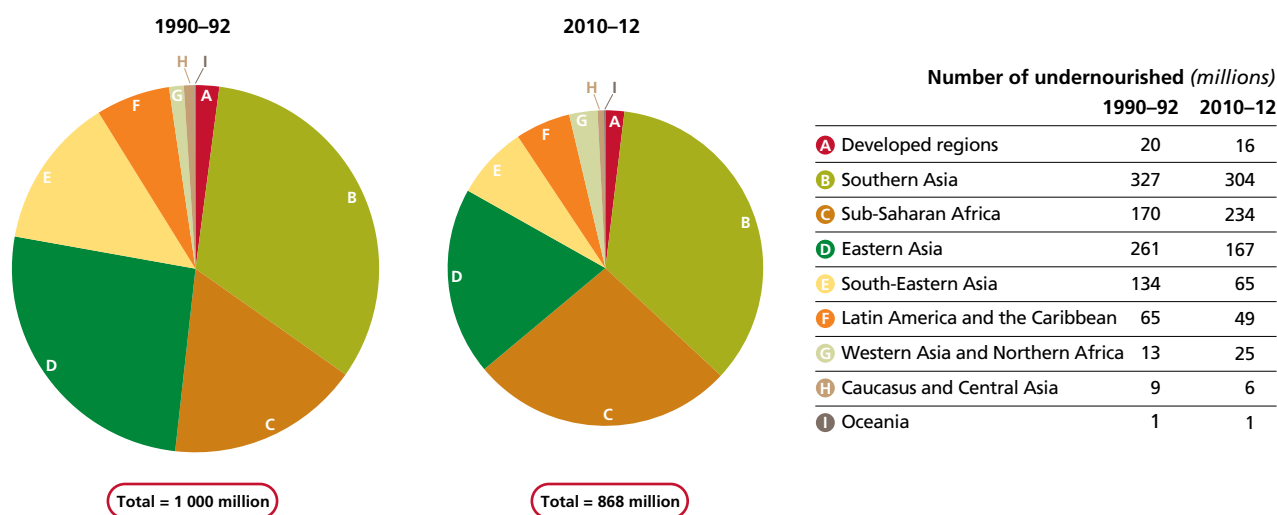
Source: FAO.

Undernourishment in recent years

The new estimates suggest that the increase in hunger during 2007–10 – the period characterized by food price and economic crises – was less severe than previously estimated. There are several reasons for this. First, the methodology estimates *chronic* undernourishment based on habitual consumption of dietary energy and does not fully capture the effects of price spikes, which are typically short-term. As a result, the prevalence of undernourishment (PoU) indicator should not be used to draw definitive conclusions about the effects of price spikes or other short-term shocks. Second, and most importantly, the transmission of economic shocks to many developing countries was less pronounced than initially thought. More recent GDP estimates suggest that the “great recession” of 2008–09 resulted in only a mild slowdown in GDP growth in many developing countries, and increases in domestic staple food prices were very small in China, India and Indonesia (the three largest developing countries). Past estimates of undernourishment assumed that

FIGURE 4

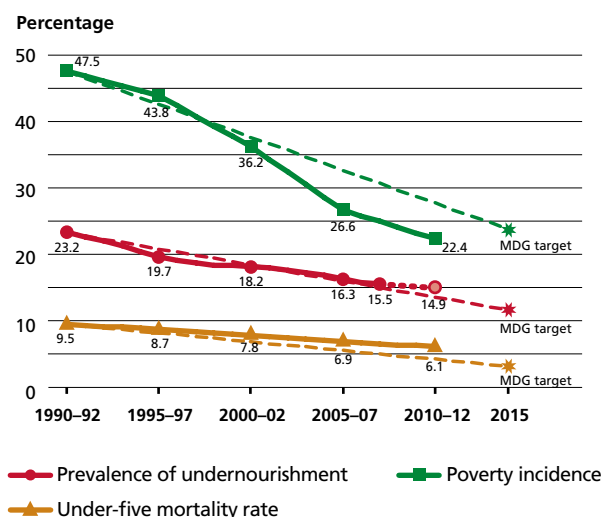
The distribution of hunger in the world is changing  
Number of undernourished by region, 1990–92 and 2010–12



Note: The areas of the pie charts are proportional to the total number of undernourished in each period. All figures are rounded.  
Source: FAO.

FIGURE 5

Poverty, undernourishment and child mortality in the developing world



Source: FAO.

developing countries and their most vulnerable populations were much more exposed to the economic downturn.

Although the estimates of the prevalence of undernourishment are lower than previous calculations, the period 2007–10 is characterized by a significant slowdown in progress towards lower hunger rates, bringing hunger

reduction essentially to a halt for the developing countries as a whole. Again, the overall picture masks very different trends across regions and countries. In Western Asia, the prevalence of undernourishment was increasing before 2007 and continued its upward trend. In sub-Saharan Africa, the modest progress achieved during 2002–05 was reversed, with hunger rates rising by 2 percent per year since 2007. Progress slowed in Latin America and the Caribbean, from an average annual rate of reduction of 1.9 percent per year in 2002–05 to 0.9 percent in 2006–09. Eastern Asia and South-Eastern Asia, by contrast, managed to accelerate their hunger reduction rates. South-Eastern Asia was able to speed up hunger reduction from 3.1 percent per year before 2007 to 4.6 percent afterwards, while Eastern Asia improved the pace from 0.1 percent to over 4 percent.

Behind these regional divergences stand markedly different capacities to deal with economic shocks (such as price increases and economic recessions), including vastly different levels of vulnerability in the face of global recession and differences in the ability to take advantage of higher prices through increased supply response, depending on market infrastructure, technology levels and natural resource endowments. (Some indicative comparisons were presented in the 2011 edition of this report.) Some countries in Asia managed to mitigate international price pressure through border measures and counter-cyclical measures to avert the worst impacts of the recession. In those countries, domestic rice prices rose only slightly. Many African countries, by contrast, were fully exposed to both price hikes and the

**BOX 1**

**Improvements in data and methodology**

This year's edition of *The State of Food Insecurity in the World* presents new estimates of the number and proportion of hungry people in the world going back to 1990, reflecting several key improvements in data and in FAO's methodology used to derive its prevalence of undernourishment indicator (PoU). The new estimates incorporate

- the latest revisions of world population data;
- new data from demographic, health and household surveys that suggest revised minimum dietary energy requirements, by country;
- new estimates of dietary energy supply, by country;
- country-specific estimates of food losses at the retail distribution level; and
- technical improvements to the methodology.

(For more detail on these changes, see pages 13–14 and the technical annex.)

Notwithstanding these improvements, it is important to note several caveats. First, the PoU indicator is defined solely in terms of dietary energy availability and its distribution in the population and does not consider other aspects of nutrition. Second, it uses the energy

requirements for minimum activity levels as a benchmark for dietary energy adequacy, whereas many poor and hungry people are likely to have livelihoods involving arduous manual labour. And third, the current methodology does not capture the impact of short-term price and other economic shocks, unless these are reflected in changes in long-term food consumption patterns. These limitations are consistent with definitions used previously, but they underline the need to consider the PoU indicator as a conservative estimate of undernourishment. Further improvements and a broader set of indicators are necessary to reach a more holistic understanding of undernourishment and food insecurity. For example, alternative indicators could include those using a higher minimum energy requirement threshold corresponding to higher activity levels. These would imply very different levels and trends in undernourishment, as discussed further in the technical annex.

global recession, with limited access to the means and measures necessary to mitigate hardships for their populations. All this suggests that additional regionally focused efforts are required. These efforts should be led by national governments and fully supported by the international community.

The lesson to be learned from these diverse experiences is that, even in cases where a sharp reduction in the total amount of dietary energy consumed by the population as a result of higher food prices cannot be detected, higher food prices may nevertheless have had other negative impacts. These may include a deterioration in dietary quality, as well as reduced access to other basic needs such as health and education. In response to income losses and/or higher food prices, for example, poor consumers in many countries may have had to compromise on the quality and diversity of the food they consumed by reverting to cheaper and less nutritious foods. Such impacts are difficult to quantify with the information currently available in most countries, and certainly cannot be captured by an indicator based only on the adequacy of dietary energy.

Also, significant short-term hardships that many of the poor may have endured when food prices spiked in the short run, or when the economic recession left them without jobs and livelihoods for months, will not be fully captured by an

indicator of chronic undernourishment based on annual average consumption. The poorest of the poor were unlikely to have had either food stocks or financial savings to draw upon and, where public safety nets were unavailable or ill-functioning, they may have been exposed to severe short-term food deprivation that would only be revealed if timely and frequent assessments of acute food insecurity were possible for representative samples of the population.

To summarize, the experience of recent years has demonstrated that the consequences of food price rises and other economic shocks are diverse and complex, involving more than simply total dietary energy intake; they range from a deterioration of dietary quality to possible cuts in other types of consumption that are fundamental for human development and growth in both the short and longer term. Further improvements in the methodology, better data and a wider suite of indicators are needed to fully capture these effects. Although the data and methodology used to derive the PoU indicator do not allow estimation of the impact of short-term price spikes (and dips), it is clear that progress in reducing the prevalence of undernourishment has slowed considerably since 2007, and many regions are unlikely to achieve the MDG hunger target without early resumption of progress, requiring inclusive economic recovery as well as food price stability.



## Improvements in data and methodology

### ■ Improving the prevalence of undernourishment indicator

Over the past two years, FAO has overhauled the methodology used to estimate its PoU indicator. The proposed changes were noted in the 2011 edition of this report and have been presented at various scientific fora, including the National Academy of Sciences in Washington DC in February 2011, a Round Table of the Committee on World Food Security in Rome in September 2011, and the International Scientific Symposium on Food and Nutrition Security Information in Rome in January 2012.

These changes are wide-ranging and include a comprehensive revision of food availability data (including improved estimation of food losses), improved parameters for dietary energy requirements, updated parameters for food access and a new functional form for the distributions used to estimate the prevalence of undernourishment. Some of the changes pertain to regular data updates carried out almost every year (population estimates, revision of food availability data), while others are the outcome of intensive efforts, aimed at substantially improving the methodology currently used. Essentially, all the updates and improvements were contingent upon the availability of new data sources.

For the first time, sufficient data on food supply and consumption are available to assess comprehensively and in a methodologically consistent way trends in dietary energy availability up to the current year. New food balance sheets have been compiled, up to 2009, and food supply projections have been made for the period 2010–12 that reflect the most up-to-date evidence on food production, trade and uses during recent years. In addition, household survey data on food consumption for a number of countries have enabled revisions to be made that estimate more accurately the inequality of food access in many countries, although these surveys cover different years (between 1995 and 2010) for different countries.

While data remain scarce, recent analyses indicate that food losses and waste can be significant. Among the methodological changes introduced thus far, accounting for food losses at the retail level is the single most important factor affecting the new hunger estimates, lifting them by 117 million in 2008 compared with the estimates reported in the 2011 edition of this report. In the past, food losses incurred at the retail level were not captured by the methodology.

The new undernourishment estimates also incorporate the effects of population data revisions. While these revisions had little impact on global estimates, they have been pronounced for certain countries and regions. China's population estimate for the 1990s, for example, has been revised upwards by as much as 25 million people, while Bangladesh's population has been revised downwards by about 11 percent (or 17 million people), all the way back to 1990. Such changes in estimated population size affect estimates of undernourishment in two ways. First, they make the same amount of food available to a different number of people, thus changing the estimates of dietary energy supply for the average consumer, which in turn alters the estimated prevalence of undernourishment. Second, they change the total number of people for which the prevalence level applies, thus leading to a different number of undernourished people.

All other data and methodological revisions result in a reduction in the estimated number of undernourished people in developing countries. These other revisions are also larger in recent years than in 1990, which results in a stronger decline in the prevalence of undernourishment over time compared with the estimates published previously. More detail on these changes and their impacts on the prevalence of undernourishment are presented in the technical annex.

Despite these enhancements, important data gaps and data quality problems nevertheless remain. Key improvements that are still needed include:

- A concerted effort to improve the quality of basic data on food production, utilization, storage and trade. To this end, FAO is leading the implementation of the Global Strategy for the Improvement of Agricultural Statistics to address the declining capacity of many developing countries to produce basic statistics and to address emerging data needs.
- A continuous effort to maintain an up-to-date parameter base for undernourishment estimates, with regular "health checks" of the parameters for food requirements and access. Methodological and data revisions are a normal feature of any statistical domain, and are the result of ongoing efforts to constantly improve the quality of available data.

In addition, further efforts are needed to more explicitly incorporate the impacts of price and income shocks into the analysis.

### ■ ... and moving towards a suite of food security indicators

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Notwithstanding improvements in data and methodology, the PoU indicator alone is clearly not sufficient to provide a comprehensive picture of the food security situation in every country. For this reason, a preliminary set of more than 20 indicators, available for most countries and years, has been identified, including measures of dietary energy supply, food production, food prices, food expenditures, anthropometric indicators and volatility. These indicators are presented in the *State of Food Insecurity in the World* companion website ([www.fao.org/publications/sofi/en/](http://www.fao.org/publications/sofi/en/)) to allow food security analysts and policy makers to make a more comprehensive

assessment of the various dimensions and manifestations of food insecurity, and thus inform policy for more effective interventions and responses.

Plans are underway to expand and improve the indicator base. To this end, FAO is launching an initiative to create an “experience-based” food security indicator (similar to the Latin American and Caribbean Food Insecurity Scale) for a large number of countries, available on an annual basis. The initiative is based on a global poll that will monitor food insecurity based on short interviews. Such an indicator would ensure timely monitoring of the difficulties that individuals and households face in accessing food, thus providing a direct basis for food security interventions.





# Economic growth, hunger and malnutrition

## Income growth and changes in food consumption

### Key message

**In order for economic growth to enhance the nutrition of the neediest, the poor must participate in the growth process and its benefits:**

(i) Growth needs to involve and reach the poor; (ii) the poor need to use the additional income for improving the quantity and quality of their diets and for improved health and sanitation services; and (iii) governments need to use additional public resources for public goods and services to benefit the poor and hungry.

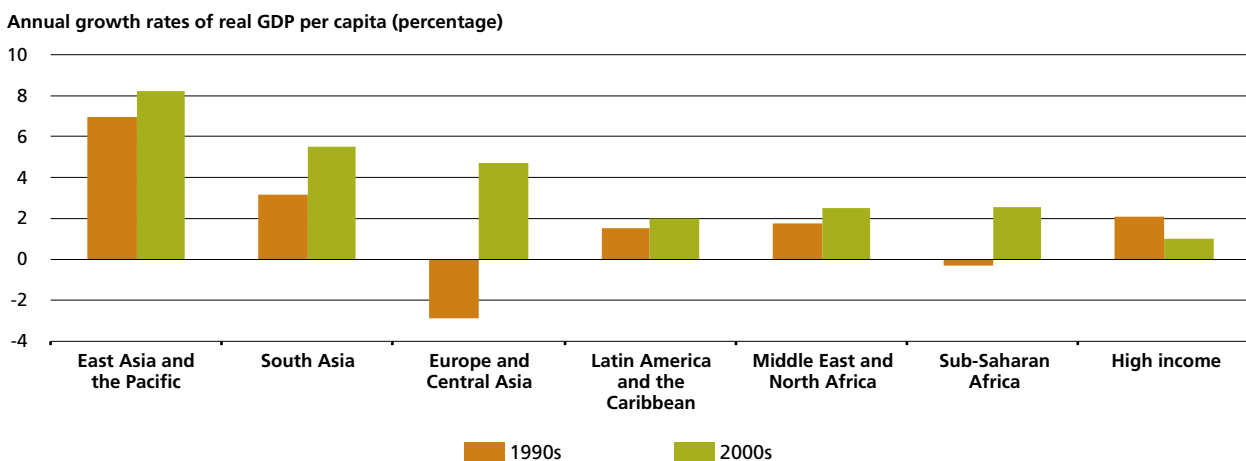
countries were more rapid in the 2000s than in the 1990s, with the most dramatic turnarounds taking place in sub-Saharan Africa and in Europe and Central Asia (developing countries only for both groups; Figure 6). The most rapid growth rates (by far) occurred in East Asia and the Pacific in both periods. Growth rates for high-income countries slowed in the 2000s.

In order for economic growth to enhance access to food that is adequate in quantity (dietary energy) and in quality (diversity, nutrient content and safety), three key steps are required. First, growth needs to reach and involve the poor and provide increased employment and income-earning opportunities for the poor. Second, the poor need to use their additional income for improving the quantity and quality of their diet, water and sanitation as well as on improved health services. (The role of women is crucial in ensuring that these spending patterns are realized.) Third, governments need to spend additional public revenues on safety nets and key public goods and services such as education, infrastructure and public health measures.

**E**conomic growth in recent decades has provided considerable scope for reducing hunger and malnutrition. Between 1990 and 2010, real per capita incomes grew by nearly 2 percent per year globally, though with major differences among countries and between decades. Growth rates for all groups of developing

FIGURE 6

Economic growth rates in developing countries have varied significantly by region and over time

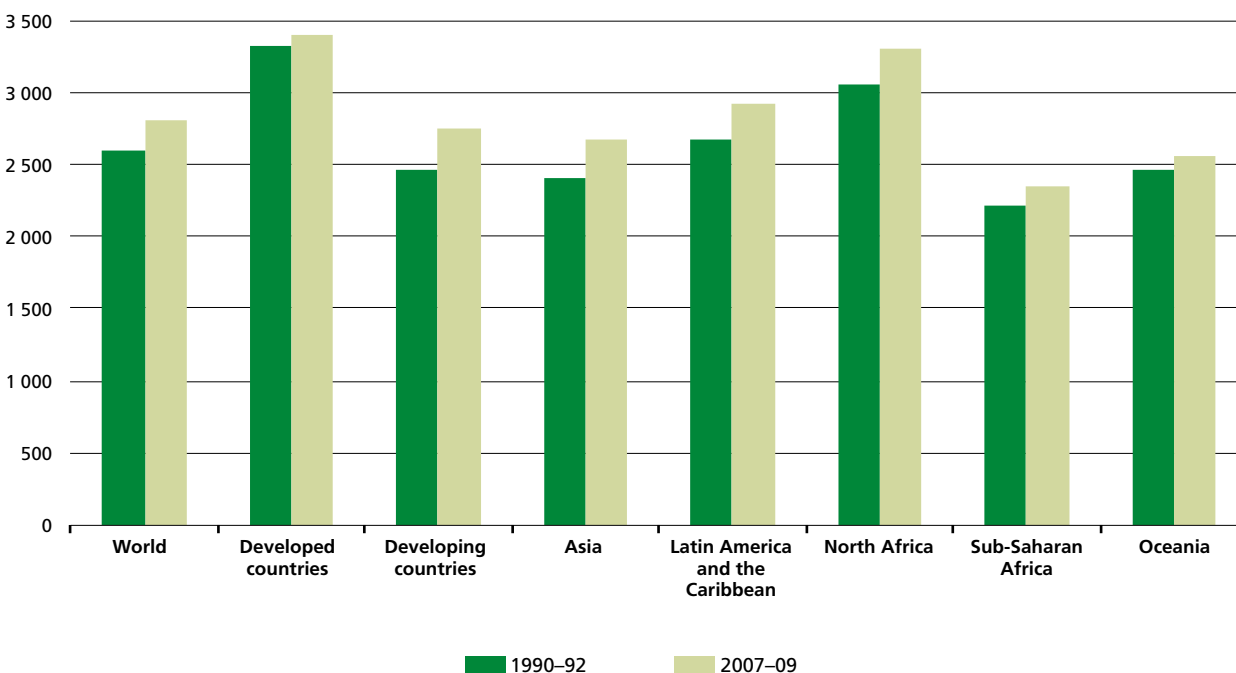


Note: All groupings refer to developing countries only (except for "High income"). Real GDP per capita expressed in purchasing power parity (PPP) terms.  
Source of raw data: World Bank, *World Development Indicators*.

**FIGURE 7**

Dietary energy supplies have risen in all regions

**Dietary energy supplies (kcal/person/day)**



Source: FAO.

Before discussing these key steps in more detail, the report will first review some broad trends in dietary energy and nutrition during the past two decades.

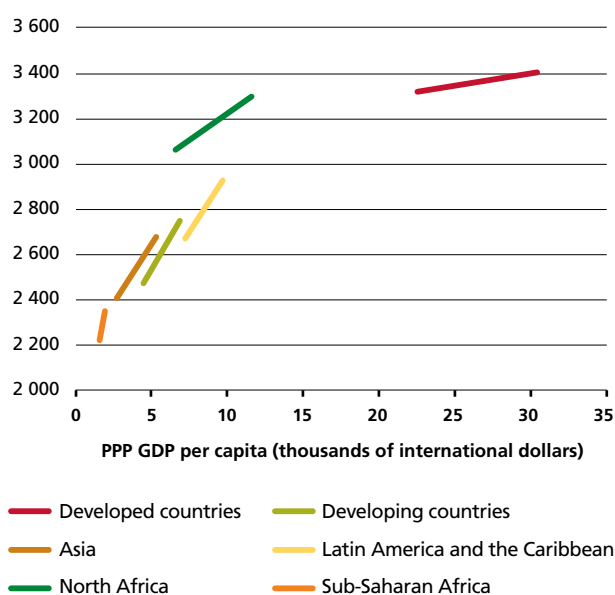
**Trends in dietary energy supplies**

The 2 percent per annum increases in real per capita incomes between 1990 and 2010 resulted in increased demand for dietary energy. On average, for the entire world, dietary energy supplies (DES) increased by about 210 kcal per person per day, or 8 percent (Figure 7). The increase was larger in the developing countries (275 kcal/person/day) than in the developed countries (86 kcal/person/day). Across developing country regions, the largest absolute increases (260 to 270 kcal per day) were in Asia (where economic growth was most rapid) and Latin America and the Caribbean, while the smallest increases (less than 130 kcal per day) were in Oceania and sub-Saharan Africa (where economic growth was slow). Figure 8 shows graphically how demand for energy is greater at higher levels of income. It also shows how the impact of additional income is greater at lower levels of income (in which case the slope of the line is steeper).

**FIGURE 8**

Demand for food consumption increases as incomes rise

**Dietary energy supply (kcal/person/day)**



Notes: PPP = purchasing power parity. Regional aggregates include only developing countries. Sources of raw data: FAO and World Bank.

### ■ Changes in food consumption patterns

The rise in available food energy has been accompanied by changes in the composition of diets. Hence, the source of DES shifts over time as incomes grow. Figure 9 illustrates these changes at the regional level in terms of the shares of major food groups in total dietary energy availability. Worldwide, the shares of cereals, roots and tubers declined significantly, whereas the shares of fruits and vegetables and of animal products, including fish, increased.

Regionally, there are contrasts between regions with rapid economic growth and regions that have grown less rapidly. Per capita dietary energy from cereals, roots and tubers declined in rapidly growing Asia, despite an increase in total per capita dietary energy availability. At the same time, dietary energy from animal-source products and fruits and vegetables increased noticeably. In sub-Saharan Africa, however, dietary energy availability from cereals, roots and tubers increased while dietary energy from animal-source foods and fruits and vegetables was essentially constant.

Numerous studies have shown a statistically significant positive association between total household per capita income and dietary diversity, defined as the number of individual foods or food groups consumed over a given period of time.<sup>2</sup> The close association between income and diets can be shown by using household consumption surveys. Figure 10 presents the results of an analysis of

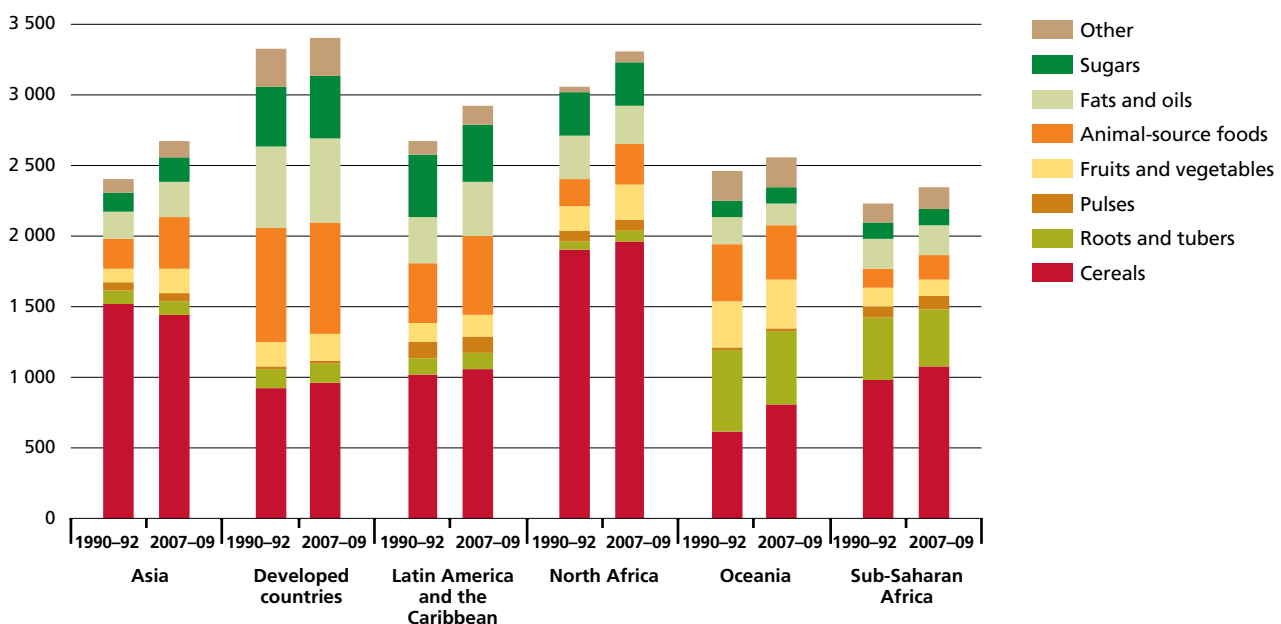
59 household surveys conducted in 47 developing countries in recent years, showing the lowest (Q1) and highest (Q5) quintiles according to per capita income. Despite regional differences in diets, the survey results confirm that diets in the higher-income groups are more diversified, irrespective of the region. As incomes grow, the contribution of cereals, roots and tubers to total per capita DES decreases whereas the contributions of animal-source foods and of fruits and vegetables increase significantly. The relative contribution from sugars to overall DES is also clearly rising with increasing incomes, in most regions.

The shifts in diet composition with income are reflected in changes in the availability of nutrients. As shown in Figure 11, the relative importance of carbohydrates from cereals, roots and tubers is much smaller in the diets of higher-income households. Conversely, the relative importance of carbohydrates from sugars and other foods is higher in higher-income households, as is the contribution of fats. These are all indicators of a major nutrition transition (discussed further below). There are both positive and negative aspects to these changes. An increase in the share of DES from foods other than staples (e.g. animal-source foods, fats and oils, legumes, vegetables and fruits) is generally beneficial to health and nutrition. Increases in the share of fats for people with low fat intake may be good – fats are high in calories and they are required for bioavailability of some micronutrients (those that are fat-

FIGURE 9

Diets are becoming more diverse worldwide

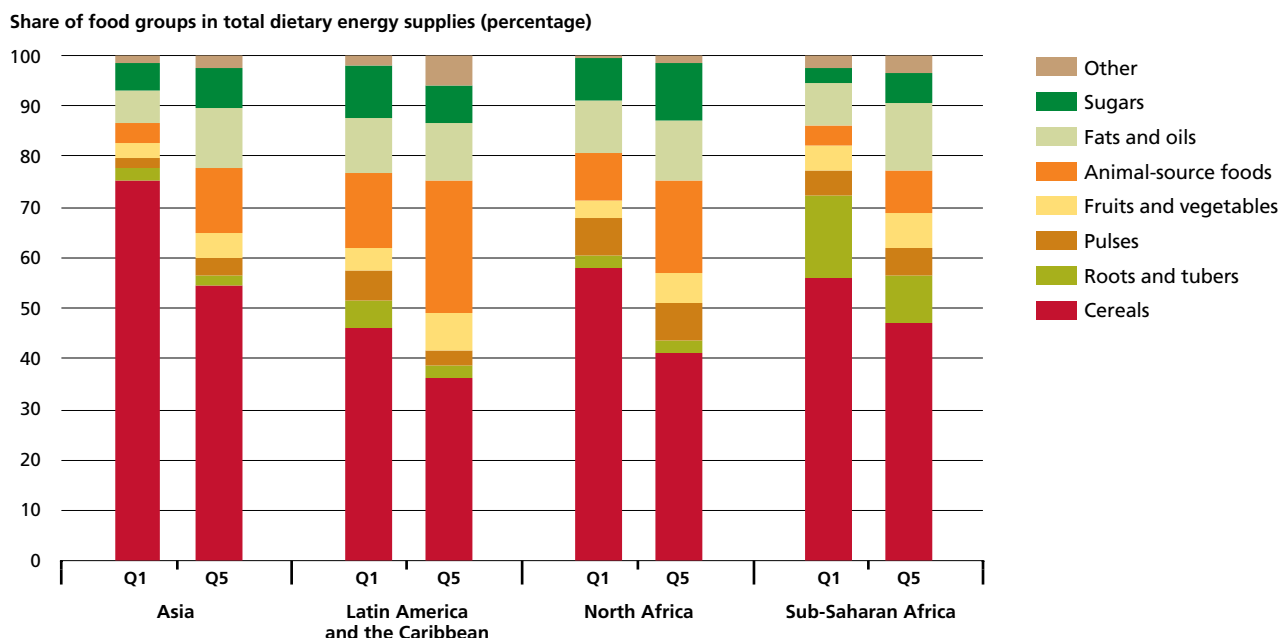
Contributions to total dietary energy supplies (kcal)



Source: FAO.

FIGURE 10

As incomes rise, dietary diversity increases



Note: Data refer to households of lowest and highest income quintiles in 47 developing countries. Source: FAO, analysis of household surveys.

soluble). However, for individuals who have higher levels of fat in their diets, a further increase may be detrimental to health.

Finally, there is also some increase in the relative contribution of protein to total dietary energy supplies, but this increase is relatively small compared with the other changes.

As shown in Figure 10, consumption of animal-source foods (including fish) increases significantly as per capita incomes grow. In fact, with the longer-term economic growth observed worldwide since the early 1960s, growth in consumption of animal-source foods has markedly outpaced growth in that of other major food groups.<sup>3</sup> Consumption of milk per person has almost doubled in developing countries, meat and fish consumption has tripled, and egg consumption has increased by a factor of five. Growth has been strongest in Eastern and South-Eastern Asia and in Latin America and the Caribbean, whereas it stagnated in sub-Saharan Africa. The rates of growth were generally lower in developed countries, where consumption levels were already higher than in developing countries.

Expressed as the relative contribution of animal-source foods to total per capita DES availability, diets seem to be converging to a more uniform pattern, as Figure 12 shows for a selected number of countries. Whereas only small increases (or even a decrease, in the case of the United

States of America) were observed in countries that already had relatively high shares of 20–25 percent in the early 1960s (e.g. France, Germany, United States of America), the increases were significant in countries with lower initial shares and fast economic growth during this period. The latter group includes some developed countries (e.g. Italy, Spain) as well as various developing countries (e.g. Brazil, China). Generally, the levels of per capita consumption of animal-source foods are still rather low in most developing countries, in spite of high growth rates.

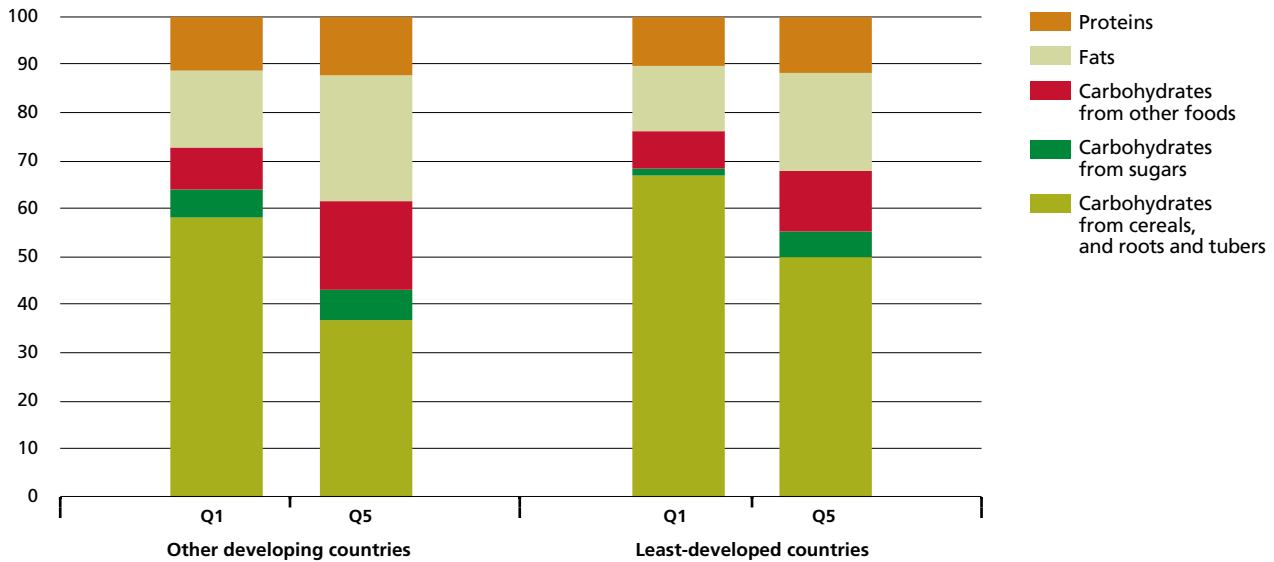
Meat, fish, milk and eggs provide proteins containing a wide range of amino-acids as well as bioavailable micronutrients such as iron, zinc, calcium and vitamins A and B<sub>12</sub>, in which many malnourished people are deficient.<sup>4</sup> Several of these (e.g. iron and zinc) may be difficult to obtain in sufficient amounts from plant-based diets (owing to poor bioavailability). Young children in particular benefit from animal-source foods. However, there are concerns that excessive consumption of meat (especially red meat), dairy products and eggs by older children and adults can have detrimental health effects and increase the risk of chronic non-communicable diseases such as heart disease, cancer, diabetes and obesity.

Fruits and vegetables are an important component of a healthy diet. WHO and FAO recommend a minimum daily intake of 400 g of fruits and vegetables (excluding potatoes and other starchy tubers); levels lower than this are thought

FIGURE 11

As incomes rise, consumption of fats increases and consumption of cereals, roots and tubers decreases

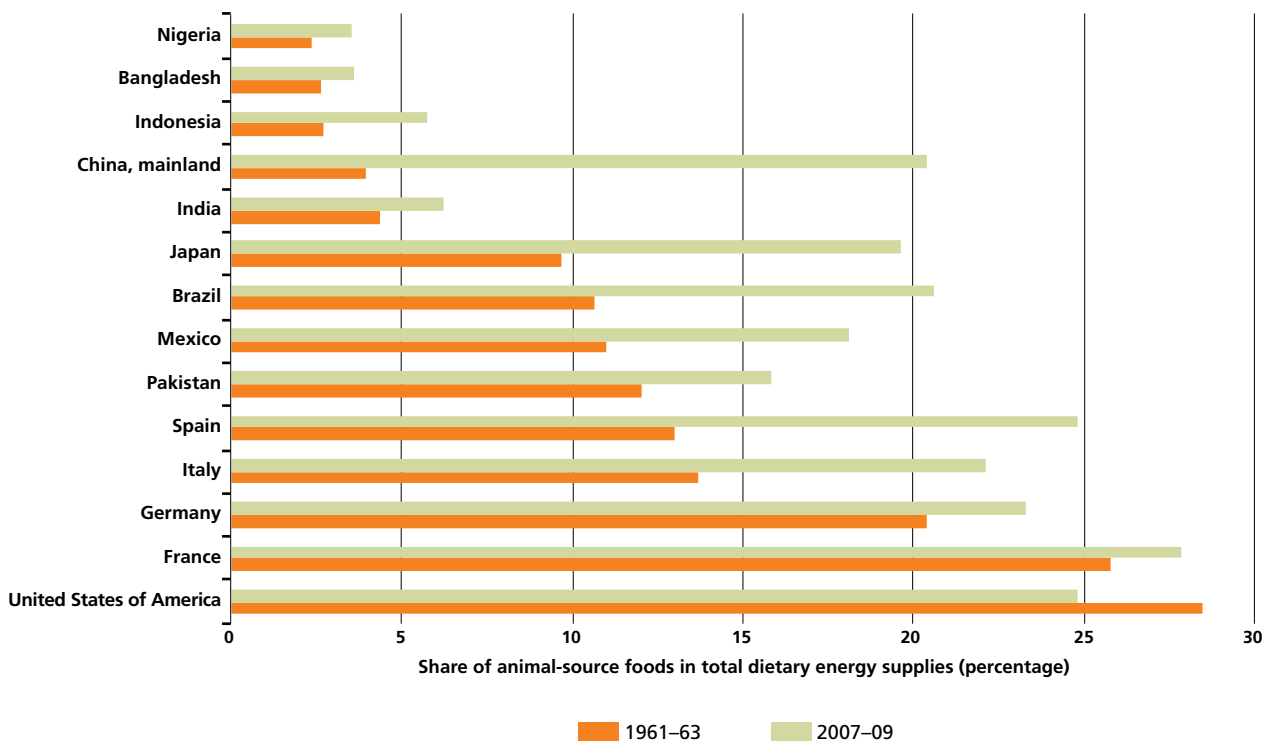
Share of macronutrients in total dietary energy supplies (percentage)



Note: Data refer to households of lowest and highest income quintiles in 47 developing countries.  
Source: FAO, analysis of household surveys.

FIGURE 12

Diets are converging towards an overall higher share of animal-source foods in most countries with fast economic growth



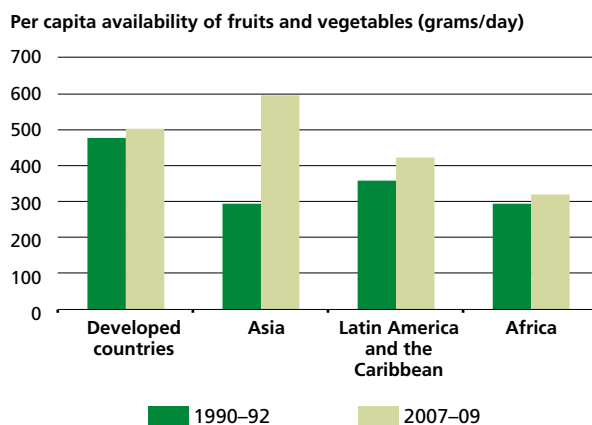
Source of raw data: FAO.

to increase the risk of chronic diseases.<sup>5</sup> An adequate intake of fruits and vegetables also contributes to the prevention of micronutrient deficiencies.

A recent study found that almost 80 percent of the population of 52 mainly low- and middle-income countries consumed less than the minimum recommended levels of fruits and vegetables.<sup>6</sup> The prevalence of the population with below-minimum intake levels ranged from 37 percent in Ghana to 99 percent in Pakistan (the range was similar for men and women separately). It was also found that fruit and vegetable consumption tends to decrease with age and increase with income. While average daily per capita availability levels have been increasing in many regions, especially in Asia, regional average levels are still below the recommended minimum levels in Africa, where daily fruit and vegetable availability has stagnated at levels far below the recommendations (Figure 13).

FIGURE 13

Consumption of fruits and vegetables is increasing, but remains insufficient in some regions



Source of raw data: FAO.

## How does economic growth contribute to hunger reduction and improved nutrition?

### Key message

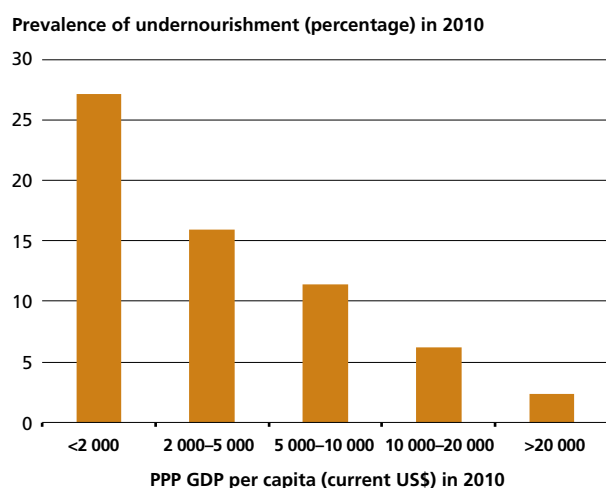
**Economic and agricultural growth should be “nutrition-sensitive”.** Growth needs to result in better nutritional outcomes through enhanced opportunities for the poor to diversify their diets; improved access to safe drinking water and sanitation; improved access to health services; better consumer awareness regarding adequate nutrition and child care practices; and targeted distribution of supplements in situations of acute micronutrient deficiencies. Good nutrition in turn, is key to sustainable economic growth.

Over the long term, it is obvious that higher levels of per capita income help to reduce the proportion of the population who suffer from insufficient food energy intake – FAO’s estimate of undernourishment in developed countries is an order of magnitude below that of developing countries (Figure 14). The previous section showed that economic growth leads to improvements in the composition of diets and, ultimately, better nutrition. But how does economic growth help to reduce undernourishment for the poorest of the poor? And what additional steps need to be taken to reduce hunger and malnutrition more quickly?

There are several key steps in the process that links economic growth (i.e. growth in GDP per capita) to a reduction in undernourishment and malnutrition. First, economic growth must reach the very poor. To reduce poverty and hunger, growth should generate demand for the assets controlled by the poor. Second, poor households must use some of their increased income to increase their intake of dietary energy and other nutrients and to make private investments in health, sanitation and education; women’s involvement is crucial to realizing these spending patterns. Third, a large share of the additional public revenues generated by economic growth must be used to make public-sector investments in social protection systems/safety nets, nutrition, health and education, so as to increase the human capital of the poor. Governments should also invest in public goods and services that promote growth in the sectors in which the poor are employed, for example the agriculture sector (see “Contribution of agricultural growth to reduction of poverty, hunger and malnutrition”, pages 28–35). In order to ensure that these three key steps are indeed effective and sustainable, good governance at the national level is also essential. Good governance extends to the provision of a wide range of essential public goods, including political stability, rule of law, respect for human rights, control of corruption, and government effectiveness.

FIGURE 14

Prevalence of undernourishment declines as GDP per capita increases



Note: PPP = purchasing power parity  
Source of raw data: FAO and World Bank.

### Does economic growth reach the poor?

People who do not have sufficient food intake to lead active and healthy lives are among the poorest in the world. Fundamentally, the poorest do not have the resources either to grow an adequate quantity of food or to purchase it in the market. Thus, the first requirement for economic growth to help reduce undernourishment is that it reaches these very poor people.

Turning to the evidence on the poverty-reducing impact of growth, most research on this issue has found that economic growth leads to increases in the incomes of both the top and bottom quintiles of the income distribution.<sup>7</sup> There are, however, many exceptions – the poor do not benefit from all types of growth under all conditions. The extent to which the poor will benefit from growth depends on initial levels of inequality, the extent to which growth generates employment for the poor, and the sector of the economy in which growth occurs.

The greater the inequality in distribution of assets such as land, water, capital, education and health, the more difficult it will be for the poor to participate in the growth process,<sup>8</sup> and progress in reducing undernourishment is likely to be slow. For example, poor people often have little education, which prevents them from participating in new dynamic labour markets that offer higher wages. Inequality can also reduce the rate of overall economic growth,<sup>9</sup> further harming the poor. Economic growth that is attributable to exploitation of minerals and petroleum, for example, is less likely to directly reduce poverty. Such sectors are capital-intensive and thus lead to less income growth for the poor,

who own very little capital. However, state revenues from such sectors can be used in favour of the poor, as was the case in Indonesia, where government money from oil exports in the 1970s and 1980s was used to improve rural infrastructure, including health clinics and roads.

The impacts of economic growth depend on the source of that growth. There is strong evidence that the incomes of the very poor respond more to agricultural growth than to non-agricultural growth.<sup>10</sup> One reason why agricultural growth is likely to generate income for the poor is that in many countries where poverty is high, poor people are often concentrated in rural areas, and agricultural growth more directly affects the rural economy than do other types of growth. This issue is discussed in more detail in the section “Contribution of agricultural growth to reduction of poverty, hunger and malnutrition”, pages 28–35.

### How do the poor use their additional income?

Even when economic growth does reach the poor, other factors are also important in order to reduce undernourishment as rapidly as possible. The poor must use that additional income to purchase more food energy or nutrients. In the case of the very poor, most research shows that the income elasticity of demand for dietary energy is indeed positive, and in fact is greater than that for the not-so-poor or the rich.<sup>11</sup> In other words, while the poor use additional income to purchase more food energy, the rich do so to a much lesser extent, if at all.

Not all of the additional income used by the poor to purchase additional food is oriented to increasing energy intake, however. Even poor consumers will use some of their additional income to shift to more expensive staple foods, for example from cassava to rice or from rice that is less thoroughly milled to rice that is whiter and more polished. Some of these shifts may do nothing to increase energy intake or improve nutrition, but reflect consumer preferences for attributes such as taste, smell and appearance.

As consumers become wealthier, they tend to increase their consumption of foods other than staple foods (see Figure 10 on page 18, which shows that the rich spend a much larger share of their food budgets than the poor on animal-source foods and fruits and vegetables). Again, some of these foods will enhance nutritional status, but others will not. People do place value on being better nourished, but they also want to eat better-tasting food. Moreover, they may be unaware of the health problems associated with consuming certain foods (leading to obesity) and of the importance of certain micronutrients such as iodine, iron, zinc or vitamin A (the lack of which causes “hidden hunger”).

Finally, consumers will also choose to spend some of their additional income on a wide range of non-food items, such as education, clothes, health or cellular phones. These choices can be influenced by information campaigns or

school curricula that promote the benefits of such key investments. As a result of investments in additional health measures such as sanitary toilets and more frequent trips to the doctor (especially by pregnant women) the impact of economic growth on nutrition will be strengthened. These spending patterns mean that the impacts of food price and income shocks (whether positive or negative) are not limited only to dietary energy intake or food consumption levels, but that adjustments take place in other areas as well.

How additional household income is spent is strongly influenced by the share of income that accrues to women (see Box 6 on page 37). Research has shown that when women have more control over household income, more money tends to be spent on items that improve nutrition and health.<sup>12</sup> During the past two decades, women's participation in the labour force has increased significantly, especially in developed regions such as Europe and North America, and to some extent in the urban areas of developing countries. Female labour force participation is likely to increase with further economic growth and, if accompanied by female empowerment and women's increasing control over household income, may provide further impetus to improving children's nutrition and health.

### ■ How do governments use their additional resources?

Besides increasing private incomes, economic growth also increases public resources. Governments can use these resources in numerous ways to initiate and support institutional reforms and programmes in favour of the poor and hungry, including measures to enable more equitable access to productive resources, investment in rural infrastructure and measures to ensure the sustainability of agro-ecosystems – which are the main source of livelihoods for the poor. A large share of public revenues from economic growth should be used to finance education, skills development and a wide variety of public health measures. Possible examples include improved access to safe drinking water; an increased density of health clinics, especially in rural areas; targeted distribution of vitamin supplements; and information dissemination campaigns promoting improved child care practices such as breastfeeding, complementary feeding and increased birth spacing.

Empirically, higher levels of income are associated with higher levels of such inputs into food security and nutrition,<sup>13</sup> although some countries have done a better job than others at providing such public goods. While it is true that a reorientation of government budgetary expenditures would be helpful for reducing undernourishment even in the absence of economic growth, there is little doubt that economic growth provides more scope to increase sensible social spending. Thus, growth with redistribution is more likely to be effective in reducing undernourishment than either growth or redistribution on their own.

### ■ What is the role of good governance?

#### Key message

**To accelerate hunger reduction, economic growth needs to be accompanied by purposeful and decisive public action.** Public policies and programmes must create a conducive environment for pro-poor long-term economic growth. Key elements of enabling environments include provision of public goods and services for the development of the productive sectors, equitable access to resources by the poor, empowerment of women, and design and implementation of social protection systems. An improved governance system, based on transparency, participation, accountability, rule of law and human rights, is essential for the effectiveness of such policies and programmes.

As is evident from the first section of this report, a number of countries did not succeed in reducing hunger and malnutrition in line with earlier commitments and stated goals. They either had slow growth or the linkages between growth and reductions in hunger and malnutrition were not strong. One reason for this could be weak government structures and lack of political will to put hunger reduction higher on the list of political priorities. As stated in the second draft of the *Global Strategic Framework for Food Security and Nutrition*, the causes of hunger and malnutrition include: “lack of good governance to ensure transparency, accountability and rule of law, which underpin access to food and higher living standards; lack of high-level political commitment and prioritization of the fight against hunger and malnutrition, including failure to fully implement past pledges and commitments and lack of accountability; lack of coherence in policymaking within countries, but also globally and regionally; lack of prioritization of policies, plans, programmes and funding to tackle hunger, malnutrition and food insecurity, focusing in particular on the most vulnerable and food insecure populations; war, conflict, lack of security, political instability and weak institutions; and weak international governance of food security and nutrition.”<sup>14</sup>

In order to ensure that economic growth does indeed contribute to food security and improved nutrition on a sustainable basis, good governance is essential. This extends to providing essential public goods, including political stability, rule of law, respect for human rights, control of corruption and government effectiveness. Effective institutions are a key feature of good governance. Realization of the right to food can add value to an effective food-security strategy by ensuring transparent policy processes, accountability of public institutions and



clarification of government obligations and of the rights and obligations of rights-holders.

If the poor are to benefit from economic growth, it is vital that they have a say in the decisions that affect them. Experience shows that involvement of all stakeholders – including

vulnerable women, youth, indigenous people and other marginalized population groups – in the formulation, planning, implementation, monitoring and evaluation of development activities results in more equitable access to resources and greater benefits for the poor from economic growth.



## Nutrition outcomes – global progress, but many problems remain

There are various indications that the observed increase in per capita food energy availability and in dietary diversity in many countries has contributed to an overall improvement of nutrition globally.<sup>15</sup> A recent assessment found that adherence to the dietary recommendations established by WHO has improved worldwide over the past two decades, although with significant discrepancies across regions.<sup>16</sup>

Children's nutrition has also improved. The percentage of underweight children (low weight for age) declined from 25 percent in 1990 to 16 percent in 2010, and stunting (low height for age) in children under the age of five has decreased globally from 39 to 26 percent over the same period. Progress in the prevalence of child underweight has been rather slow in Africa and most rapid in Asia, particularly China and South-Eastern Asia, where stunting declined from 49 to 28 percent between 1990 and 2010 (see Box 1 for the example of Bangladesh).<sup>17</sup> The highest rates of child underweight and infant and child mortality are in sub-Saharan Africa, but in recent years there have been substantial declines of child mortality in many individual countries in this region.<sup>18</sup>

Some progress has also been made over the past two decades with regard to the reduction of micronutrient deficiency, or "hidden hunger". Progress in eliminating Vitamin A deficiency was remarkable in Eastern Asia and much of Central and South America, although it has lagged behind in sub-Saharan Africa and in Central and Southern Asia. With the effective expansion of salt iodization programmes, the prevalence of iodine deficiency seems to have declined significantly around the world.

Although more rapid economic growth accounts for some of the improved outcomes in Asia, there are substantial differences in child undernutrition levels across countries that cannot all be explained by differences in economic growth. One factor is whether or not growth is accompanied by poverty reduction. Other factors include prioritization within agricultural strategies between staple grains, fruit, vegetables, livestock and fisheries, access to clean water, health and sanitation and cultural traditions. Even when the

poor participate in income growth, they need assistance through effective policies and institutions, particularly relating to health services and nutrition education, to ensure that child nutrition improves. For example, one study found that the absence of such favourable conditions may explain why the notable economic growth in India has not led to a uniform reduction in childhood undernutrition in the various states of the country.<sup>19</sup>

Despite the improvements in nutrition outcomes in many countries, underweight (low weight-for-age) remains the single largest risk factor contributing to the global burden of disease in the developing world. In 2010, more than 100 million children under the age of five in developing countries were still underweight. Children in the poorest households are twice as likely to be underweight as those in the least-poor households. Childhood malnutrition is an underlying cause of death in an estimated 35 percent of all deaths among children under the age of five.<sup>20</sup>

Micronutrient deficiencies ("hidden hunger") still affect over 30 percent of the world's population, causing increased morbidity and mortality, impaired cognitive development and reduced learning ability and productivity, reduced work capacity in populations due to high rates of illness and disability, and tragic loss of human potential. Overcoming micronutrient malnutrition is a precondition for ensuring development. In the case of iron deficiency anaemia, prevalence has not changed substantially; it has even increased in some countries.<sup>21</sup> In India, stunting and iron and iodine deficiencies result in productivity losses equivalent to 2.95 percent of GDP annually.<sup>22</sup> In Sierra Leone, iron deficiency among women working in agriculture will cost US\$94.5 million over five years.<sup>23</sup>

More rapid economic growth can generate opportunities for more effective action to prevent and control micronutrient deficiencies. Agricultural development strategies that promote high-value activities, both nutritionally and in terms of income, such as production of livestock, fruits and vegetables, result in more diversified diets. Additionally, supplementation, targeted towards the most vulnerable, particularly in the first

BOX 1

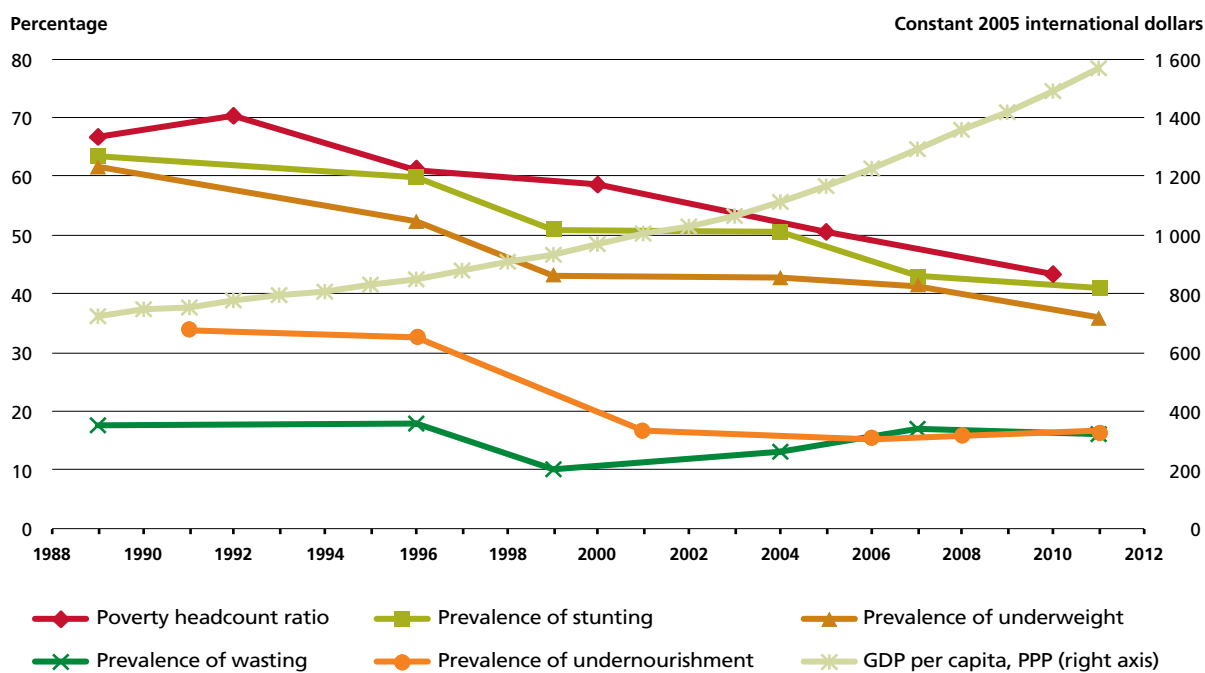
**Economic growth and nutrition in Bangladesh**

Bangladesh has experienced rapid economic growth during the past two decades, and also performed relatively well in terms of nutrition improvements, particularly in the 1990s. Per capita GDP doubled between 1990 and 2010 (see Figure), and agricultural growth averaged 3.3 percent per year (driven by impressive gains in rice yields). Poverty rates declined substantially during that time, indicating that economic growth had reached the poor. Significant declines in the prevalence of stunting (height for age, an indicator of chronic malnutrition) and underweight (weight for age) in children under the age of five were achieved in the 1990s, although progress stalled between 1999 and 2004. Thus, stunting declined by 12 percentage points from 63 percent in 1990 to 51 percent by 1999, with underweight registering an even larger fall from 62 to 43 percent, but between 1999 and 2004 no progress was recorded. Progress has since resumed, although in some cases at a slower rate: between 2004 and 2011, the underweight rate fell by 7 percentage points, with most of

the decline concentrated between 2007 and 2011, and stunting fell by 10 percentage points, of which 8 points were achieved between 2004 and 2007. Current estimates indicate that Bangladesh has already achieved a 50 percent reduction in undernourishment and is likely to achieve the same reduction for underweight, thus meeting the hunger target of the first MDG.

Nutritional successes are stronger when economic growth that reaches the poor is coupled with more specific educational and nutritional interventions. As incomes rise, the consumption of more nutritious foods appears to be increasing – the dietary energy supply available from eggs and fruits and vegetables has more than doubled since 1990. The share of government spending going to health is about double that of the country's large neighbours, India and Pakistan. Literacy rates for young females (aged 15–24 years) have doubled, rising from 38 percent in 1991 to 77 percent in 2009. The coverage of vitamin A supplementation for children aged

Indicators of income, poverty and malnutrition in Bangladesh, 1990–2011



Note: Data on prevalence of stunting, underweight and wasting refer to children under five years of age. Source of raw data: FAO and World Bank.

(Cont.)

**BOX 1 (Cont.)**

6–59 months (which started in the 1990s) is now nearly universal, and consumption of iodized salt has also increased substantially in recent years. The use of oral rehydration salts to treat diarrhoea has nearly doubled, from 35 percent in 2000 to 68 percent in 2007. Immunization rates for measles accelerated sharply from 65 to 94 percent in 2002 and 2005, respectively, with coverage largely maintained to the present. More recently, there has also been a substantial increase in exclusive breastfeeding during the first six months of life, from 43 percent in 2007 to 64 percent in 2011. These factors may have contributed to the reduction in stunting, given the vulnerability of children in the first 1 000 days following conception.

Much more remains to be done, however. Malnutrition in Bangladesh costs an estimated US\$1 billion a year in lost economic productivity.<sup>1</sup> The prevalence of wasting, an

indicator of acute malnutrition, declined from 1990 to 2000, but then increased steadily until 2007 when it reached 17 percent, exceeding the 15 percent emergency threshold. This spike is a concern given that there were no major disasters during that period in Bangladesh. (In 2008 following cyclone Sidr and the food price crisis, some studies indicated that wasting rose to 25 percent). The latest figure in 2011, at 16 percent, still exceeds the emergency threshold, and continues to give cause for concern. Additionally, levels of stunting (41 percent) and underweight (36 percent) remain very high and constitute significant public health issues.

<sup>1</sup> Embassy of the United States of America, Dhaka. 2012. *U.S.-Funded study shows true cost of malnutrition in Bangladesh*. Press release, June 2012 (available at [http://photos.state.gov/libraries/bangladesh/8601/2012%20Press%20Releases/USAID%20malnutrition%20study\\_%20Jun%2025\\_%202012.pdf](http://photos.state.gov/libraries/bangladesh/8601/2012%20Press%20Releases/USAID%20malnutrition%20study_%20Jun%2025_%202012.pdf)).

1 000 days from conception to two years of age, and national fortification of key commodities have proven to be highly cost-effective strategies.<sup>24</sup>

### ■ The nutrition transition and the double burden of malnutrition

As incomes and urbanization increase, people gradually adopt a lifestyle with reduced physical activity, less time for household work, and more meals away from home. Diets increasingly contain more energy-dense, semi-processed foods, and become higher in saturated fats, sugars and cholesterol. This shift is referred to as the nutrition transition.<sup>25</sup> While initially associated with richer urban populations, experts agree that the nutrition transition is rapidly affecting all societies.<sup>26</sup>

The nutrition transition is associated with an increase in overnutrition and obesity. It also appears to bear a causal relationship to the disease burden and mortality transition referred to as the “epidemiological transition”.<sup>27</sup> This is the shift in disease profile from one dominated by mortality largely attributable to infectious and communicable diseases to one characterized by an increase in non-communicable diseases, such as cardiovascular diseases and diabetes. According to the WHO, overweight (body mass index [BMI]  $\geq 25$ ) and obesity (BMI  $\geq 30$ ) are the fifth-leading risk factor for global deaths.<sup>28</sup>

Globally, the number of overweight people has reached more than 1.4 billion adults,<sup>29</sup> surpassing the number of undernourished worldwide. The costs of being overweight (as opposed to being obese), however, are arguably less than the costs of being undernourished. Worldwide, obesity has more than doubled since 1980, although the prevalence of

adult obesity is currently much higher in developed countries than in developing countries (Figure 15). The highest rates are observed in North Africa and the Near East, North America, the Pacific Islands and South Africa.

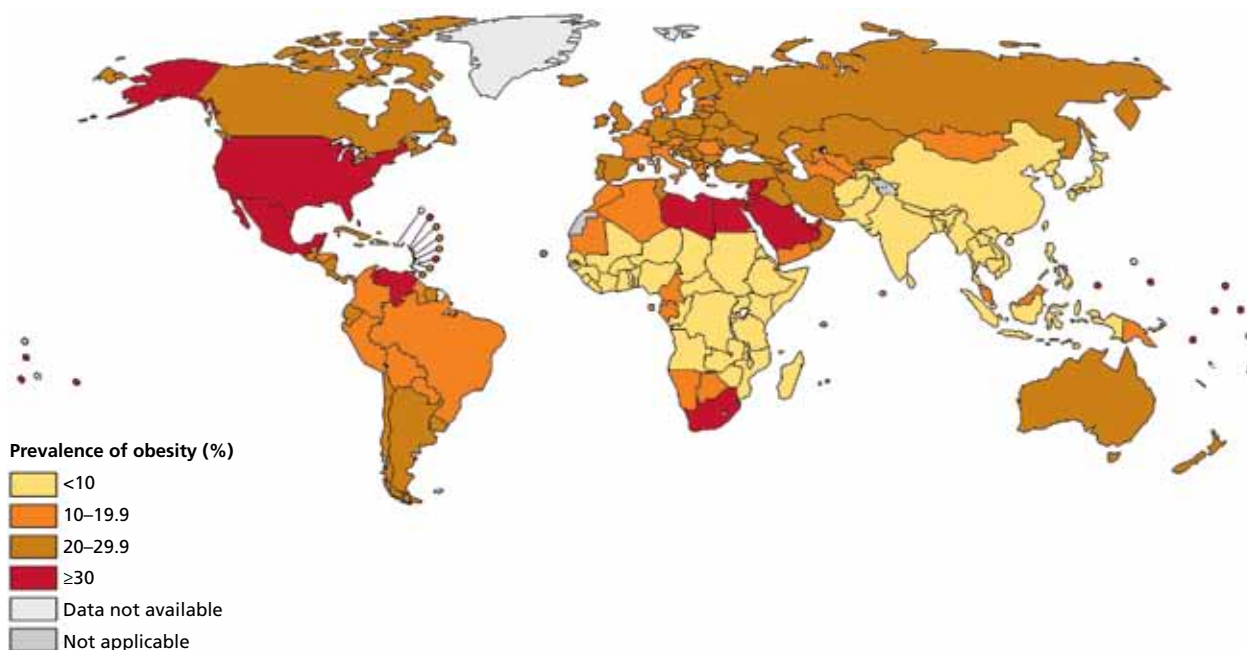
The world is increasingly faced with a *double burden of malnutrition*, whereby undernutrition, especially among children, co-exists with overweight and diet-related chronic diseases and micronutrient malnutrition.<sup>30</sup> Figure 16 shows selected low and middle-income countries in different regions that have a significant prevalence of both undernutrition and overnutrition in their populations, measured respectively as adult obesity and stunting of children under the age of five.<sup>31</sup>

These two dimensions of the double burden have long been perceived as being caused by distinct factors: poverty on the one hand and affluence on the other. However, such a categorization is too simplistic. Today, high prevalence rates of overweight are also found in low-income countries or even within the same household as undernutrition. The reason for this co-existence is that being overweight is not necessarily a matter of eating too much food, but eating food that is not nutritious, and poor consumers may have less education and access to information about nutrition. Another part of the explanation may be the rapidly growing supply of previously unavailable products (e.g. some processed foods, soft drinks and snacks) in the modern retail chains of many developing countries. In many cases, such products replace traditional foods, including street foods in urban areas.

Today, it is increasingly evident that the double burden of malnutrition often manifests itself as a life-cycle problem in low-income families. Poor women suffering from undernutrition during pregnancy give birth to undernourished babies. If inadequate nutrition during prenatal development

FIGURE 15

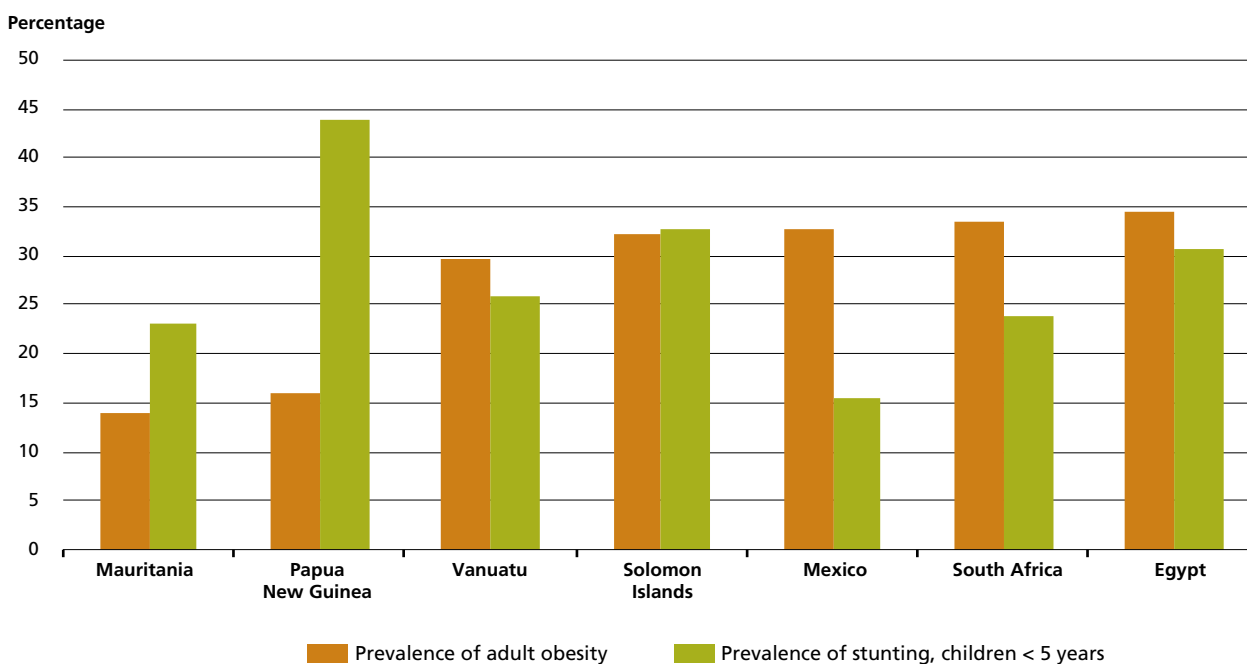
Prevalence of obesity in 2008



Notes: Data refer to adults of both sexes aged 20+, age standardized, in 2008. Obesity is defined as BMI  $\geq 30\text{kg/m}^2$ . Source: World Health Organization.

FIGURE 16

The double burden of malnutrition: adult obesity and child stunting in selected countries



Source of raw data: World Health Organization.

and infancy is followed later in life by an excessively increased intake of dietary energy, this could result in an increased propensity to be overweight or obese. Undernutrition (as measured by stunting) during childhood can lead to the risk of greater susceptibility to obesity and diet-related non-communicable diseases later in life as adults. This explains why, in many developing countries, undernutrition, overnutrition and micronutrient deficiencies are often all rooted in poverty. A double burden, for example in terms of stunted children and overweight mothers, is thus closely associated with economic development and is increasingly being observed even within the same low-income households.<sup>32</sup>

### ■ Conclusion: improving nutrition as rapidly as possible

Dietary changes observed over the past two decades have had both positive and negative impacts on nutrition. On the positive side, the quality of diets at the aggregate global level has improved, and nutritional outcomes have improved in most parts of the world. Mortality rates and the proportion of underweight children under the age of five have declined. There has also been progress in reducing the prevalence of some micronutrient deficiencies, although with large variations across regions.

On the negative side, however, the global number of children who are underweight and/or stunted remains unacceptably high. Moreover, the global number of overweight (but not obese) people has surpassed the

number of undernourished and the number of people suffering from micronutrient deficiencies remains high in many countries.

There is a wide and growing consensus that strong economic growth can lead to significant improvements in nutrition. To achieve this as rapidly as possible, the process of growth must benefit the poor, but it must also be “nutrition-sensitive”.<sup>33</sup> To date, the linkage between economic growth and nutrition has been weak, with long lags before real changes in nutritional status occur. Policies in support of such objectives should be pursued within an integrated agriculture–nutrition–health framework. Improving food security and nutrition is about more than just increasing the quantity of energy intake – it is also about improving the quality of the food in terms of dietary diversity, variety, nutrient content and safety. Measures to achieve greater dietary diversity and adequate intake of micronutrients may include the judicious use of targeted supplementation for the poorest until the cost of a diversified diet becomes affordable. Overnutrition should be addressed through changes in lifestyle and healthier diets.

While economic growth is important for progress in improving people’s nutrition, the links run in the other direction as also – nutritious diets are vital for achieving people’s full physical and cognitive potential and health, thus contributing to economic growth. Improved childhood nutrition and access to education can improve cognitive development and thereby raise levels of income when those children become adults – with benefits at the individual level as well as for society as a whole.<sup>34</sup>



# Contribution of agricultural growth to reduction of poverty, hunger and malnutrition

## The role of agricultural growth in economic growth, and poverty and hunger reduction

### Key message

**Agricultural growth is particularly effective in reducing hunger and malnutrition.** Most of the extreme poor depend on agriculture and related activities for a significant part of their livelihoods. Agricultural growth involving smallholders, especially women, will be most effective in reducing extreme poverty and hunger when it increases returns to labour and generates employment for the poor.

The importance of agriculture in national economies varies widely, but relatively predictably – the relative importance of agriculture declines as GDP per capita increases and the economy undergoes a structural transformation. In some of the world's poorest countries, agriculture accounts for more than 30 percent of economic activity, and in the least-developed countries as a group, it accounts for 27 percent of GDP (2009 figures). By contrast, in OECD economies, agriculture accounts for less than 1.5 percent of overall economic output. Thus, the role of agriculture in driving overall economic growth will vary from country to country, and it is generally more important in poorer countries.

Growth in agriculture over the past few decades has largely been driven by growth in labour productivity and, perhaps surprisingly, labour productivity in agriculture has on average been growing faster than labour productivity outside agriculture since the 1960s.<sup>35</sup> This rapid growth in labour productivity has been driven by labour movements out of agriculture, in response to both “industrial pull” and “agricultural push” dynamics. In addition, annual growth of total factor productivity (TFP) in agriculture has been up to 1.5 percentage points higher than in non-agriculture, countering the notion of agriculture as a backward sector where investments and policies are automatically less effective in generating growth than other sectors.

Overall, the role of agricultural growth in reducing poverty is likely to be greater than its role in driving economic growth. This is likely to be the case because the share of the labour force that works in the agriculture sector is much larger than the share of economic output that comes from agriculture. For the least-developed countries, the share of the total economically active population in agriculture was 66 percent in 2009, more than double the share of agriculture in GDP. The implication is that the people who work in agriculture tend to have lower incomes, which is consistent with the fact that poverty is concentrated in rural areas. Because so many of the poor work in agriculture, agricultural growth is more likely to involve and benefit the poor than is non-agricultural growth.

A recent detailed analysis of data on cross-country growth experience has shown that, provided income inequality is not excessive, agricultural growth reduces poverty among the poorest of the poor.<sup>36</sup> In resource-poor low-income countries (excluding sub-Saharan Africa), a given rate of GDP growth due to agricultural growth reduces poverty five times more than does an identical dose of GDP growth due to non-agricultural growth. In sub-Saharan Africa, agricultural growth is 11 times more effective. Thus, raising agricultural production and productivity remains crucial for reducing poverty in a cost-effective manner, especially in low-income countries.

The ability of agriculture to generate overall GDP growth and its comparative advantage in reducing poverty will vary from country to country. In this regard, a typology introduced in the World Development Report 2008 (see Table 1) stresses that in agriculture-based economies (most of them in sub-Saharan Africa), agriculture contributes significantly to economic growth, and, because the poor are concentrated in rural areas, it will also contribute significantly to poverty reduction.<sup>37</sup> The key policy agenda in these countries is to enable agriculture to work as an engine of growth and poverty reduction. In transforming economies (mainly in

Asia, North Africa and the Near East) agriculture contributes less to economic growth, but since poverty remains overwhelmingly rural, agricultural growth, as well as growth in the rural non-farm economy, has strong poverty reduction effects. In urbanized economies (mainly in Eastern Europe and Latin America), where poverty is primarily urban, a more

TABLE 1

**Role of agriculture in economic growth and poverty reduction, by type of economy**

	Agriculture-based economies	Transforming economies	Urbanized economies
Total population (millions)	615	3 510	965
Total poor population (millions)			
US\$1.08/day	170	583	32
US\$2.15/day	278	1 530	91
Agricultural labour force as share of total (%)	65	57	18
GDP growth (annual, 1993–2005, %)	3.7	6.3	2.6
Agricultural GDP as share of total (%)	29	13	6
Agricultural GDP growth (annual, 1993–2005, %)	4	2.9	2.2
Agriculture's contribution to GDP growth (1993–2005, %)	32	7	5

Source: Adapted from Tables 1.1 and 1.2 of World Bank. 2008. *World Development Report 2008: Agriculture for Development*. Washington, DC.

## BOX 2

**Promoting decent employment in agriculture and rural areas for achieving food security**

According to the ILO's definition, "decent work sums up the aspirations of people in their working lives. It involves opportunities for work that is productive and delivers a fair income, security in the workplace and social protection for families, better prospects for personal development and social integration, freedom for people to express their concerns, organize and participate in the decisions that affect their lives and equality of opportunity and treatment for all women and men."<sup>1</sup>

Rural labour markets are highly informal, with a prevalence of casual work arrangements and information asymmetries, as well as gender and age-based inequalities. Rural working conditions are often poor, access to social protection is limited, and labour legislation is often not enforced; rural workers are the least organized and least protected by legislative frameworks.<sup>2</sup>

Policies and programmes should aim not only at more but also at better employment in the farm and non-farm

productive agriculture sector can help to cap food price increases and improve the purchasing power of the urban poor, who spend a large portion of their income on food.

In addition to the type of economy the agriculture sector is embedded in, the propensity for agriculture to contribute to poverty reduction is also a function of the structure of the sector, especially with regards to the distribution of land. For example, in a smallholder-based and labour-intensive agriculture sector, higher land and labour productivity lead to rapid reductions in poverty (e.g. Eastern and South-Eastern Asia). China cut poverty extremely rapidly during the 1980s to mid-1990s during a period of strong agricultural growth, as it started from a situation of relatively equal access to farmland and human capital.<sup>38</sup> As inequality increased over time, poverty reduction slowed. In parts of Latin America, however, because of an unequal distribution of land and the dominance of mechanized farming, the relationship between productivity and poverty reduction is much weaker: yields have grown rapidly but rural poverty has changed little.<sup>39</sup>

In order for agricultural growth to include the poor, it should utilize the assets typically owned by the poor. In all cases, the poor own their own labour, and in some cases this is all they own. Thus, growth that generates employment, increases wages and upgrades the quality of jobs (see Box 2), especially for unskilled labour, is of crucial importance for reducing poverty and increasing access to adequate food in terms of both quantity and quality. Poor access to food can cause low labour productivity, which in turn hampers economic growth, especially in agrarian-based contexts.<sup>40</sup>

sector.<sup>3</sup> For instance, integrated production and pest management (IPPM) helps reduce the overall use of pesticides and selection of less hazardous products when pesticide use is necessary. Equipped with knowledge of IPPM techniques, agricultural workers can better negotiate clauses requiring the use of IPPM in collective bargaining agreements with employers.<sup>4</sup> Likewise, providing support to formal trade unions (e.g. the General Agricultural Workers Union of Ghana) to facilitate the inclusion of self-employed farmers and agricultural workers, including seasonal workers, can give such workers a stronger voice in social dialogue and bargaining processes. As a final example of improving the condition of employment in the agriculture sector, the Ministry of Agriculture in Thailand is designing a scheme to provide rice farmers with pensions and disability compensation.

Sources: Please see notes on page 61.

Employment-enhancing growth is widely recognized as a necessary condition for achieving sustainable economic development. Countries that have been successful in reducing poverty in relatively short periods of time went through employment-centred structural transformations, in which industrial and agricultural policies as well as active social policies were used in synergy.<sup>41</sup> Employment-enhancing policies include tackling constraints to entrepreneurship development, improving literacy and education, as well as skills development to increase the employability of the workforce, especially the youth.

In countries with a relatively equal distribution of land, many of the poor also have access to some land, which

allows them to benefit from growth that increases its value (e.g. through higher yields). Thus, for example, yield growth and poverty reduction have gone hand in hand in China, where the distribution of land is relatively equal.<sup>42</sup> By contrast, in India, land distribution is more unequal, and yield growth has not sparked as much reduction in poverty and undernourishment. In situations where a large share of production growth occurs on large farms, the poor can still participate in growth if crop production is labour-intensive and serves to increase rural wages – however, the benefits to the poor will still be less than if the poor owned the land. If the growth occurs on large mechanized farms, there will be little scope for participation of the poor.



## Smallholders' contribution to increasing agricultural production and productivity<sup>43</sup>

The global demand for food is expected to increase by 60 percent by 2050. Given climate change, natural resource constraints and competing demands, especially for the production of biofuels, among other factors, this presents a considerable challenge for the agriculture and food systems worldwide. Smallholders will need to play a key role in meeting these requirements, if for no reason other than the sheer magnitude of their production in developing countries.

Historically, smallholders have proved to be key players in meeting food demand. In Asia during the Green Revolution, smallholder farmers adopted new technical innovations, increased productivity, and produced enough food to lower the real prices of staple foods for consumers. The demand for labour in rural areas increased, generating jobs for the rural poor and increasing wages for unskilled workers. This combination of factors helped to improve food security for all. Many of the development success stories of the past 20–40 years were based on smallholder production (e.g. China, Indonesia, and Viet Nam; see Box 3). During this time, smallholders were also typically more efficient than large-scale farmers.<sup>44</sup> Looking ahead, smallholder production is likely to be more efficient for labour-intensive products such as vegetables.

Despite these past successes, smallholders will need to overcome considerable constraints if they are to compete in many modern markets. Within developing countries, changes in the agricultural and food-marketing, processing and retail sectors have resulted in increased private-sector investments, both domestic and foreign, in agro-food industries.

Sales through more sophisticated channels, such as supermarkets, require greater managerial and logistics skills from farmers and an ability to provide continuity of supply and to meet demanding food safety and quality requirements. Agricultural research and extension are becoming increasingly private and globalized, focusing on technologies that are knowledge-intensive and require management skills and effective learning. This could limit small farms' access to innovative inputs. Smaller farms face difficulties in accessing credit, as financial institutions are often reluctant to lend due to poor collateral and lack of information on the creditworthiness of the potential borrower. Small women farmers face even greater disadvantages than their male counterparts as they typically have even less access to financial and social capital, market information and productive resources such as land.

Smallholders are capable of meeting these challenges, but they need an appropriate "enabling environment" in order to do so. Provision of better rural infrastructure, such as roads, physical markets, storage facilities and communication services, will reduce transaction costs and enable farmers to reach markets. Interventions to ensure land tenure and property rights security will encourage smallholders to invest in land improvements. Provision of education in rural areas is essential if smallholders are to participate in markets, as small farmers cannot trade in sophisticated chains if they are neither literate nor numerate and/or lack the ability to organize supplies and the confidence to partner with buyers. It is also imperative that policies redress gender and other inequalities regarding access to assets and resources in order to bring long-term benefits to women and their families.



## BOX 3

**Agricultural growth in Viet Nam**

Viet Nam has experienced rapid economic growth overall (5.8 percent per capita per year from 1990 to 2010), and rapid growth in agriculture also. Between 1990 and 2010, agricultural growth averaged 4.0 percent per year, one of the best performances in the world during that period. Total factor productivity growth in agriculture was also quite rapid at 3.1 percent per year from 1991 to 2000 and 2.4 percent per year from 2001 to 2009.<sup>1</sup>

Most of the production growth derived from increased yields. Yields of rice, the most important crop, increased by 50 percent, but yields of maize, rubber, cashews and cassava all more than doubled. However, area harvested also increased: areas under maize and rubber cultivation more than doubled, that for cashews more than tripled, and the area under coffee cultivation increased by a factor of eight (from about 60 000 hectares in 1990 to more than half a million by 2008). Aquaculture production has also grown extremely rapidly, by about 12 percent per year since 1990.

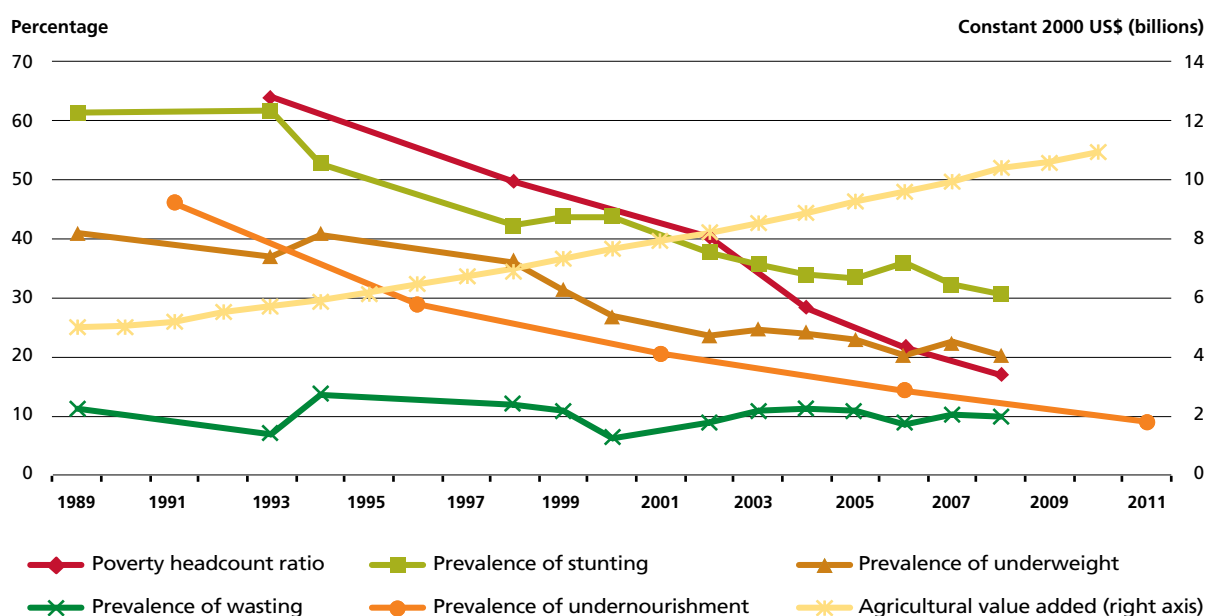
Because land distribution in Viet Nam is relatively equal compared with most countries, the growth in yields has benefited many small landowners. The growth in area harvested has also increased demand for labour, one of the

key assets of the poor. This growth pattern has contributed to rapid reductions in poverty, undernourishment, stunting and underweight (the latter two referring to children under the age of five). Indeed, Viet Nam has already achieved several of the Millennium Development Goals.

Market-oriented agricultural households benefited the most during the mid-1990s, with the poverty rate for these households falling by more than 40 percent in just five years. But subsistence-oriented agricultural households also benefited – their poverty rate fell by 28 percent over five years. For households that were initially subsistence-oriented but strongly increased their participation in markets during the 1990s, the poverty decline was 35 percent. All these household types experienced an increase in non-agricultural income, thus underlining the importance of a dynamic non-farm economy.<sup>2</sup>

<sup>1</sup> K. Fuglie. 2012. Productivity growth and technology capital in the global agricultural economy. Chapter 16 in K.O. Fuglie, E. Ball and S.L. Wang, eds. *Productivity growth in agriculture: an international perspective*. Wallingford, UK, CABI.

<sup>2</sup> A. de Janvry and E. Sadoulet. 2010. Agricultural growth and poverty reduction: additional evidence. *The World Bank Research Observer*, 25(1): 1–20

**Indicators of agricultural GDP, poverty and malnutrition in Viet Nam, 1989–2011**


Note: Data on prevalence of stunting, underweight and wasting refer to children under five years of age.  
Source of raw data: FAO and World Bank.

BOX 4

**Agricultural growth in the United Republic of Tanzania**

The United Republic of Tanzania's agriculture sector grew at an annual average rate of 3.8 percent per year between 1990 and 2010, placing it among the top 15 performers worldwide during that period. The prevalence of undernourishment, however, first increased and then stagnated during the past 20 years, and progress in reducing stunting and poverty has been very slow. Thus, rapid agricultural growth in and of itself is not sufficient to improve nutrition.

Production growth in agriculture during the past 20 years was accounted for primarily by increased area harvested, with relatively little deriving from higher yields. Four-fifths of the increased area harvested has come from eight crops: maize, dry beans, groundnuts, rice, bananas, coconuts, sorghum and cassava. But yields for maize, coconuts, sorghum and cassava have declined during the past two decades and those for rice have increased only slightly. The declining yields possibly reflect expansion into marginal lands with lower soil fertility and yield potential. Reflecting the reliance on land expansion, growth of total factor productivity in agriculture, while positive, was not especially noteworthy during this time – it averaged 0.4 percent per year from 1991 to 2000, and 1.0 percent per year from 2001 to 2009.<sup>1</sup>

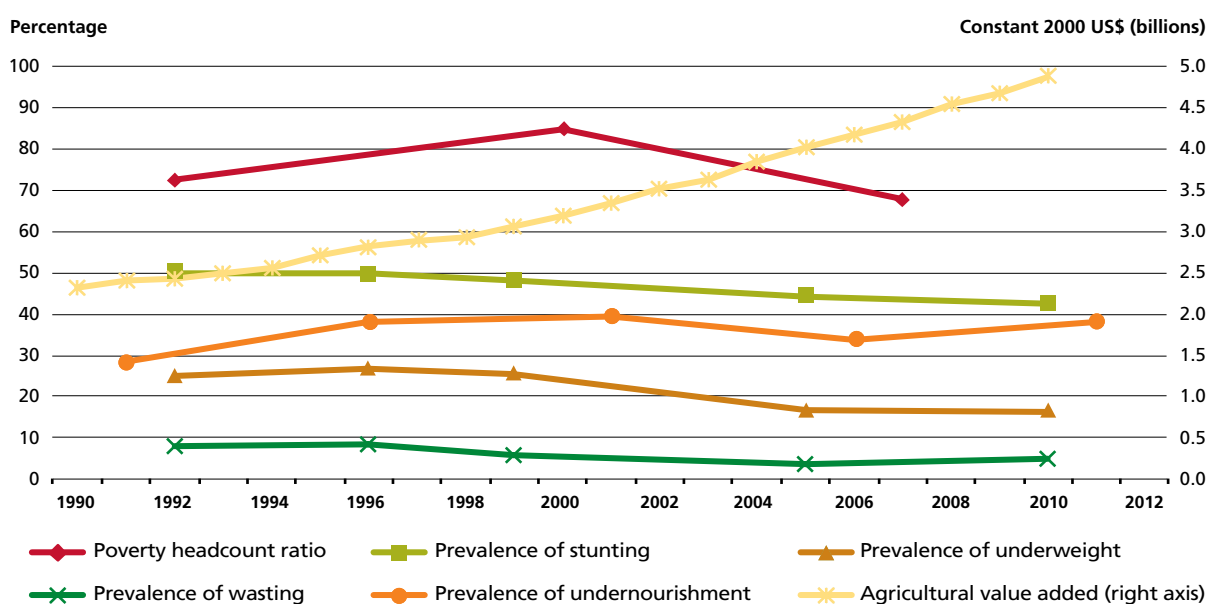
A growth pattern based on land expansion raises questions of sustainability. In addition, the extent to which the benefits are captured by the poor depends on the extent to which the additional land brought under cultivation is fertile and is owned by the poor.

There has been some rapid export growth of cotton and tobacco in recent years, both of which are crops grown by smallholders. But these are non-food crops, and their production is concentrated in relatively small parts of the country. A growth strategy focusing on maize, root crops, pulses and oilseeds would be more effective in reducing poverty and undernourishment, because these crops are more widely grown by poor farmers and account for a larger share of poor people's budgets.<sup>2</sup> Increased spending on agricultural research and extension focused on these crops will be needed if such a growth strategy is to be pursued.

<sup>1</sup> K. Fuglie. 2012. Productivity growth and technology capital in the global agricultural economy. Chapter 16 in K.O. Fuglie, E. Ball and S.L. Wang, eds. *Productivity growth in agriculture: an international perspective*. Wallingford, UK, CABI.

<sup>2</sup> K. Pauw and J. Thurlow. 2011. *The role of agricultural growth in reducing poverty and hunger: the case of Tanzania*. IFPRI 2020 Conference Brief No. 21. Washington, DC, IFPRI.

Indicators of agricultural GDP, poverty and malnutrition in the United Republic of Tanzania, 1990–2011



Note: Data on prevalence of stunting, underweight and wasting refer to children under five years of age. Source of raw data: FAO and World Bank.

Governments can provide further significant support to smallholder development by, for example, ensuring high-quality agricultural research is clearly targeted towards smallholder and consumer needs, where possible in partnership with the private sector. Government extension services will need to focus more on production, but also on marketing and food safety.

A greater focus on integrating smallholders into markets will provide several benefits. Not only will it help meet future food demand; it will also contribute to improving food security and nutrition in rural and urban areas. In addition, it will open up increased opportunities for linkages with the rural non-farm economy, as smallholders are likely to use most of their additional income to purchase locally produced goods and services.



## Hunger, agriculture and sustainable development

If the world is to succeed in overcoming hunger and malnutrition and meeting the demand of today's and future generations, fundamental changes in the agricultural and food systems are needed. At the recent Rio+20 Summit, world leaders reconfirmed that "poverty eradication, changing unsustainable and promoting sustainable patterns of consumption and production and protecting and managing the natural resource base of economic and social development are the overarching objectives of and essential requirements for sustainable development."<sup>45</sup> Success in achieving these objectives is literally vital for food security and adequate nutrition for all.

This is particularly relevant for the way countries seek to enable their agricultural and food systems to meet the needs of today's and future generations. Sustainable development and the Rio vision cannot be achieved unless hunger and malnutrition are eradicated. It is essential that national governments and all stakeholders promote the gradual realization of the right to adequate food, establish and protect rights to resources, especially for the most vulnerable; incorporate incentives for sustainable consumption and production into food systems; promote fair and well-functioning agricultural and food markets; reduce risk and increase the resilience of the most vulnerable; and invest public resources in essential public goods, including innovation and infrastructure.

On the consumption side, there is a need to contribute to sustainable use of resources by reducing over-consumption, shifting to nutritious diets with a lower environmental footprint and reducing food losses and waste throughout the food chain. Regarding food and agricultural production, there is great potential for

sustainable intensification. Adequate and stable agricultural productivity growth depends critically on the health of agro-ecosystems and their capacity to provide services such as soil fertility, resistance to pests and diseases and overall resilience of the production system. Healthy ecosystems can also provide important benefits beyond the farm, reducing agricultural pollution that has high costs, and contributing to climate change mitigation, biodiversity conservation and watershed protection. Often, farmers, fishermen and forest dwellers lack the capacity and incentives to adopt the practices needed to achieve sustainable and healthy agro-ecosystems.

Thus governments, the private sector and non-governmental organizations are increasingly interested and engaged in building the needed technical, policy and financing frameworks to support more sustainable forms of production. There are a range of possible approaches to incorporating environmental values in agricultural policy-making to explicitly recognize and reduce the costs of agricultural pollution and increase the external environmental benefits the agriculture sector can provide. It is critical to evaluate such approaches in terms of their equity impacts as much as their efficiency, as they involve transfers of costs and benefits amongst groups in society. Some successes with approaches that combine poverty reduction and environmental sustainability have been achieved and these need to be built upon and expanded.

In view of this vision, the four Rome-based organizations – FAO, IFAD, WFP and Bioversity International – have identified ten key priorities and calls for action, which formed their contribution to the outcome document of the Rio+20 Summit (see Box 5).

BOX 5

**Contribution of Rome-based organizations (FAO, IFAD, WFP and Bioversity International) to the Rio+20 outcome document**

- Current development pathways have left 1.4 billion in extreme poverty, 925 million<sup>1</sup> hungry and many more malnourished and food insecure.
- Unsustainable models of development are degrading the natural environment, threatening the ecosystems and biodiversity on which livelihoods and food and nutrition security depend.
- Globally, risks are increasing – erratic weather patterns, natural disasters, price volatility and market risks are all increasing uncertainty for global food and nutrition security.
- An unsustainable agriculture and food system has contributed to these social and environmental failures but agriculture also offers many solutions for sustainable development and a green economy. There cannot be a green economy without sustainable agriculture.
- A profound change of our agriculture and food system is urgently needed to achieve global food security, improve people's lives and manage the environment more sustainably.
- Including and empowering hundreds of millions of smallholder households and landless farmers – many of them women – is critical to this reform.
- Sustainability requires a reform of the overall agriculture and food system, from production to consumption.
- Social protection and safety nets are essential to support resilient livelihoods, protect the most vulnerable and include them in sustainable development pathways.
- Better and more coherent global, national and local policies are needed for sustainable development and to support the reform of agriculture and food systems at scale.
- The Rome-based organizations will work together to advance the objectives and outcomes of Rio + 20 by supporting countries' efforts to build more sustainable agriculture and food systems.

<sup>1</sup> Note that FAO's latest estimate of global undernourishment is now 868 million.  
 Source: FAO, IFAD, WFP, Bioversity International. 2012. *Rome-based Organizations submission to Rio + 20 outcome document* (available at [http://www.fao.org/fileadmin/user\\_upload/sustainability/pdf/11\\_11\\_30\\_Rome-based\\_Organizations\\_Submission\\_to\\_Rio\\_20\\_Outcome\\_document.pdf](http://www.fao.org/fileadmin/user_upload/sustainability/pdf/11_11_30_Rome-based_Organizations_Submission_to_Rio_20_Outcome_document.pdf)).



## The importance of the rural non-farm economy and its links with agriculture<sup>46</sup>

In spite of its importance, agriculture will not be a way out of poverty for all rural people. On the one hand, some smallholder farmers – particularly those with adequate levels of assets and access to transforming agricultural markets – will be able to develop sustainable, commercialized production systems. These systems will allow them to move up and work their way out of poverty. Acquiring new land that enables them to expand their production and marketed surplus will, in many cases, be part of that process. On the other hand, many poor rural people have extremely limited, or no, access to land and markets; they will not be able to rely on farming alone to exit poverty. In addition, in countries where the supply of land is limited, not all farmers can expand their landholdings. Instead, some will need to seek opportunities in the rural non-farm economy, either through wage employment or self-employment, which can provide them with their main route out of poverty. For youth, many of whom aspire to move beyond agriculture, the rural non-farm economy will be of particular importance.

As an economy grows and GDP per capita increases, the non-farm economy also grows in importance within the rural economy as a whole. In agriculture-based economies, the share of rural income derived from non-agricultural sources may be only 20 to 30 per cent, but in urbanizing economies it can be as high as 60 or 70 per cent (see Figure 17). An analysis of RIGA (Rural Income Generating Activities) data show that a majority of households participate in rural non-farm income generating activities:<sup>47</sup> in Asia and Latin America, typically between 50 and 60 percent and in sub-Saharan Africa, between 25 and 50 percent. However, only 20–25 percent of rural households in Asia and Latin America, and 10–20 percent of households in sub-Saharan Africa derive more than three-quarters of their income from the non-farm economy. For a majority of households, then, participation in the non-farm economy is either part-time or seasonal, and it serves to manage risk and diversify income sources. Essentially, most rural households have one foot in farming and the other in the non-farm economy.

Agricultural development has long been recognized as playing an important role in fostering development in the rest of the economy through a series of linkages between it and other sectors.<sup>48</sup> Agriculture also generally plays a predominant role in influencing the size and structure of the rural non-farm economy, by supplying raw materials for agro-processing, providing a market for agricultural inputs and consumer goods and services, releasing labour into other sectors of the economy and supplying – and reducing the price of – food to the non-farm economy.

In regions where agriculture has grown robustly, the rural non-farm economy has also typically enjoyed rapid growth. The literature suggests that each dollar of additional value added in agriculture generates another 30–80 cents in second-round income gains elsewhere in the economy,<sup>49</sup> depending on factors such as population densities and surplus labour availability. The relationship between agriculture and other sectors evolves through different levels of development: at low levels of development it encourages growth elsewhere in the economy; as countries grow, there is a more mutually beneficial relationship; and eventually, agriculture is of little importance as a motor of economic growth.<sup>50</sup> Conversely, slow income growth in agriculture leads to weak consumer demand, limited agricultural input requirements, limited growth in agro-processing and stagnant wages. Under these circumstances, little dynamism can be expected in the non-farm economy, and poor rural households will be pushed towards survival strategies that will include low-return, non-farm activities and migration. All this suggests that, particularly

in agriculture-based countries, where there is growth in the agriculture sector there are likely to be opportunities to catalyse the growth of the non-farm economy and create a virtuous cycle of rural growth and employment generation.

In addition to agriculture, however, other factors may influence the shape and development of the rural non-farm economy. These include urbanization and improved transport and communication linkages between rural and urban areas.<sup>51</sup> Migration out of agriculture into the rural non-farm economy and secondary towns is strongly associated with rural poverty reduction. For example, Indian villages close to towns and cities have a better record of reducing poverty than others,<sup>52</sup> and this is common in other countries too. Improved transport and communication linkages between rural and urban areas offer new opportunities for rural households, particularly in transforming and urbanizing economies. In China and South-Eastern Asia, high population densities and low transport costs have led to labour-intensive manufacturing for export markets being subcontracted to rural industries.<sup>53</sup>

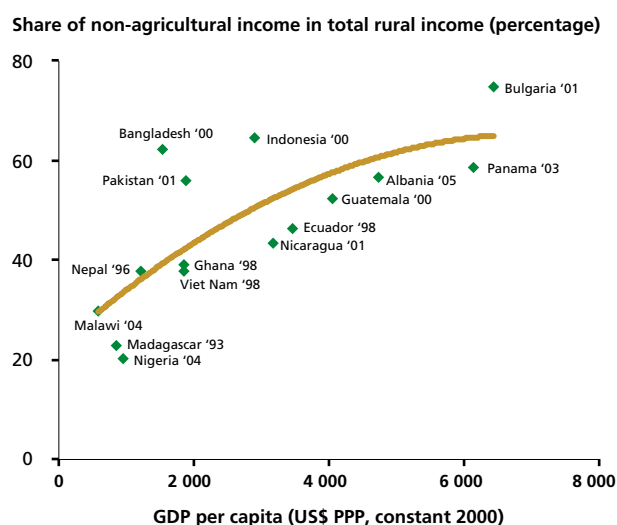
### ■ Conclusion: promoting poverty reduction through agricultural growth while preparing rural populations for structural transformation of the rural economy

Ultimately, the role of agriculture in reducing poverty and undernourishment will depend on the specific context. In many cases, especially in poorer ones, it can serve as an engine of economic growth. As was shown, governments, interacting with all stakeholders, can support and enhance this role in many ways. Strengthening the chances of smallholders to take part in the sustainable development of agriculture and rural areas is vital in this regard.

However, as GDP per capita increases, agriculture becomes less important both to the economy overall and to the poor, and non-agricultural growth becomes a more powerful engine of poverty alleviation for people who are poor but not very poor. Thus, growth in the non-agriculture sector is also crucial for food security. For example, it can provide a source of employment, particularly for youth, that facilitates employment transitions from the agriculture sector to higher-productivity jobs in industry and services, whether those higher-productivity jobs are in urban or rural areas. Governments of the countries concerned need to envisage this structural transformation and take early steps, especially through investments in infrastructure, education and training, to ensure that the rural poor are well prepared to participate in the transformation process and enabled to take advantage of emerging income-earning opportunities. Country-owned and inclusive agricultural development strategies, such as the Comprehensive Africa Agricultural Development Programme, should meet the challenge of designing, implementing and evaluating such a coherent policy framework, in order to achieve productivity growth and sustainability, while paying due attention to the role of smallholders and rural poor in the transformation process.

FIGURE 17

As economies grow, so does the importance of non-agricultural income in the rural economy as a whole



Source: A. Valdés, W. Foster, G. Anriquez, C. Azzarri, K. Covarrubias, B. Davis, S. DiGiuseppe, T. Essam, T. Hertz, A.P. de la O, E. Quiñones, K. Stamoulis, P. Winters and A. Zezza. 2008. A profile of the rural poor. Background paper for the IFAD Rural Poverty Report 2011. Rome, IFAD.



# Social protection for the poor and vulnerable

## A foundation for reducing hunger and malnutrition

### Key message

**Social protection is crucial for accelerating hunger reduction.** First, it can protect the most vulnerable, who do not benefit from economic growth. Second, social protection, properly structured, can contribute directly to more rapid economic growth through human resource development and strengthened ability of the poor, especially smallholders, to manage risks and adopt improved technologies with higher productivity.

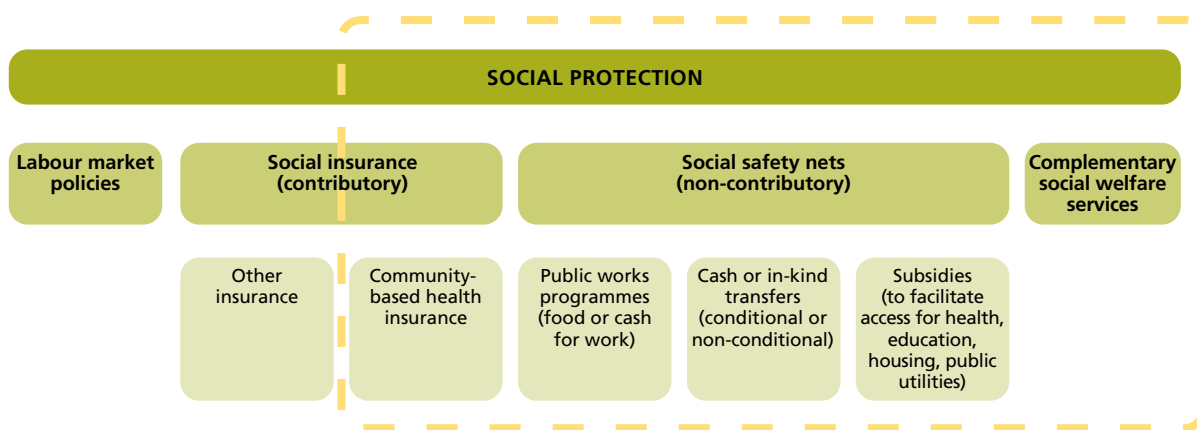
**E**quitable and strong economic growth based on growth of the agricultural and rural economy of low-income countries goes a long way in enhancing access to food and improving nutrition of the very poor. However, some of the changes made possible through economic growth take time to bear fruit and the neediest population groups often cannot take immediate advantage of the opportunities it generates. Therefore, reducing hunger requires specific attention to both short- and longer-term

interventions, often referred to as the “twin-track approach”.<sup>54</sup> Social protection instruments can establish a bridge between the two tracks,<sup>55</sup> because they play a crucial role in ensuring that economic growth contributes to reducing hunger and malnutrition as rapidly as possible. Social protection contributes in two distinct ways. First, it can help countries to reduce undernourishment more rapidly than would otherwise occur. Second, if properly structured, it can contribute directly to more rapid economic growth. It is helpful to conceptually distinguish these two contributions; however, any given policy or programme can make contributions in both of these areas simultaneously.

A wide range of policies and instruments fall within the remit of a social protection system (Figure 18). Safety nets, or social assistance/transfers normally targeted at the poor and not requiring a financial contribution from the beneficiaries, are only one component of social protection. In addition, social protection includes aspects of labour market policies and insurance options, such as contributory pensions and health insurance, as well as aspects of sectoral policies for education, health, nutrition, HIV/AIDS and agriculture.<sup>56</sup>

FIGURE 18

Royal Government of Cambodia’s National Social Protection Strategy



Note: The dashed rectangle in the diagram indicates those social protection measures that are targeted towards the poor.  
Source: Cambodian Council of Agricultural and Rural Development (CARD). 2011. *National Social Protection Strategy for the Poor and Vulnerable (2011–2015)*.



## Safety nets to improve food security and nutrition

Safety nets aimed at the poor and smallholder farmers have traditionally been non-contributory, requiring no financial contributions by the beneficiaries. There is a broad spectrum of such instruments, including transfers (conditional or non-conditional, cash or in-kind), subsidies and public works. However, an increasing number of governments are using contributory micro-insurance schemes in health and/or agriculture for the poor. The recent national social protection strategy developed by the Cambodian Government prioritizes provision of safety nets for the poor and vulnerable, but also includes community-based health insurance requiring financial contributions by the poor, as one part of social protection (Figure 18).

**Transfers** can be delivered directly as cash or in-kind, or increasingly as a hybrid of cash and in-kind transfers (see Box 6). Cash transfer programmes provide people with money, while vouchers include the provision of coupons to purchase a fixed quantity of food (commodity-based vouchers) or food for a fixed monetary value (value-based vouchers) and can be electronic or paper-based. Vouchers can also be used to target agricultural input support, such as vouchers for improved seeds, fertilizer, or access to services, more effectively.

Food and cash distributions can be conditional or unconditional. Conditional transfers are frequently based on beneficiaries complying with certain conditions, such as

### BOX 6

#### Designing transfers to promote women's social and economic empowerment

A substantial and growing body of evidence has shown that increasing resources in the hands of women (rather than men) has a positive impact on family welfare, in particular children's health (child survival and nutrition rates) and education.<sup>1</sup>

- Evidence from Sri Lanka shows that household food consumption is more diversified when women have more control of household income.<sup>2</sup>
- In Brazil, the Bolsa Familia programme increased the labour participation of women by 16 percent between beneficiary and non-beneficiary households.<sup>3</sup> Cash transfers that put money directly in the hands of women have also increased women's status within the household (Brazil's Bolsa Familia<sup>4</sup>) and promoted their self-esteem and economic empowerment (Mexico's Progresa/Oportunidades programme<sup>5</sup>).
- The Social Cash Transfer Scheme in Malawi also reduced women and children's risk-coping activities such as engaging in transactional sex<sup>6</sup> or in hazardous child labour.
- Programmes conditional on child school attendance have also been shown to increase girls' school attendance in Nicaragua<sup>7</sup> and an evaluation of India's Mid-Day Meals Programme found that girls in the programme were 30 percent more likely to complete primary school.<sup>8</sup>

The type of food transferred can also make a difference in terms of relative impact on different household members. Evidence from an IFPRI study in Bangladesh showed that women's dietary energy intake increased relatively more when a less preferred staple (atta flour) was distributed, while men's dietary energy intake increased relatively more when the more preferred staple (rice) was distributed.<sup>9</sup>

In order to increase women's control over transfers, it may make sense in some circumstances to distribute transfers in the form of food, because in many societies food is seen as the domain of women. Women are therefore more likely to have control over the use of transfers of food, and of cash-like instruments tied to food.<sup>10</sup> Making transfers conditional on activities in women's domain, such as taking children to health clinics, can also ensure that a cash transfer is given to women as opposed to the household head (who is generally male). However, it is important that programmes take into consideration the time demands placed on women, because evidence shows that time constraints can affect nutritional outcomes.<sup>11</sup>

Sources: Please see notes on page 61.

attending health clinics, enrolment and attendance at school, or receiving nutrition education, thus implementing the twin-track approach of both short- and long-term objectives. Such conditional transfers include school-feeding (school meals, snacks such as high-energy biscuits and/or take-home rations that can be provided in the form of either food or cash) as well as health-based conditional cash or in-kind transfers (see Box 7). In a recent study, the authors argued that while school feeding programmes can influence the education outcomes of schoolchildren and, to a lesser degree, augment nutrition for families of beneficiaries, they are best viewed as transfer programmes that can provide both a social safety net and human capital investments.<sup>57</sup> The value transfer in school-feeding enhances the ability of households, including farmers, to cope with shocks and manage risks. Through greater levels of education it can lead to higher productivity and improved gender outcomes.<sup>58</sup>

Unconditional transfers include general food distribution, supplemental and emergency feeding and cash transfer programmes, usually targeted at vulnerable groups, but without requiring the recipients to undertake certain actions. Supplemental and emergency feeding targets pregnant and lactating women or children under two years of age within the “1 000 day” window of opportunity. Programmes may be preventive or palliative, determining whether it serves an insurance or assistance function.

**Subsidies** that affect prices paid by the poor can also act as indirect safety nets by augmenting household purchasing power through the sale of certain foods and agricultural inputs at lower prices. They are widely used in Bangladesh, India and throughout the Near East. Subsidies can be generalized (universal) or targeted and are often advocated as a way to protect the poor. Universal subsidies available to all are the easiest to administer and obtain the most political support. Critics argue, however, that universal subsidies are

### BOX 7

#### Are cash transfers enough to improve nutrition?

Whether or not cash transfers can achieve nutritional objectives is a much debated topic. For example, research on Indonesia has found that the income elasticity of some key micronutrients (e.g., iron, calcium, vitamin B<sub>1</sub>) was significantly higher during the 1997–98 crisis than in a normal year.<sup>1</sup> When staple food price shocks hit poor households, they will protect staple food consumption but are unable to protect dietary diversity, resulting in adverse effects on nutritional status.<sup>2</sup> Population groups most affected are those with the highest nutrient requirements, including young children, pregnant and lactating women and the chronically ill. As a result, marked increases in child wasting and child anaemia are often found to be the first consequences of food crises. Under such conditions, a simple cash transfer during a price spike (or income shock) may be enough to protect the consumption of some, but not all, essential micronutrients.

But the debate goes beyond the appropriateness of cash transfers during episodes of high food prices. In contexts where production, access and utilization are poor, concerns have been raised regarding whether or not cash transfers can have a positive impact on nutrition, as consumption of some key nutrients seems to be not particularly responsive to income.<sup>3</sup> Under these conditions, specific nutritional supplementation programmes are likely to be needed. Cash transfers are also unlikely to be appropriate to prevent growth failure for children under the age of two, when a highly nutrient-dense diet is required but may not be available in the local market.

Findings from the Productive Safety Nets Programme in Ethiopia on the impacts of food and cash transfers during a period of high food prices indicate that food transfers or “cash plus food” packages are superior to un-indexed cash transfers when it comes to self-reported food security.<sup>4</sup> The authors conclude that any social protection programme that aims to enhance or protect household food security must introduce mechanisms that buffer social transfers against shocks such as high food prices. Thus, during a price spike, commodity-based vouchers may be more appropriate than cash vouchers.

A further study, on the impact of a cash and food transfer pilot in post-tsunami Sri Lanka, found that cash-receiving households were more likely than food-receiving households to spend some of their resources on improving the diversity of their diets by buying more expensive cereals and greater amounts of meat, dairy products and processed foods.<sup>5</sup> The increased diversity in consumption was achieved at the expense of reduced consumption of the two basic staples – rice and wheat. These effects mainly occur among the poorest beneficiary households. However, work in progress in Niger, comparing food and cash transfers, shows that the majority of households prefer food, and that food-receiving households tend to have more diverse diets and less damaging coping strategies.

Sources: Please see notes on page 61.



generally regressive in that the benefit of the subsidy disproportionately reaches the rich rather than the poor (because the rich consume more than the poor in total), and that they are extremely expensive and crowd out spending on public goods that are essential for long-term economic growth. In 2008, for example, Egypt introduced additional bread subsidies with an annual cost of US\$2.5 billion.

Sometimes an attempt is made to design subsidies that are, in principle, open to all but are implicitly targeted to the poor because they are for goods consumed preferentially by the poor.<sup>59</sup> For example, the Tunisian Government has subsidized smaller cartons of milk that are typically bought by poorer households.<sup>60</sup> Subsidies that are implicitly targeted are similar to transfers, which were discussed earlier, but such subsidies can result in very high leakages to the non-poor. Depending on the product subsidized, it can also result in very low value transfers to the poor, and always requires the poor to have sufficient resources to buy the product in question.

### ■ Targeting and modalities are important

According to newly released World Bank data, safety nets are insufficient or non-existent in many developing countries. At least 60 percent of people in developing countries – and nearly 80 percent in the world's poorest countries – lack effective safety net coverage.<sup>61</sup> Recently, in the face of rising human-rights-based approaches to social protection, the universalist agenda has gained a strong voice advocating minimum levels of social protection for all.<sup>62</sup>

Scarcity of resources and the need to maximize cost-effectiveness, however, has meant that targeted safety nets within social protection remain relevant because the majority of financing of safety net programmes comes from international aid including official development assistance, grants and loans. The ability to raise revenue through domestic taxation is often limited, and when such sources do exist they are frequently diverted to other priority areas. According to one study, the return on investment in social protection cannot justify by itself a greater claim for limited

#### BOX 8

### Fighting malnutrition in urban areas: the pioneering food security system of Belo Horizonte

Belo Horizonte is the third-largest city in Brazil, with a population of about 2.5 million. In the early 1990s, about 38 percent of its inhabitants lived below the poverty line and close to 20 percent of children under the age of three suffered from malnutrition. The magnitude of this problem prompted the development of a multifaceted structural response by the government that successfully transformed the human right to foods that are adequate in both quantity and quality into reality.

The programme reduced child mortality by 60 percent and substantially influenced Brazil's national Zero Hunger Policy, using only around 2 percent of the city's annual budget. It has received awards from the United Nations Educational, Scientific and Cultural Organization (UNESCO) and from the World Future Council (WFC). The overall system consists of more than 20 highly interconnected programmes that foster and complement one another. The key elements are:

- Central project management by means of a specially created department within the municipality.
- Supporting urban agriculture with community gardens in poor districts and with training workshops to promote successful cultivation.
- Provision of special sales outlets to commercial greengrocers in the most popular markets if they offer at least 25 healthy products at a fixed low price.

- Provision of market stalls to small-scale farmers from the surrounding area, so that they have a chance to sell directly to consumers.
- A nutrition information programme targeted to poorer areas of the city, including free cooking lessons. The programme is coordinated by a team consisting of employees from the departments for health, education, sports, social work and food security.
- Free school meals that supply fresh products with high nutritional value.
- Supply of affordable, healthy and nourishing meals for low-income citizens in so-called Public Restaurants, subsidized by the municipality. Belo Horizonte has five of these, providing 4 million meals a year. As people with average incomes can also eat there, the poor don't have the feeling of being stigmatized.

The food security system of Belo Horizonte could, with some adaptation, become a successful model for other cities around the world. Work will soon be starting to bring this approach to Cape Town, South Africa and other selected African city governments.

*Note:* For more information, see the World Future Council website ([www.worldfuturecouncil.org/3751.html](http://www.worldfuturecouncil.org/3751.html)).

public funds as there are more productive forms of government spending.<sup>63</sup> For example, a typical economic internal rate of return for social protection projects is between 8 and 17 percent, while the median rate of return for all sectors is about 25 percent (for all World Bank projects across all sectors for which it was estimated over 2005–07).<sup>64</sup> What makes social protection more desirable than other forms of spending is their strong direct effect on poverty reduction, but these benefits are dependent on effective targeting.

It is widely recognized that the choice of the most appropriate modality depends on a proper assessment of context-specific factors. When choosing the delivery modality within public works programmes or non-contributory direct transfers, decision-makers should take into account a number of factors: the programme objectives (e.g. if there is a specific nutritional objective then specialized food products may be more appropriate than cash); the functioning of markets including the availability of food; the preferences of beneficiaries;<sup>65</sup> the cost-effectiveness of alternative modalities; and gender and the intra-household distribution of transfers.<sup>66</sup>

### ■ Impact of transfers on food security and nutrition

Most evidence on the impacts of social protection programmes in poor and middle income countries comes from conditional cash transfer programmes in Latin America, many of which have been rigorously evaluated.<sup>67</sup> While many of these programmes achieved short-term outcomes in terms of increased household food consumption, the impacts on nutrition, as measured by anthropometric outcomes<sup>68</sup> or reduced prevalence of micronutrient deficiencies, are mixed. Programmes in Mexico and Nicaragua showed improvements in child height, but in Brazil and Honduras hardly any effects on pre-school nutritional status were found. Improvements in iron status were observed in Mexico, but not in the other countries (Honduras and Nicaragua) where this outcome was studied.<sup>69</sup> Furthermore, the pathways through which these results occurred, and the role of different programming components, are unclear. An open question in this regard is whether it was the transfer itself or the conditionalities that drove the impact.



## Social protection and economic growth

Social protection and economic growth are closely interlinked, and each has effects on the other. Economic growth increases the financial and human resources available to support social protection: for example, developed countries, with higher levels of GDP per capita, usually have more comprehensive social security systems than do developing countries. Safety net programmes within social protection are also a key factor in driving economic growth. They can allow for the acquisition of the human capital (for both children and adults) that leads to increased productivity. They can buffer the poor from economic or climatic shocks, leading to investment in agriculture and greater adoption of improved technologies that increase farm income. In addition, they can contribute to the construction of infrastructure through public works programmes, thus providing public goods that are essential for increases in GDP per capita. Working together, social protection and economic growth provide essential building blocks for eliminating hunger worldwide.

### ■ Building human capital

Some research has been able to investigate the long-term effects of nutritional interventions in early childhood,

including the impact on nutrition outcomes, the pathways through which these occurred and the impact on adult economic productivity (see Box 9 on page 41). Evidence outside Latin America includes a study of the Child Support Grant in South Africa that found beneficiary children to be 3.5 cm taller as adults.<sup>70</sup>

These studies provide evidence of a causal link between undernutrition (as measured by stunting), schooling and adult wages through two main pathways. First, children who were well nourished grew up to be taller and stronger, increasing their ability to earn high wages at manual labour. Second, well-nourished children started school earlier and had fewer absences from school while enrolled, leading to improved cognitive skills and higher wages. The key message is that investments in early childhood nutrition can spur economic growth, as these investments have long-term effects on cognitive skills and productivity. Thus, social protection is about more than just providing welfare payments – it is also about driving economic growth by improving diets and raising levels of nutrition, reducing illness and absenteeism, improving cognitive skills, increasing the returns to education and the ability to do work. These features of social protection programmes are discussed next.

## BOX 9

**Nutritional interventions in the “1 000 day window” in Guatemala**

A study in Guatemala examined the direct effect of a nutrition intervention in early childhood on adult economic productivity. The study is based on data from 1 424 Guatemalan individuals (aged 25–42 years) between 2002 and 2004. They accounted for 60 percent of the 2 392 children (aged 0–7 years) who had been enrolled in a nutrition intervention study during 1969–77. In this initial study, two villages were randomly assigned a nutritious supplement (atole) for all children aged six months to three years and two villages were assigned a less-nutritious one (fresco). The outcome variables estimated in 2002–04 were annual income, hours worked, and average hourly wages from all economic activities.

The results suggest that receiving atole before the age of three years was associated with 46 percent higher hourly wages for men. There was also a tendency for hours worked to be reduced and for annual incomes to be greater for those who received atole, although the effect was not statistically significant (perhaps because of an insufficiently large sample). Ultimately children who did not suffer growth failure in the first three years had more years of schooling, scored higher on adult cognitive tests, were more likely to work in white collar jobs or as skilled labour, were less likely to live in poor households, and, for women, to have had fewer pregnancies, fewer miscarriages, and fewer stillbirths.

*Sources:* Please see notes on page 61.

**Risk, insurance and technology adoption**

Agriculture is inherently risky, and may be even more so in the future with an increasing frequency of extreme climate events. A farmer may do everything right but as a result of the vagaries of nature produce very little. For poor farmers growing familiar crop varieties, taking on new crops or new varieties may be beyond their tolerance for risk, given that failure may be catastrophic. Managing hazards and risks adequately and enabling the poor to adopt higher risk but also higher return strategies is an important dimension of enabling them to adopt better livelihood strategies that lead to an escape from poverty. Provision of good safety net programmes with clearly articulated, transparent and non-discriminatory eligibility mechanisms can facilitate this adoption process by providing a basic level of consumption below which they know they cannot fall.

A simple example may be a household with insecure land tenure living in a drought-prone area. Income profile A (Figure 19) represents a household growing cassava, a food crop that is drought-tolerant with a fairly short maturation period and is locally marketed. Income profile B represents one growing coffee, a long-gestation cash crop that is less drought-tolerant and is exported to world markets. The income from coffee is typically higher but carries greater risks – yield losses due to drought, potentially losing the land before the coffee plants reach maturity, or the harvest occurring at a trough in the international coffee price. Any one of these events (or worse, some combination) will result in the very low troughs in income profile B. The possibility of such troughs means that a household will be discouraged from adopting coffee growing without some protection against the troughs. Such risk aversion, while

understandable, will hinder the escape from hunger for the individual household, as well as slowing agricultural growth that has the potential to provide multiplier effects throughout the economy and promote food security more broadly.

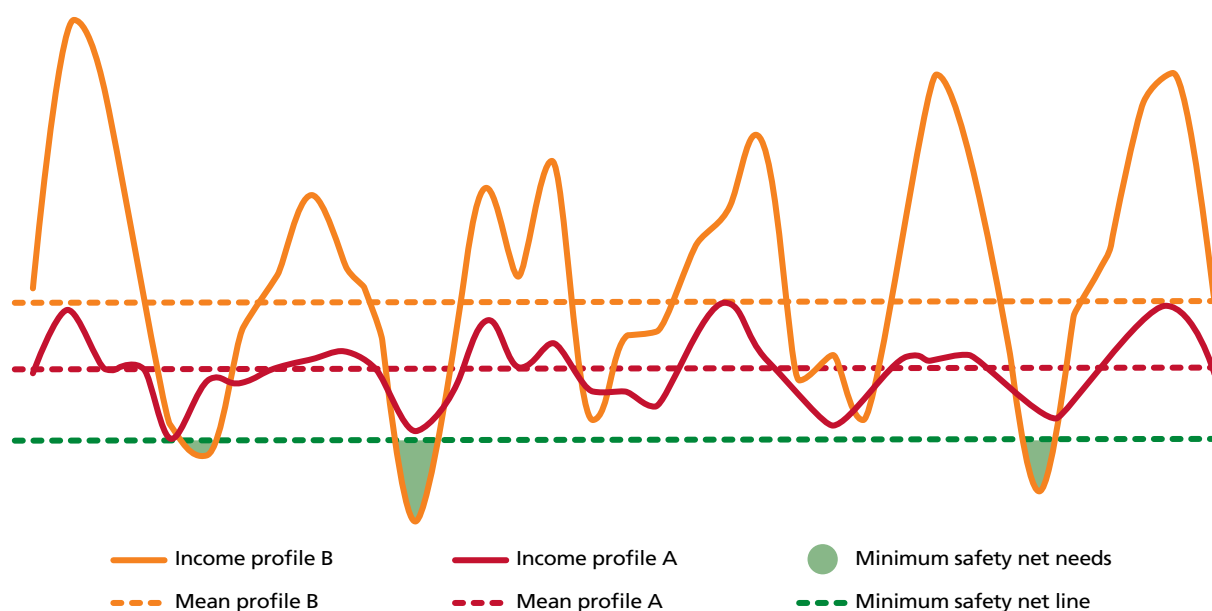
Managing these risks can be done in several ways. First, the probability of shocks occurring can be reduced, thereby reducing the frequency and/or magnitude of the troughs in Figure 19. Examples of risk reduction activities include irrigation schemes; new drought-, salt- or flood-tolerant seed varieties, and vaccination programmes that reduce the risk of disease for livestock farmers. A land registration programme that promotes access by women, and is sensitive to traditional tenure patterns (as opposed to single-right privatization), would reduce the risk of negative shocks for both income profiles.

Second, even if a shock does occur, various types of insurance (typically requiring contributions by the beneficiary) can reduce the impact of the shock, in essence filling the troughs in Figure 19.<sup>71</sup> For example, weather-based index insurance can provide insurance in case of drought, and commodity risk-management instruments (e.g. futures contracts) can provide insurance against short-term price fluctuations, thus reducing the size of the troughs in income profile B.

Thus, insurance that mitigates the impact of weather shocks is a key tool for helping farmers avoid poverty traps and for accelerating the adoption of agricultural technologies. Traditional insurance schemes have proved to be very expensive to operate, however, due to high administrative costs. In response, new forms of insurance are becoming increasingly popular. For example, weather index insurance makes payouts based on measurements of rainfall,

FIGURE 19

## Safety net needs for prudent risk taking



Source: Adapted from L. Brown and U. Gentilini. 2007. On the edge: the role of food-based safety nets in helping vulnerable households manage food insecurity. In B. Guha-Khasnobis, S.S. Acharya and B. Davis. *Food insecurity, vulnerability and human rights failure*. Basingstoke, UK, Palgrave Macmillan and United Nations University-WIDER.

temperature or humidity (crop yield over a large area is another possible index), rather than the actual loss in a particular farmer's field.<sup>72</sup> It is designed to trigger compensation against predefined specific hazards such as droughts or floods.<sup>73</sup> The linking of pay-outs to predetermined thresholds instead of being based on specific micro-level losses reduces administrative costs and removes perverse incentives (moral hazard) whereby farmers could actually prefer that their crops fail. It also reduces the likelihood of adverse selection, whereby the only farmers who pay for insurance are those who have a high probability of crop loss.

The weather risk management facility of IFAD and WFP provides insurance based on levels of rainfall, thereby mitigating the impact of weather-related shocks on poor smallholder farmers and enabling farmers to manage agricultural risks and build resilience. Another example is the R4 Rural Resilience Initiative launched by WFP and Oxfam America (R4 refers to the four risk-management strategies that the initiative integrates). R4 builds on the initial success of a holistic risk management framework developed by Oxfam America and a group of partners including the Relief Society of Tigray (REST) to enable poor farmers to strengthen their food and income security through a combination of improved resource management (risk reduction), microcredit (prudent risk-taking), insurance (risk transfer), and savings (risk reserves). Within this initiative, the Horn of Africa Risk Transfer for Adaptation (HARITA) project allows Ethiopian farmers to pay for crop insurance with their own labour,

through a public works programme. An impact evaluation covering the 2009/10 season found that index insurance had large positive impacts on crop yields.<sup>74</sup> The study found that significantly more farmers who were buying insurance for the second time planned to plant different crops, use more fertilizer and take out loans. The evidence suggests that farmers are learning that insurance is an effective risk-management tool that helps them take prudent risks to intensify production and build their livelihoods.

#### Investing in nutrition-sensitive food and agricultural systems

While ample evidence exists on the impact of conditional cash transfers in improving human capital,<sup>75</sup> fewer studies have looked at the labour supply or productive impacts.<sup>76</sup> Nevertheless, a wide range of research reports little reduction in adult work (i.e. time allocated to work, or labour supply) due to receipt of conditional cash transfers.<sup>77</sup> In terms of production, despite the scarcity of available information, those studies that do exist report positive impact on potential productive activities, as well as potential conflicts between social objectives and livelihood activities. Two studies on the Mexican PROGRESA programme, for example, found that it led to increased land use, livestock ownership, crop production and agricultural expenditures and a greater likelihood of operating a microenterprise.<sup>78</sup> Yet, another study found that agricultural households benefiting from

PROGRESA were less likely to comply with conditionality due to time conflicts with their livelihood activities.<sup>79</sup>

In sub-Saharan Africa, the Malawi SCT programme was found to lead to increased investment in agricultural assets, including crop implements and livestock, increased satisfaction of household consumption by own production, decreased agricultural wage labour and child work off farm, and increased labour allocation to on farm activities by both adults and children.<sup>80</sup> In Ethiopia, households with access to both the Productive Safety Net Programme (PSNP) as well as complementary packages of agricultural support showed no indication of disincentive effects on labour supply and were more likely to be food-secure, to borrow for productive purposes, use improved agricultural technologies and operate their own non-farm business activities.<sup>81</sup> A follow-up study found that the PSNP has led to a significant improvement in food security status for those who had participated in the programme for five years versus those who had received only one year of benefits.<sup>82</sup> Moreover, households that participated in PSNP as well as the complementary programmes achieved significantly higher grain production and made greater use of fertilizer.

Moreover, cash transfers can be an important complement to a broader rural development agenda. The importance of a pro-poor growth strategy focusing on agriculture, and particularly the need for a new Green Revolution in sub-Saharan Africa, has been widely discussed.<sup>83</sup> Such a strategy would imply a combination of increased access to a diverse package of modern agricultural technologies, including an initial fertilizer subsidy, and

investment in rural infrastructure and agricultural research and extension.<sup>84</sup> Yet, a lack of access to agricultural assets, markets and institutions, and in particular credit, is constraining potential engagement in agriculture.<sup>85</sup> One mechanism to overcome such constraints, especially among poor farmers who are most likely to be credit constrained, is through the provision of cash transfers.<sup>86</sup> Thus, cash transfers can serve not only as a means of social protection but also as a means of promoting farm-level production gains (see Box 10).

### Public works programmes

Public works programmes, sometimes referred to as cash-for-work or food-for-work, are best used as a livelihood protection mechanism and are best implemented with an employment guarantee, for example India's National Employment Guarantee Scheme. A guarantee of employment when needed effectively provides insurance and enables households to undertake more risk in their normal livelihood strategy than they would do in the absence of the programme. Households can then plant higher-risk and higher-yield crops, moving from income profile A to income profile B in Figure 19.<sup>87</sup> For example, results from an evaluation of the PSNP in Ethiopia between 2006 and 2010 showed that participation in the PSNP and the Household Asset Building Programme raised the likelihood of using fertilizer by 19.5 percentage points.<sup>88</sup>

Public works programmes also have the potential to create indirect benefits. Construction of infrastructure such as roads, bridges and irrigation systems can lead to

#### BOX 10

### From Protection to Production

FAO has recently joined forces with the United Nations Children's Fund (UNICEF), the United Kingdom Department for International Development (DFID) and seven countries in sub-Saharan Africa – the From Protection to Production (PtoP) Project – to study the impact of cash transfer programmes on household economic decision-making and the local economy.<sup>1</sup> The study of the economic and productive impacts is also important for policy. The perception exists among many officials in ministries of finance and the economy that cash transfer programmes are just welfare, charity and/or handouts, and do not have economic impacts.

This research project seeks to understand the potential economic development impacts of cash transfers on the rural poor in sub-Saharan Africa. It aims to enhance the understanding of how social protection interventions can contribute to sustainable poverty reduction and economic

growth at the household and community-levels. This will be documented by the production of case studies and cross-country comparisons. The project is using a mixed-method approach, combining econometric, simulation and qualitative methods to understand the impact on household decision-making and local economies, taking advantage of data from ongoing rigorous impact evaluations for the following programmes: the CT-OVC programme in Kenya, the Tigray Social Cash Pilot in Ethiopia, the Malawi Social Cash Transfer programme, the Livelihood Empowerment Against Poverty programme in Ghana, the Child Grant Programme in Lesotho, the Zambia Child Grant Programme and the Zimbabwe Social Cash Transfer Programme.

<sup>1</sup> For further information see the PtoP website (available at <http://www.fao.org/economic/ptop/en/>).

**BOX 11**

**Designing public works programmes to benefit women**

Public works programmes that create community infrastructure potentially reduce time burdens for women and girls who collect water and firewood. They also provide employment opportunities for rural women, which may have significant impacts on food security and improvement of nutrition because women's income is more likely to be spent on food and children's goods. Addressing gender inequality and promoting women's capacities through public works programmes requires consideration of decent work, women's care responsibilities and their need to participate on a flexible basis.<sup>1</sup> Integrating family responsibilities with work has been shown to increase female participation, and incorporation of training has been shown to increase female employability when the programme ends.<sup>2</sup> Evidence from disaster recovery projects

reveals that training females for non-traditional female jobs, such as construction, and giving females leadership roles, can improve the long-term effectiveness of such training for women.<sup>3</sup>

While public works programmes can benefit women, attention should be given to the energy costs expended by women in these programmes. In some cases, women can use more energy than they receive from the transfer, depending on the intra-household distribution of the benefits.<sup>4</sup> This happens because the allocation of food within households may not be gender-equitable, with women willingly or unwillingly sacrificing food to benefit other household members.

*Sources:* Please see notes on page 61.

significant second-round employment benefits and multiplier effects on local economies and agricultural productivity. Public works are implemented in both development and recovery settings and, in theory, have the ability to be scaled up quickly (see Box 11).

**■ Systems of social protection**

Given the range of different (but related) objectives for social protection, there has been an increasing focus on pursuing a systems-based approach, as opposed to the ad hoc, project-based, short-term approach that dominated in the past. The World Bank's *Social Protection and Labour Strategy 2012-2022* states that "the main objective of the new strategy ... is to help countries move from fragmented approaches to harmonized systems".<sup>89</sup> It is based on an understanding that more systematic and predictable risk-management tools with a focus on enhancing long-term resilience will lead to sustainable graduation out of poverty.

Systems will not only vary according to the objective, but will also depend on the context – whether countries have high or low capacity and whether they are politically stable or unstable. The systems approach is relevant not only in development contexts but also in emergency and early recovery contexts where shocks can be recurrent (e.g. Ethiopia, the Sahel, Yemen) or one-off. It is a way to move beyond a purely relief-focused approach towards multi-year resilience-building programmes such as the PSNP in Ethiopia whereby chronically food-insecure households receive support for up to five years, and the Hunger Safety Net Programme in Kenya.<sup>90</sup> A systems approach also implies the use of common administrative mechanisms such as unique

beneficiary registration, common identification and targeting methods, common monitoring and evaluation systems, and integrated and synchronized transfer modalities. The two most well known examples are Brazil's *Bolsa Familia* and Mexico's *Progresar-Oportunidades*, but similar programmes are being increasingly used in low-income countries as well.

**■ Conclusion: social protection – immediate help for the neediest and a foundation for reducing hunger and malnutrition in the long run**

Even when the poor benefit from economic growth, these benefits take time to materialize. Thus, in the short-term, social protection supports the most vulnerable so that hunger and undernutrition can be reduced now. But social protection is also a foundation for reducing undernourishment in the long term. First, it improves nutrition for young children – an investment that will pay off in the future with smarter, stronger and healthier adults. Second, it helps to mitigate the impact of risk to promote technology adoption and economic growth. A systems approach is needed to link the various goals in an integrated and cost-effective manner. Through such an approach, undernourishment and malnutrition can be eliminated as quickly as possible.



# Annex 1

**TABLE 1.1**  
Prevalence of undernourishment and progress towards the World Food Summit (WFS)<sup>1</sup> and the Millennium Development Goal (MDG)<sup>2</sup> targets in developing countries

World Region/Subregion/country	Number of people undernourished							Proportion of undernourished in total population						
	1990– 1992	1999– 2001	2004– 2006	2007– 2009	2010– 2012	Change so far	Progress towards WFS target <sup>4</sup>	1990– 1992	1999– 2001	2004– 2006	2007– 2009	2010– 2012	Change so far	Progress towards MDG target <sup>4</sup>
	(millions)					(%)		(%)					(%)	
<b>WORLD<sup>5</sup></b>	<b>1 000</b>	<b>919</b>	<b>898</b>	<b>867</b>	<b>868</b>	<b>-13.2</b>	<b>▼</b>	<b>18.6</b>	<b>15.0</b>	<b>13.8</b>	<b>12.9</b>	<b>12.5</b>	<b>-32.8</b>	<b>■</b>
Developed regions	20	18	13	15	16	na	na	1.9	1.6	1.2	1.3	1.4	na	na
Developing regions	980	901	885	852	852	-13.1	▼	23.2	18.3	16.8	15.5	14.9	-35.8	■
Least-developed countries <sup>6</sup>	201	228	233	243	260	29.5	▲	37.9	34.6	31.4	30.5	30.6	-19.3	■
Landlocked developing countries <sup>7</sup>	96	114	111	110	113	18.7	▲	35.4	34.4	30.1	28.1	27.1	-23.4	■
Small island developing states <sup>8</sup>	11	10	10	9	9	-13.8	▼	25.4	20.3	19.4	17.4	16.9	-33.5	■
Low-income economies <sup>9</sup>	192	223	226	234	245	27.1	▲	37.9	34.7	31.5	30.6	30.1	-20.6	■
Lower-middle-income economies <sup>10</sup>	441	414	420	403	395	-10.4	▼	24.4	19.5	18.2	16.7	15.6	-36.1	■
Low-income food-deficit countries <sup>11</sup>	543	561	575	568	573	5.6	▲	27.6	23.5	22.0	20.6	19.8	-28.3	■
<b>AFRICA</b>	<b>175</b>	<b>205</b>	<b>210</b>	<b>220</b>	<b>239</b>	<b>36.8</b>	<b>▲</b>	<b>27.3</b>	<b>25.3</b>	<b>23.1</b>	<b>22.6</b>	<b>22.9</b>	<b>-16.1</b>	<b>■</b>
<b>Northern Africa</b>	<b>5</b>	<b>5</b>	<b>5</b>	<b>4</b>	<b>4</b>	<b>-2.5</b>	<b>◀▶</b>	<b>3.8</b>	<b>3.3</b>	<b>3.1</b>	<b>2.7</b>	<b>2.7</b>	<b>-28.9</b>	<b>■</b>
Algeria	1	2	ns	ns	ns	na	na	5.2	5.8	< 5	< 5	< 5	na	■
Egypt	ns	ns	ns	ns	ns	na	na	< 5	< 5	< 5	< 5	< 5	na	■
Libya	ns	ns	ns	ns	ns	na	na	< 5	< 5	< 5	< 5	< 5	na	■
Morocco	2	2	2	2	2	-1.5	◀▶	7.1	6.2	5.2	5.2	5.5	-22.5	■
Tunisia	ns	ns	ns	ns	ns	na	na	< 5	< 5	< 5	< 5	< 5	na	■
<b>Sub-Saharan Africa<sup>12</sup></b>	<b>170</b>	<b>200</b>	<b>205</b>	<b>216</b>	<b>234</b>	<b>37.8</b>	<b>▲</b>	<b>32.8</b>	<b>30.0</b>	<b>27.2</b>	<b>26.5</b>	<b>26.8</b>	<b>-18.3</b>	<b>■</b>
Angola	7	7	6	6	5	-21.0	▼	63.9	47.5	35.1	30.7	27.4	-57.1	■
Benin	1	1	1	1	1	-33.7	▼	22.4	16.4	13.1	10.8	8.1	-63.8	■
Botswana	< 0.5	1	1	1	1	45.3	▲	27.4	34.5	32.9	31.9	27.9	1.8	■
Burkina Faso	2	3	4	4	4	99.9	▲	22.9	26.4	25.8	24.4	25.9	13.1	■
Burundi	3	4	5	6	6	124.4	▲	49.0	63.0	67.9	72.4	73.4	49.8	■
Cameroon	5	5	3	3	3	-35.2	▼	38.7	29.1	19.5	15.6	15.7	-59.4	■
Central African Republic	1	2	2	1	1	-9.8	▼	49.5	45.1	40.6	32.6	30.0	-39.4	■
Chad	4	3	4	4	4	1.7	◀▶	61.1	41.0	37.3	36.4	33.4	-45.3	■
Congo	1	1	1	1	2	47.1	▲	42.8	30.1	32.9	34.6	37.4	-12.6	■
Côte d'Ivoire	2	3	4	4	4	143.4	▲	13.7	19.9	19.6	19.3	21.4	56.2	■
Eritrea	2	3	3	3	4	54.3	▲	72.4	76.2	74.8	69.1	65.4	-9.7	■
Ethiopia	34	36	35	35	34	0.1	◀▶	68.0	55.3	47.7	43.8	40.2	-40.9	■
Ghana	6	3	2	1	1	-87.0	▼*	40.5	16.6	9.5	5.8	< 5	na	■



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	(millions)					(%)		(%)					(%)	
Guinea	1	2	2	1	2	57.2	▲	18.4	20.6	17.0	15.5	17.3	-6.0	■
Kenya	9	10	12	12	13	46.3	▲	35.6	32.8	32.9	32.4	30.4	-14.6	■
Liberia	1	1	1	1	1	88.0	▲	32.9	34.9	29.6	29.6	31.4	-4.6	■
Madagascar	3	5	5	6	7	147.3	▲	24.8	32.4	28.1	29.1	33.4	34.7	■
Malawi	4	3	3	3	4	-16.9	▼	44.8	26.8	24.7	23.0	23.1	-48.4	■
Mali	2	2	2	1	1	-44.3	▼	25.3	21.5	14.7	9.5	7.9	-68.8	■
Mozambique	8	8	8	9	9	18.0	▲	57.1	45.3	40.3	39.9	39.2	-31.3	■
Namibia	1	< 0.5	1	1	1	43.5	▲	37.5	24.9	26.8	32.7	33.9	-9.6	■
Niger	3	3	3	2	2	-31.7	▼	36.9	25.8	20.0	13.6	12.6	-65.9	■
Nigeria	19	13	10	11	14	-28.1	▼	19.3	10.2	6.8	7.3	8.5	-56.0	■
Rwanda	4	4	4	3	3	-11.9	▼	52.6	46.5	42.1	34.2	28.9	-45.1	■
Senegal	2	2	2	2	3	61.9	▲	21.7	24.2	16.9	16.5	20.5	-5.5	■
Sierra Leone	2	2	2	2	2	3.5	◀▶	41.9	41.1	35.5	33.1	28.8	-31.3	■
South Africa	ns	ns	ns	ns	ns	na	na	< 5	< 5	< 5	< 5	< 5	na	■
Sudan	11	11	12	15	18	53.8	▲	42.1	31.7	32.0	36.6	39.4	-6.4	■
Togo	1	1	1	1	1	-17.1	▼	32.8	25.2	20.4	19.8	16.5	-49.7	■
Uganda	5	6	8	10	12	145.7	▲	26.6	26.5	27.9	31.0	34.6	30.1	■
United Republic of Tanzania	8	14	14	15	18	131.1	▲	29.4	40.4	35.1	36.1	38.8	32.0	■
Zambia	3	4	6	6	6	131.1	▲	34.3	43.9	48.3	47.5	47.4	38.2	■
Zimbabwe	5	5	5	4	4	-11.7	▼	44.1	43.1	38.2	33.9	32.8	-25.6	■
<b>ASIA</b>	<b>739</b>	<b>634</b>	<b>620</b>	<b>581</b>	<b>563</b>	<b>-23.9</b>	<b>▼</b>	<b>23.7</b>	<b>17.7</b>	<b>16.3</b>	<b>14.8</b>	<b>13.9</b>	<b>-41.4</b>	<b>■</b>
<b>Caucasus and Central Asia</b>	<b>9</b>	<b>11</b>	<b>7</b>	<b>7</b>	<b>6</b>	<b>-38.3</b>	<b>▼</b>	<b>12.8</b>	<b>15.8</b>	<b>9.9</b>	<b>9.2</b>	<b>7.4</b>	<b>-42.2</b>	<b>■</b>
Armenia	1	1	< 0.5	ns	ns	na	na	22.8	19.0	5.4	< 5	< 5	na	■
Azerbaijan	2	1	ns	ns	ns	na	na	23.0	14.7	< 5	< 5	< 5	na	■
Georgia	3	1	1	1	1	-67.3	▼*	60.4	21.5	28.9	30.0	24.7	-59.1	■
Kazakhstan	ns	1	ns	ns	ns	na	na	< 5	8.0	< 5	< 5	< 5	na	■
Kyrgyzstan	1	1	< 0.5	< 0.5	< 0.5	-49.7	▼*	15.5	15.8	9.4	8.6	6.4	-58.7	■
Tajikistan	2	3	2	2	2	31.9	▲	31.0	40.8	34.3	36.7	31.7	2.3	■
Turkmenistan	< 0.5	< 0.5	< 0.5	ns	ns	na	na	9.5	8.1	5.5	< 5	< 5	na	■
Uzbekistan	ns	4	3	2	2	125.6	▲	3.6	14.7	9.8	7.9	6.1	69.4	■

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	(millions)					(%)		(%)					(%)	
<b>Eastern Asia</b>	<b>261</b>	<b>197</b>	<b>186</b>	<b>169</b>	<b>167</b>	<b>-35.9</b>	▼	<b>20.8</b>	<b>14.4</b>	<b>13.2</b>	<b>11.8</b>	<b>11.5</b>	<b>-44.7</b>	■
<b>Eastern Asia, excluding China</b>	<b>7</b>	<b>10</b>	<b>10</b>	<b>11</b>	<b>9</b>	<b>29.0</b>	▲	<b>10.4</b>	<b>14.0</b>	<b>13.6</b>	<b>14.5</b>	<b>11.7</b>	<b>12.5</b>	■
China	254	187	176	158	158	-37.6	▼	21.4	14.4	13.1	11.6	11.5	-46.3	■
Democratic People's Republic of Korea	5	8	9	10	8	50.5	▲	25.4	37.0	36.1	39.7	32.0	26.0	■
Mongolia	1	1	1	1	1	-18.8	▼	37.5	37.6	32.5	27.6	24.2	-35.5	■
Republic of Korea	ns	ns	ns	ns	ns	na	na	< 5	< 5	< 5	< 5	< 5	na	■
<b>Southern Asia</b>	<b>327</b>	<b>309</b>	<b>323</b>	<b>311</b>	<b>304</b>	<b>-7.1</b>	▼	<b>26.8</b>	<b>21.2</b>	<b>20.4</b>	<b>18.8</b>	<b>17.6</b>	<b>-34.6</b>	■
<b>Southern Asia, excluding India</b>	<b>87</b>	<b>85</b>	<b>85</b>	<b>84</b>	<b>87</b>	<b>-0.8</b>	◀▶	<b>26.4</b>	<b>21.0</b>	<b>19.1</b>	<b>18.1</b>	<b>17.8</b>	<b>-32.6</b>	■
Bangladesh	37	24	21	23	25	-32.0	▼	34.6	18.4	15.1	16.1	16.8	-51.4	■
India	240	224	238	227	217	-9.3	▼	26.9	21.3	20.9	19.0	17.5	-34.9	■
Iran (Islamic Republic of)	ns	ns	4	4	ns	na	na	< 5	< 5	5.8	5.2	< 5	na	■
Nepal	5	6	6	6	5	8.6	▲	25.9	24.5	21.7	20.1	18.0	-30.5	■
Pakistan	30	35	36	35	35	15.9	▲	26.4	24.0	22.8	20.8	19.9	-24.6	■
Sri Lanka	6	5	6	5	5	-15.1	▼	33.9	28.7	27.9	25.7	24.0	-29.2	■
<b>South-Eastern Asia</b>	<b>134</b>	<b>104</b>	<b>88</b>	<b>76</b>	<b>65</b>	<b>-51.2</b>	▼*	<b>29.6</b>	<b>20.0</b>	<b>15.8</b>	<b>13.2</b>	<b>10.9</b>	<b>-63.2</b>	■
Cambodia	4	4	4	3	2	-37.8	▼	39.9	33.8	27.4	21.7	17.1	-57.1	■
Indonesia	37	38	34	28	21	-43.8	▼	19.9	17.8	15.1	11.9	8.6	-56.8	■
Lao People's Democratic Republic	2	2	2	2	2	-9.2	▼	44.6	39.5	33.4	29.4	27.8	-37.7	■
Malaysia	ns	ns	ns	ns	ns	na	na	< 5	< 5	< 5	< 5	< 5	na	■
Philippines	15	16	15	14	16	5.4	▲	24.2	20.9	18.0	15.9	17.0	-29.8	■
Thailand	25	12	7	6	5	-79.8	▼*	43.8	19.6	11.2	9.5	7.3	-83.3	■
Viet Nam	32	17	13	11	8	-75.1	▼*	46.9	22.0	15.6	12.5	9.0	-80.8	■
<b>Western Asia</b>	<b>8</b>	<b>13</b>	<b>16</b>	<b>18</b>	<b>21</b>	<b>146.6</b>	▲	<b>6.6</b>	<b>8.0</b>	<b>8.8</b>	<b>9.4</b>	<b>10.1</b>	<b>53.0</b>	■
Iraq	2	5	6	8	9	334.9	▲	10.9	19.0	23.1	25.9	26.0	138.5	■
Jordan	< 0.5	< 0.5	ns	ns	ns	na	na	6.7	6.1	< 5	< 5	< 5	na	■
Kuwait	1	ns	ns	ns	ns	na	na	28.7	1.5	0.9	1.1	1.7	na	■
Lebanon	ns	ns	ns	ns	ns	na	na	< 5	< 5	< 5	< 5	< 5	na	■
Saudi Arabia	ns	ns	ns	ns	ns	na	na	< 5	< 5	< 5	< 5	< 5	na	■
Syrian Arab Republic	ns	ns	ns	ns	ns	na	na	< 5	< 5	< 5	< 5	< 5	na	■
Turkey	ns	ns	ns	ns	ns	na	na	< 5	< 5	< 5	< 5	< 5	na	■
United Arab Emirates	ns	ns	ns	ns	ns	na	na	< 5	< 5	< 5	< 5	< 5	na	■
Yemen	4	5	7	7	8	124.3	▲	28.6	30.4	31.7	30.6	32.4	13.3	■

**TABLE 1.1**  
Prevalence of undernourishment and progress towards the World Food Summit (WFS)<sup>1</sup> and the Millennium Development Goal (MDG)<sup>2</sup> targets in developing countries

World Region/Subregion/country	Number of people undernourished							Proportion of undernourished in total population						
	1990– 1992	1999– 2001	2004– 2006	2007– 2009	2010– 2012	Change so far	Progress towards WFS target <sup>4</sup>	1990– 1992	1999– 2001	2004– 2006	2007– 2009	2010– 2012	Change so far	Progress towards MDG target <sup>4</sup>
	(millions)					(%)		(%)					(%)	
<b>LATIN AMERICA AND THE CARIBBEAN</b>	<b>65</b>	<b>60</b>	<b>54</b>	<b>50</b>	<b>49</b>	<b>-24.9</b>	<b>▼</b>	<b>14.6</b>	<b>11.6</b>	<b>9.7</b>	<b>8.7</b>	<b>8.3</b>	<b>-43.2</b>	<b>■</b>
<b>Caribbean<sup>13</sup></b>	<b>9</b>	<b>7</b>	<b>7</b>	<b>7</b>	<b>7</b>	<b>-23.3</b>	<b>▼</b>	<b>28.5</b>	<b>21.4</b>	<b>20.9</b>	<b>18.6</b>	<b>17.8</b>	<b>-37.5</b>	<b>■</b>
Cuba	1	ns	ns	ns	ns	na	na	11.5	< 5	< 5	< 5	< 5	na	■
Dominican Republic	2	2	2	2	2	-30.8	▼	30.4	21.6	18.6	15.9	15.4	-49.3	■
Haiti	5	5	5	5	5	-2.5	◀▶	63.5	53.0	53.5	46.8	44.5	-29.9	■
<b>Latin America<sup>14</sup></b>	<b>57</b>	<b>53</b>	<b>46</b>	<b>43</b>	<b>42</b>	<b>-25.1</b>	<b>▼</b>	<b>13.6</b>	<b>11.0</b>	<b>9.0</b>	<b>8.1</b>	<b>7.7</b>	<b>-43.4</b>	<b>■</b>
Argentina	ns	ns	ns	ns	ns	na	na	< 5	< 5	< 5	< 5	< 5	na	■
Bolivia (Plurinational State of)	2	2	3	3	2	3.4	◀▶	34.6	28.7	29.1	27.5	24.1	-30.3	■
Brazil	23	21	16	15	13	-40.4	▼	14.9	12.1	8.7	7.8	6.9	-53.7	■
Chile	1	ns	ns	ns	ns	na	na	8.1	< 5	< 5	< 5	< 5	na	■
Colombia	6	5	6	6	6	-8.5	▼	19.1	13.0	13.6	12.5	12.6	-34.0	■
Costa Rica	ns	ns	ns	ns	< 0.5	na	na	< 5	< 5	< 5	< 5	6.5	na	■
Ecuador	3	3	3	3	3	4.6	◀▶	24.5	20.9	21.4	19.6	18.3	-25.3	■
El Salvador	1	1	1	1	1	-8.9	▼	15.6	9.2	10.6	11.3	12.3	-21.2	■
Guatemala	1	3	4	4	4	203.8	▲	16.2	26.5	29.9	30.2	30.4	87.7	■
Honduras	1	1	1	1	1	-30.9	▼	21.4	16.3	14.2	11.6	9.6	-55.1	■
Mexico	ns	ns	ns	ns	ns	na	na	< 5	< 5	< 5	< 5	< 5	na	■
Nicaragua	2	2	1	1	1	-49.2	▼*	55.1	34.3	26.7	23.9	20.1	-63.5	■
Panama	1	1	1	< 0.5	< 0.5	-35.2	▼	22.8	25.7	19.7	13.1	10.2	-55.3	■
Paraguay	1	1	1	1	2	95.6	▲	19.7	13.0	12.6	16.8	25.5	29.4	■
Peru	7	6	6	5	3	-54.4	▼*	32.6	22.5	21.4	15.9	11.2	-65.6	■
Uruguay	< 0.5	ns	ns	ns	ns	na	na	7.3	< 5	< 5	< 5	< 5	na	■
Venezuela (Bolivarian Republic of)	3	4	3	ns	ns	na	na	13.5	15.5	9.7	< 5	< 5	na	■
<b>OCEANIA</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>39.0</b>	<b>▲</b>	<b>13.6</b>	<b>15.5</b>	<b>13.7</b>	<b>11.9</b>	<b>12.1</b>	<b>-11.0</b>	<b>■</b>

## Updating and overhauling the FAO methodology for assessing food insecurity – a summary of changes and their impacts

### Introduction

During the past five years, the increased volatility of food prices and the availability of new sources of data on food access have emphasized the need for a revision of the FAO methodology<sup>91</sup> to improve the estimation of undernourishment. In 2010, the Committee on World Food Security (CFS) called for a review of the hunger measure, and an Expert Round Table was held in September 2011 to discuss the merits and drawbacks of the existing methodology.<sup>92</sup>

The Round Table confirmed that the FAO methodology is fundamentally valid in its statistical principles, and that no viable alternative has been made available thus far to globally assess the extent of chronic food deprivation. However, the experts gathered in Rome also found that the methodology could be improved in several ways, especially by making fuller use of the increased number of available household expenditure and living standard measurement surveys, which could provide more information on food access distribution in the population.<sup>93</sup>

The experts also emphasized that the state of food insecurity in any country cannot be comprehensively assessed by reference only to the prevalence of undernourishment defined in terms of dietary energy. It was unanimously felt that a broader core set of food security indicators is needed to capture other dimensions of food insecurity beyond that of food energy deprivation. The economic consequences of maintaining adequate energy intake in the face of higher food prices, as well as the nutritional implications of diets that are sufficient in terms of calories but deficient in fundamental micronutrients (“hidden hunger”), have been identified as two aspects not captured by the prevalence of undernourishment indicator that merit proper attention.

In response to the above conclusions and to the explicit request by CFS, the evidence presented in this year’s edition of *The State of Food Insecurity in the World* has been strengthened in two major ways. First, the entire series of undernourishment figures have been updated back to 1990, reflecting improvements in both the data and the methodology used. Second, an initial core set of indicators has been identified to convey information on various facets of food insecurity.

Both efforts should be seen as the starting point for a continued endeavour to improve the monitoring of food security. While both the methodology and the conceptual framework for food insecurity assessment have been significantly amended this year to reflect the improved data and information, further revisions are expected in the near future, as more reliable data on food waste and more surveys to assess the distribution of food access become available. Also, although several additional indicators that can provide useful information on food security have been identified, coverage in terms of countries and years for many of these is still far from complete.

This technical annex includes a description of the various data innovations and methodological improvements included in the 2012 edition of this report, compared to the traditional methods adopted previously. It provides an assessment of the marginal

impact of each innovation on the estimated numbers and prevalence rates, to help explain the considerable differences between this year’s and last year’s assessments. The traditional methods used to estimate the prevalence of undernourishment are described in detail in an extended technical note available online at [www.fao.org/publications/sofi/en/](http://www.fao.org/publications/sofi/en/).

### ■ The FAO methodology in brief

Since its establishment, FAO has been charged with responsibility for monitoring the world food situation to enable the international community to appropriately direct actions aimed at promoting universal achievement of the right to adequate food. FAO’s food security monitoring work involves, *inter alia*, estimation of the prevalence of undernourishment indicator, published annually in *The State of Food Insecurity in the World*.

The terms “undernourishment” and “hunger” have been interpreted as referring to a continued inability to obtain enough food, that is, a quantity of food energy sufficient to conduct a healthy and active life. Two issues have to be addressed in reaching a viable operational definition of undernourishment.

First, considering the complexity of human nutrition, and both quantitative and qualitative dimensions of food, the expression “enough food” needs to be qualified. The FAO method has been based on the measurement of dietary energy intake, with “enough” defined with reference to a normative dietary energy requirement benchmark established by nutritionists. Accordingly, a human being is considered to be undernourished if the level of his or her habitual dietary energy intake is below the minimum level nutritionists deem appropriate. As such, “undernourishment” has been defined as an extreme form of food insecurity, arising when food energy availability is inadequate to cover even minimum needs for a sedentary lifestyle.

Second, there is the question of the appropriate time span to assess undernourishment. For how long should an individual be deprived of the minimum energy intake before he or she is considered “undernourished”? If our interest is in highlighting deep, chronic undernourishment, the reference period should be long enough for the consequences of low food intake to be detrimental to health. Although there is no doubt that temporary food shortage may be stressful, the FAO indicator is based on a full year, with the average consumption of food over the period referred to as the habitual level.

Hence, the FAO indicator is designed to capture a clearly – and narrowly – defined concept of undernourishment, namely a state of energy deprivation lasting over a year. As such, the FAO indicator is not meant to capture short-lived effects of temporary crises. Furthermore, it does not capture inadequate intake of other essential nutrients; nor does it capture the effects of other sacrifices that individuals or households may make to maintain their consumption of dietary energy.

For a more complete description of the state of food (in) security, the prevalence of undernourishment indicator has to be supplemented with a broader set of indicators to monitor various dimensions of food security.

## Summary of changes and impacts

### Substantial data innovations embedded in the undernourishment estimates

The new estimates presented in this year's report are the result of considerable efforts to update and improve the database used. Updates have been obtained for data on food supplies, population and the intranational food access distribution as recorded by household expenditure and living standard measurement surveys. Table A2.1 reports the estimates published in *The State of Food Insecurity in the World 2011*, along with estimates produced by applying each of the revisions in sequence, with some indication of their effects at the margin, from 1990–92 to 2009 (the latest year for which an assessment was conducted using the previous methodology in 2011).

#### Population size

Updated information on population size and structure has been obtained from the latest revision of world population estimates.<sup>94</sup> This includes substantial revisions of population estimates for some countries with a large number of undernourished people, such as Bangladesh and China. China's population estimate for the 1990s has been revised upwards by as much as 25 million people, with a resulting increase of both the prevalence and the absolute number of undernourished earlier, while Bangladesh's population has been

revised downwards by about 11 percent (or 17 million people). The impact on undernourishment is thus different over the entire period. If the new population data were to be applied to the other data used for the estimates presented in 2011, there would have been an increase of 2.8 percent in the number of undernourished for the base period of 1990–92, and a reduction of 1.4 percent in 2009.

#### Human stature and energy requirements

A second revision relating to population data has involved the average physical stature of people by sex and age. New data has been obtained from the Demographic and Health Surveys programme of the United States Agency for International Development (USAID) and from household surveys that report anthropometric statistics. On the basis of the revised heights, the reference minimum dietary energy requirement (MDER) for each country has been re-estimated. In some cases, this has led to significant changes in MDERs and, therefore, for the prevalence of undernourishment, especially for countries for which data on heights were previously absent and therefore assumed to be equal to those of other countries with similar ethnicities. As the revision has generally resulted in a reduction of estimated average heights, compared with those previously assumed (implying a reduction of dietary energy requirements), the overall impact attributable to this revision would be a reduction in the estimated number of undernourished over the entire period, ranging from –2.4 percent in 1990–92 to –3.1 percent in 2009.

#### Food supply

The next change considered relates to the total availability of calories. The FAO Statistics Division has recently published new estimates of dietary energy supply for all countries in 2009, with revisions of the entire series. Differences with respect to past estimates can be found over the entire series, but have only been

**TABLE A2.1**  
Impact of individual data and methodology revisions on FAO estimates of undernourishment

	Number of undernourished in the developing regions (millions)							
	1990-92	1995-97	2000-02	2005-07	2009	2010	2011	2012
<b>As reported in 2011</b>	<b>833</b>	<b>774</b>	<b>821</b>	<b>839</b>	<b>866</b>			
+ Population change	+24	+12	+11	-5	-12			
	(+2.8%)	(+1.5%)	(+1.4%)	(-0.6%)	(-1.4%)			
+ Heights change	-21	-25	-27	-23	-27			
	(-2.4%)	(-3.2%)	(-3.3%)	(-2.8%)	(-3.1%)			
+ Dietary energy supply (DES) change	+12	+10	-2	-31	-66			
	(+1.5%)	(+1.4%)	(-0.2%)	(-3.8%)	(-8.0%)			
+ Food losses	+111	+114	+124	+125	+125	877	874	870
	(+13.2%)	(+14.8%)	(+15.5%)	(+16.1%)	(+16.4%)			
+ Methodology changes	+23	+24	-22	-35	-33			
	(+2.3%)	(+2.7%)	(-2.4%)	(-3.9%)	(-3.8%)	(-2.9%)	(-2.7%)	(-2.2%)
<b>New assessment</b>	<b>980</b>	<b>909</b>	<b>905</b>	<b>870</b>	<b>853</b>	<b>852</b>	<b>852</b>	<b>852</b>
<b>Overall changes</b>	<b>+17.7%</b>	<b>+17.5%</b>	<b>+10.2%</b>	<b>+3.6%</b>	<b>-1.5%</b>			

Notes: Marginal changes due to each revision are shown in parentheses. Figures reported in 2011 refer to those published in *The State of Food Insecurity in the World 2011*. Source: FAO.

substantial for the most recent periods. Use of the updated values of dietary energy supply would result in, everything else unchanged, an increase in the estimated number of undernourished in the initial periods (+1.5 percent in 1990–92, and +1.4 percent in 1995–97) and a reduction in the latest ones (0.2 percent in 2000–02, –3.8 percent in 2005–07, and –8 percent in 2009).

## Food losses

The presence of food losses occurring at the retail distribution level has been identified in the past as a known source of bias in FAO estimates of undernourishment, which used the dietary energy supply obtained from the food balance sheets to estimate the mean distribution of food consumption.<sup>95</sup> Lack of reliable estimation of the extent of such losses, however, has prevented their consideration in past estimates. In this year's edition of *The State of Food Insecurity in the World*, a first step has been taken towards correcting the estimate of mean dietary energy consumption at household level, by introducing a parameter for food losses occurring during distribution at the retail level. Country-specific values of the average per capita loss of calories at various stages of the commodity chain have been estimated based on data provided in a recent FAO study of food losses, revealing that significant food losses may occur during retail distribution, that is, from the moment food is made available for human consumption at the wholesale level to the time it reaches the households.<sup>96</sup> Estimates vary by region and by food category, ranging from 2 percent for dry grains to 10 percent for fresh fruits and vegetables. Applied to the various components of the food balance sheets, these coefficients imply an overall reduction in terms of calories available for human consumption at the household level, thus increasing the estimated number of undernourished.

Of all the revisions, this is the one that causes the most dramatic change in the estimated prevalence of undernourishment in the world, with impacts ranging from +13.2 percent in 1990–92 to +16.4 percent in 2007–09. These estimates of food losses during distribution and storage are still tentative, based on rough regional aggregates published in the referenced FAO study, and are expected to be refined in the future as more precise country-specific estimates become available.

## ■ Improvements in estimation methods

The FAO Statistics Division recently conducted a thorough revision of its undernourishment methodology, elements of which have been presented and discussed in various fora, including a Round Table organized by the Committee on World Food Security in September 2011 and at the International Scientific Symposium on Food and Nutrition Security Information in Rome in January 2012. While the review confirmed the overall validity of the fundamental approach, it also revealed scope for improvement. The changes introduced with this edition of *The State of Food Insecurity in the World* concern:

- the functional form used for the distribution of dietary energy consumption in the population; and
- the way in which the parameters involved – namely the average, the coefficient of variation (CV) and the skewness of the distribution of habitual food consumption in the population – are estimated.

These changes strengthen both the methodological soundness and the empirical validity of the underlying inferential method.

## The distributional model

Since it was first adopted in 1996, the lognormal specification for the distribution has not been changed, and updates have been limited to revisions of the mean dietary energy consumption (based on data published in the food balance sheets) and to occasional revisions of the CV, when data from more recent household consumption surveys were made available to FAO. In all other cases, the lack of adequate food consumption data from nationally representative surveys did not warrant changes in the CV, which was therefore kept constant. However, raising the mean, while keeping the assumption of lognormal distribution, has the consequence of also increasing the implied probability of high levels of consumption. This raises doubts about the appropriateness of the distribution used for recent years in many countries, where the distribution of food access may have become less skewed than implied by the lognormal model. For this reason, a more flexible model (the skew-normal introduced by A. Azzalini in 1985) has been deemed more appropriate to represent the distribution of habitual food consumption in the population. Compared with the previous version, the statistical model can now capture changes in the asymmetry of the distribution of food consumption; such changes could derive, for example, from targeted food supply schemes that only affect a specific part of a population and that could not have been captured by the approach used in the past.

## Parameter estimates: mean dietary energy consumption

A known source of bias in the FAO estimates of undernourishment is the lack of reliable information on the extent of food losses. Criticisms have therefore been raised regarding the practice of assuming the mean of the distribution of calorie consumption in the population to be equal to the average dietary energy supply from food balance sheets. The estimates reported in this year's report reflect the results of an important step to correct this bias. The estimated mean of the distribution of caloric consumption is now lower than the dietary energy supply by a coefficient that reflects food losses incurred during distribution and at the retail level, and has been estimated using data provided in a recent FAO study for all regions in the world (see the discussion of food losses above).

## Parameter estimates: coefficient of variation and skewness of food consumption distribution from household survey data

In the past, the CV of the distribution of dietary energy consumption in the population was the only parameter used to represent the inequality in the distribution of food consumption. The parameter was estimated differently for different countries, depending on the availability of data. A revision of these estimates has been long overdue. Thanks to collaboration with national statistical offices responsible for household survey data collection and dissemination, FAO has not only updated the estimates of coefficients of variation, but for the first time has estimated the skewness of the distribution of food consumption in the population.

A total of 47 surveys have been processed, ranging from 1995 through 2010. As most of these surveys are income and expenditure surveys, they have not been designed to specifically capture the level of yearly habitual food consumption of individuals living in the surveyed households; rather, they provide data on total household acquisition of food during a short reference period (from one week to one month). In most cases, it has thus been necessary to re-process available household-level information to control for excessive variability due to seasonal variation in food expenditure and to the difference between reported food *acquisition* levels over a short period, and the needed average yearly food *consumption* levels. Other sources of variability in the food consumption data obtained from these surveys include the fact that food acquired may be given out to guests or people other than household members, and households may have been using previously stored food during the reference period or, conversely, purchasing food to build up stocks. All these problems call for careful procedures to control for data quality and to process the data available to estimate the CV and skewness of individual habitual consumption.

In the end, new parameters have been obtained for 37 countries; together, these account for almost 70 percent of the number of undernourished in the developing world. In the absence of usable new evidence for the remaining countries, the coefficients of variation (and implied skewness) have been kept unchanged from values used in the past.

### Projections when data are missing

New data on food supply distribution across households and on human stature and energy requirements, obtained from surveys, are not available for all countries and all years covered. This created the need to devise sound methods to project the new information to years for which no survey data are available, for both food distribution and food requirements.

### Projection of food distribution parameters

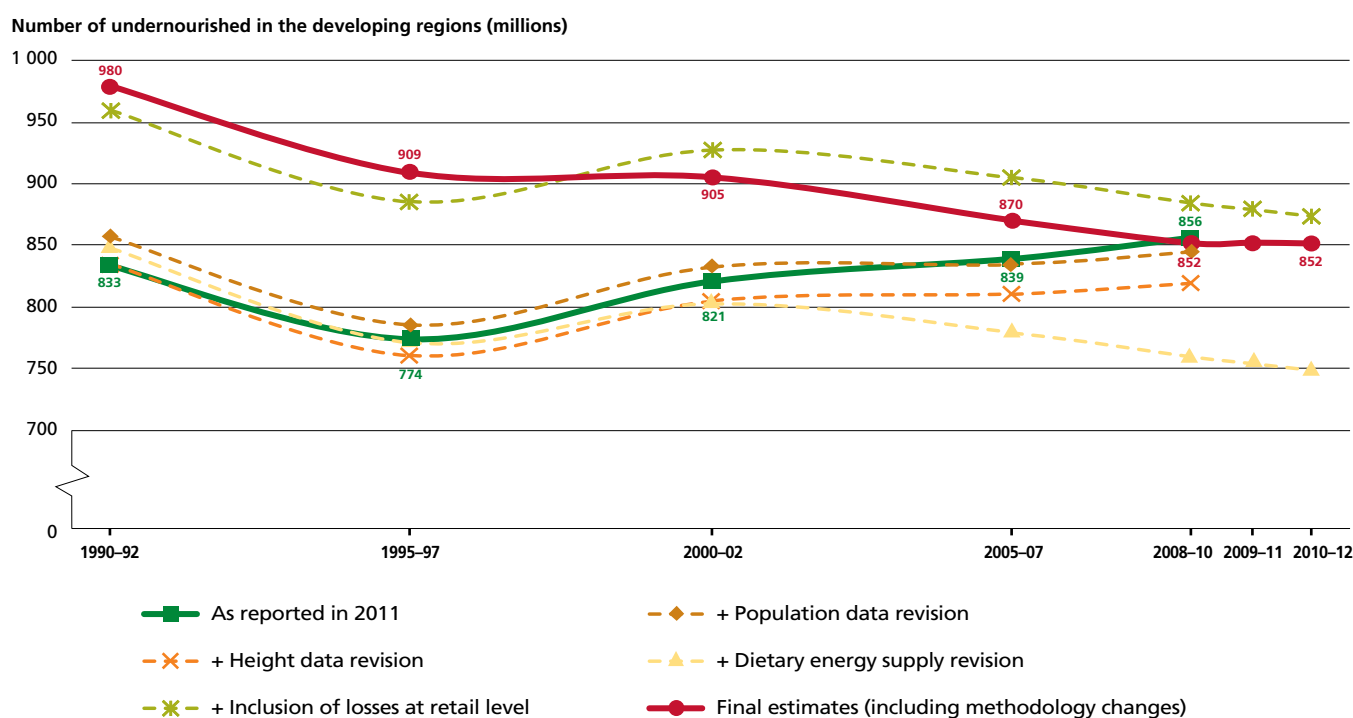
Until the 2011 edition of this report, coefficients of variation of habitual food consumption were kept fixed at the values estimated in 1996 in preparation for the World Food Survey.<sup>97</sup> Under the assumption of a lognormal distribution, these CV values also imply a fixed value for the coefficient of skewness.<sup>98</sup>

As noted, in this year's edition we have calculated the CV and the coefficient of skewness for per-person habitual food consumption in each country and for each year when a suitable survey was available. For years falling between two surveys, the missing information on CV and skewness has been estimated with a simple linear interpolation of the two parameters. The same linear interpolation has been applied to the five years preceding the first available survey, by using the old parameters as starting points.

For the years following the latest available survey, the CV and skewness estimated from the latest available survey have been retained. These parameters' values will be changed when new surveys become available.

FIGURE A2.1

Impact of individual data and methodology revisions on FAO estimates of undernourishment



Note: Figures reported in 2011 refer to those published in *The State of Food Insecurity in the World 2011*.  
Source: FAO.

## Projections of stature and dietary energy requirements

The dietary requirement threshold for a country (the MDER) is calculated as an average across sex and age groups in the population. To estimate energy requirements for each sex and age category, we use the median height of people in that group, as revealed by surveys reporting anthropometric measures.<sup>99</sup> When more than one survey is available for a country, we project the heights from the oldest survey retrospectively, and project forward those from the most recent one. For years in between surveys, we linearly interpolate the median heights for each sex and age group.

Application of these changes in methodology, including the changes in the distributional model and the new parameters for

variation and skewness, on top of all the other revisions already discussed, would have generated changes in the estimated number of undernourished in the developing world, ranging from an increase of 2.3 percent in 1990–92 and 2.7 percent in 1995–97, to reductions of 2.4, 3.9 and 3.8 percent, respectively, for 2000–02, 2005–07 and 2009.

The graphs in Figure A2.1 show the effects of the various changes described. The results of the comprehensive revision of data and methodology presented in this report are overall impacts on the estimated number of undernourished of +17.9 percent in 1990–92 and of –1.5 percent in 2009 compared with the assessment based on the data published in 2011 with no methodological changes.

**TABLE A2.2**  
Food security indicators available online\*

Type of indicator	Source	Coverage	Core	New
<b>DETERMINANTS OF (INPUTS TO) FOOD INSECURITY</b>				
<b>Availability</b>				
Average dietary supply adequacy	FAO	1990–2012		
Food production index	FAO	1990–2012		
Share of energy supply derived from cereals, roots and tubers	FAO	1990–2012		
Average protein supply	FAO	1990–2012		
Average supply of protein of animal origin	FAO	1990–2012		
<b>Physical access</b> (conditions for physical access to food)				
Percentage of paved roads over total roads	International Road Federation	1990–2009		
Rail lines density	WB	1990–2010		
Road density	WB, Transport Division	1990–2009		
<b>Economic access</b> (affordability)				
Food price level index	FAO/WB	1990–2010		
<b>Utilization</b>				
Access to improved water sources	WHO/UNICEF	1990–2010		
Access to improved sanitation facilities	WHO/UNICEF	1990–2010		
<b>OUTCOMES</b>				
<b>Inadequate access to food</b>				
Prevalence of undernourishment	FAO	1990–2011		
Share of food expenditure of the poor	FAO	partial		
Depth of the food deficit	FAO	1990–2011		
Prevalence of food inadequacy	FAO	1990–2011		
<b>Utilization</b> (food-related anthropometric failures)				
Percentage of children under 5 years of age who are stunted	WHO/UNICEF	1966–2010		
Percentage of children under 5 years of age who are wasted	WHO/UNICEF	1966–2010		
Percentage of children under 5 years of age who are underweight	WHO/UNICEF	1966–2010		
Percentage of adults who are underweight	WHO	1974–2010		
<b>VULNERABILITY/STABILITY</b>				
Domestic food price volatility	FAO/ILO	1990–2010		
Per capita food production variability	FAO	1980–2010		
Per capita food supply variability	FAO	1980–2010		
Political stability and absence of violence/terrorism	WB WGI	1996–2010		
Value of food imports over total merchandise exports	FAO	1990–2009		
Percentage of arable land equipped for irrigation	FAO	1990–2009		
Cereal import dependency ratio	FAO	1990–2009		

\* Values for these indicators are available on the website for *The State of Food Insecurity in the World* ([www.fao.org/publications/sofi/en/](http://www.fao.org/publications/sofi/en/)).  
Note: WB WGI = World Bank Worldwide Governance Indicators.



## Introducing a core set of additional food security indicators

Following the recommendation that emerged from the CFS Round Table on hunger measurement, an initial set of suitable indicators aiming to capture various aspects of food insecurity has been developed (see Table A2.2); the values for these indicators are available on the *State of Food Insecurity in the World* website ([www.fao.org/publications/sofi/en/](http://www.fao.org/publications/sofi/en/)).

The choice of indicators has been largely informed by data availability with sufficient coverage to enable meaningful comparisons across regions and over the years. While most of these indicators are already being produced and published by FAO and other international organizations, other indicators have been introduced for the first time, to fill some of the recognized gaps in food security information systems, most notably with regard to capturing the socio-economic dimensions of food insecurity.

To facilitate interpretation of the proposed indicators, they are classified along two dimensions. First, a distinction is made between indicators that describe *determinants of food insecurity*, those that describe *outcomes*, and those that convey information on vulnerability/stability. The first set includes indicators that describe structural conditions that are likely to worsen food insecurity in the absence of adequate policy interventions, including emergency assistance; the second set aims to capture the end results of food insecurity, irrespective of policy interventions or coping strategies put in place. The third set of indicators aims to capture the conditions that determine the vulnerability to possible future food insecurity.

Within the first group, indicators are then classified based on the *dimension* of food insecurity on which they provide

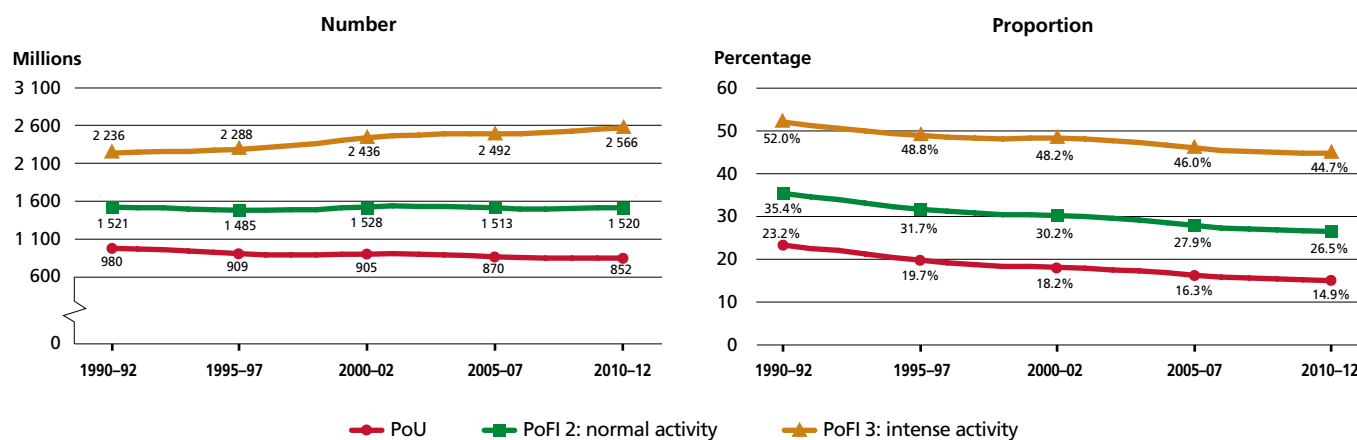
information, namely *availability, physical access, economic access (or affordability) and utilization*. Similarly, outcome indicators are classified in different groups, depending on whether they refer to outcomes in terms of *inadequate food access*, or to *anthropometric deficits due to inadequate food*.

The full list of proposed indicators is provided in Table A2.2. The table highlights the indicators that should form a core set and those that have been introduced for the first time. These new indicators are briefly described below.

- **Prevalence of food inadequacy.** This is conceptually analogous to the prevalence of undernourishment, but calculated setting the caloric threshold at a higher level corresponding to the energy need for moderate (physical activity level [PAL] = 1.75), normal (PAL = 1.85) and intense (PAL = 2.25) physical activity. It measures the percentage of the population at risk of not covering the food requirements associated with particular levels of physical activity. While the existing prevalence of undernourishment indicator is a conservative estimator of chronic food deprivation (“hunger”), such new estimators are less conservative measures of food inadequacy (see Figure A2.2).
- **Relative dietary supply index.** This is the ratio of the dietary energy supply in the country, expressed on a per capita basis, net of food losses, normalized by the country’s average dietary energy requirement (ADER), a measure of the average caloric needs of the population depending on its age/sex structure and average height distribution. It provides indications on food scarcity relative to needs in each country.
- **Food price level index.** This is an index of the food price level in each country that is comparable across countries and over time. It is based on purchasing power parities (PPP) calculated for

FIGURE A2.2

Undernourishment and food inadequacy in the developing world  
Impact on hunger estimates of alternative definitions of the minimum dietary energy requirements



Note: The graphs show estimates obtained with alternative definitions of the minimum dietary energy requirements, based on different assumptions of the coefficients for physical activity level (PAL). The standard prevalence of undernourishment indicator (PoU) assumes a PAL coefficient of 1.55, which corresponds to a sedentary lifestyle. Normal activity is associated with a PAL of 1.85, while intense physical activity is associated with a PAL of 2.25. The prevalence of food inadequacy (POFI) estimates in the graphic (calculated using PAL coefficients of 1.85 for normal activity and 2.25 for intense activity) appear to have declined less compared with the PoU (calculated using a PAL coefficient of 1.55 for a sedentary lifestyle).

Lacking disaggregated data on occupational status and physical activity levels by gender and age groups, in all cases shown, the threshold is calculated by applying the same PAL coefficient to the entire population, irrespective of gender, age and occupational status. For this reason, while the lower threshold yields a conservative estimate of food inadequacy, the higher threshold (corresponding to a PAL of 2.25) almost certainly overestimates the extent of food inadequacy, even where a large part (but not all) of the population is engaged in heavy physical work.

Source: FAO.

the International Comparison Program by World Bank researchers. The PPP relative to the food aggregate, available for 2005, is projected over time by taking into account the food and general inflation rates for each country, as measured by the consumer price index (CPI) – both the food CPI and the general CPI – published by the International Labour Organization and FAOSTAT.

- **Share of food expenditure by the poor.** This indicator measures the average share of total expenditure spent on food by households belonging to the lowest income quintile (the first 20 percent). It is compiled based on data from household expenditure surveys, and aims to capture the economic consequences of rising food prices and poverty. A rising share of food expenditure reflects the hardship that poor families face when trying to maintain food consumption when either food prices rise or incomes fall, by sacrificing other household spending, whether for consumption or investment.
- **Domestic food price volatility.** This is an index of observed variability in the annual food price level index, aimed at

capturing the consequences of all factors that determine local imbalances in the food market. Together with the other two indicators of variability, in domestic food production and food supply, it provides an indication of the past ability of a country to maintain food price stability.

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## Glossary of selected terms used in the report

**Anthropometry.** Use of human body measurements to obtain information about nutritional status.

**Dietary energy deficit.** The difference between the average daily dietary energy intake of an undernourished population and its average minimum energy requirement.

**Dietary energy intake.** The energy content of food consumed.

**Dietary energy requirement.** The amount of dietary energy required by an individual to maintain body functions, health and normal activity.

**Dietary energy supply.** Food available for human consumption, expressed in kilocalories per person per day (kcal/person/day). At country level, it is calculated as the food remaining for human use after deduction of all non-food consumption (exports, animal feed, industrial use, seed and wastage).

**Food insecurity.** A situation that exists when people lack secure access to sufficient amounts of safe and nutritious food for normal growth and development and an active and healthy life. It may be caused by the unavailability of food, insufficient purchasing power, inappropriate distribution, or inadequate use of food at the household level. Food insecurity, poor conditions of health and sanitation, and inappropriate care and feeding practices are the major causes of poor nutritional status. Food insecurity may be chronic, seasonal or transitory.

**Food security.** A situation that exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life.

**Hidden hunger:** Refers to vitamin and mineral deficiencies, or micronutrient deficiencies. Micronutrient deficiencies can compromise growth, immune function, cognitive development, and reproductive and work capacity. Somebody who suffers from hidden hunger is malnourished, but may not sense hunger. Micronutrient deficiencies can also occur in people who are overweight or obese.

**Kilocalorie (kcal).** A unit of measurement of energy. One kilocalorie equals 1 000 calories. In the International System of Units (ISU), the universal unit of energy is the joule (J). One kilocalorie = 4.184 kilojoules (kJ).

**Macronutrients.** In this document, the proteins, carbohydrates and fats that are required by the body in large amounts and are available to be used for energy. They are measured in grams.

**Malnutrition.** An abnormal physiological condition caused by deficiencies, excesses or imbalances in energy, protein and/or other nutrients.

**Micronutrients.** The vitamins, minerals and certain other substances that are required by the body in small amounts. They are measured in milligrams or micrograms.

**Minimum dietary energy requirement.** In a specified age/sex category, the minimum amount of dietary energy per person that is considered adequate to meet the energy needs for light activity and good health. For an entire population, the minimum energy requirement is the weighted average of the minimum energy requirements of the different age/sex groups in the population. It is expressed as kilocalories per person per day.

**Nutrition security.** A situation that exists when secure access to an appropriately nutritious diet is coupled with a sanitary environment, adequate health services and care, in order to ensure a healthy and active life for all household members. Nutrition security differs from food security in that it also considers the aspects of adequate caring practices, health and hygiene in addition to dietary adequacy.

**Nutritional status.** The physiological state of an individual that results from the relationship between nutrient intake and requirements and from the body's ability to digest, absorb and use these nutrients.

**Overnourishment.** Food intake that is in excess of dietary energy requirements continuously.

**Overweight and obesity.** Body weight that is above normal as a result of an excessive accumulation of fat. It is usually a manifestation of overnourishment. Overweight is defined here as BMI  $\geq 25$ –30 and obesity as BMI  $\geq 30$ .

**Stunting.** Low height for age, reflecting a sustained past episode or episodes of undernutrition.

**Undernourishment.** Food intake that is insufficient to meet dietary energy requirements continuously. This term is used interchangeably with chronic hunger, or, in this report, hunger.

**Undernutrition.** The result of undernourishment, poor absorption and/or poor biological use of nutrients consumed.

**Underweight.** Low weight for age in children, and BMI  $< 18.5$  in adults, reflecting a current condition resulting from inadequate food intake, past episodes of undernutrition or poor health conditions.

**Wasting.** Low weight for height, generally the result of weight loss associated with a recent period of starvation or disease.

For the purpose of this document, agriculture includes all food-producing sectors, such as crop production, livestock, aquaculture, fisheries and forestry.

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- $$SK = (e^{\sigma^2} + 2)\sqrt{e^{\sigma^2} - 1}$$
- and can also be conveniently expressed as a function of the coefficient of variation, according to the following formula:
- $$SK = (CV^2 + 3) \times CV$$
- This makes it clear that, when assuming a lognormal model, the skewness cannot be changed independently of the coefficient of variation.
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## NOTES for Annex 1

Countries revise their official statistics regularly for the past as well as the latest reported period. The same holds for population data of the United Nations. Whenever this happens, FAO revises its estimates of undernourishment accordingly. Therefore, users are advised to refer to changes in estimates over time only within the same edition of *The State of Food Insecurity in the World* and refrain from comparing data published in editions for different years.

1. World Food Summit goal: halve, between 1990–92 and 2015, the number of undernourished people.
2. Millennium Development Goal 1, target 1C: halve, between 1990 and 2015, the proportion of people who suffer from hunger. Indicator 1.9: Proportion of population below minimum level of dietary energy consumption (undernourishment). The results are obtained following a harmonized methodology and are based on the latest globally available data averaged over three years. Some countries may have more recent data which, if used, could lead to different estimates of the prevalence of undernourishment and consequently of the progress achieved.
3. The latest report period refers to 2010–12 provisional estimates and the baseline refers to 1990–92. For countries that did not exist in the baseline period, the 1990–92 proportion of undernourished is based on 1993–95 and the number of undernourished is based on this proportion applied to their 1990–92 population.
4. The symbols and colour indicators show the progress that is projected to be achieved by year 2015, if current trends continue:

WFS target	MDG target
◀▶ Change within ± 5%	■ Target already met or expected to be met by 2015 or prevalence < 5%
▼ Number reduced by more than 5%	■ Progress insufficient to reach the target if prevailing trends persist
▼* WFS target achieved	■ No progress, or deterioration
▲ Number increased by more than 5%	
na Not assessed	

5. Countries, areas and territories for which there were insufficient data to conduct the assessment are not considered. These include: American Samoa, Andorra, Anguilla, Aruba, Bahrain, Bhutan, British Indian Ocean Territory, British Virgin Islands, Canton and Enderbury Islands, Cayman Islands, Christmas Island, Cocos (Keeling) Islands, Cook Islands, Equatorial Guinea, Faeroe Islands, Falkland Islands (Malvinas), French Guiana, Gibraltar, Greenland, Guadeloupe, Guam, Holy See, Johnston Island, Liechtenstein, Marshall Islands, Martinique, Micronesia (Federated States of), Midway Island, Monaco, Nauru, Niue, Norfolk Island, Northern Mariana Islands, Oman, Palau, Pitcairn Islands, Puerto Rico, Qatar, Réunion, Saint Helena, Saint Pierre and Miquelon, San Marino, Singapore, Tokelau, Tonga, Turks and Caicos Islands, Tuvalu, US Virgin Islands, Wake Island, Wallis and Futuna Islands, Western Sahara.

### Country composition of the special groupings:

6. Includes: Afghanistan, Angola, Bangladesh, Benin, Burkina Faso, Burundi, Cambodia, Central African Republic, Chad, Comoros, Democratic Republic of the Congo, Djibouti, Eritrea, Ethiopia, Gambia, Guinea, Guinea Bissau, Haiti, Kiribati, Lao People's Democratic Republic, Lesotho, Liberia, Madagascar, Malawi, Mali, Mauritania, Mozambique, Myanmar, Nepal, Niger, Rwanda, Samoa, Sao Tome and Principe, Senegal, Sierra Leone, Solomon Islands, Somalia, Sudan, Timor-Leste, Togo, Uganda, United Republic of Tanzania, Vanuatu, Yemen, Zambia.
7. Includes: Afghanistan, Armenia, Azerbaijan, Bolivia (Plurinational State of), Botswana, Burkina Faso, Burundi, Central African Republic, Chad, Ethiopia, Kazakhstan, Kyrgyzstan, Lao People's Democratic Republic, Lesotho, Malawi, Mali, Mongolia, Nepal, Niger, Paraguay, Republic of Moldova, Rwanda, Swaziland, Tajikistan, The former Yugoslav Republic of Macedonia, Turkmenistan, Uganda, Uzbekistan, Zambia, Zimbabwe.

8. Includes: Antigua and Barbuda, Bahamas, Barbados, Belize, Cape Verde, Comoros, Cuba, Dominica, Dominican Republic, Fiji Islands, French Polynesia, Grenada, Guinea Bissau, Guyana, Haiti, Jamaica, Kiribati, Maldives, Mauritius, Netherlands Antilles, New Caledonia, Papua New Guinea, Saint Kitts and Nevis, Saint Lucia, Saint Vincent/Grenadines, Samoa, Sao Tome and Principe, Seychelles, Solomon Islands, Suriname, Timor-Leste, Trinidad and Tobago, Vanuatu.
9. Includes: Afghanistan, Bangladesh, Benin, Burkina Faso, Burundi, Cambodia, Central African Republic, Chad, Comoros, Democratic People's Republic of Korea, Democratic Republic of the Congo, Eritrea, Ethiopia, Gambia, Guinea, Guinea Bissau, Haiti, Kenya, Kyrgyzstan, Liberia, Madagascar, Malawi, Mali, Mauritania, Mozambique, Myanmar, Nepal, Niger, Rwanda, Sierra Leone, Somalia, Tajikistan, Togo, Uganda, United Republic of Tanzania, Zimbabwe.
10. Includes: Albania, Armenia, Belize, Bolivia (Plurinational State of), Cameroon, Cape Verde, Congo, Côte d'Ivoire, Djibouti, Egypt, El Salvador, Fiji, Georgia, Ghana, Guatemala, Guyana, India, Indonesia, Iraq, Honduras, Kiribati, Lao People's Democratic Republic, Lesotho, Republic of Moldova, Mongolia, Morocco, Nicaragua, Nigeria, Pakistan, Papua New Guinea, Paraguay, Philippines, Samoa, Sao Tome and Principe, Senegal, Solomon Islands, Sri Lanka, Sudan, Swaziland, Syrian Arab Republic, Timor-Leste, Ukraine, Uzbekistan, Vanuatu, Viet Nam, Occupied Palestinian Territory, Yemen, Zambia.
11. Includes: Afghanistan, Bangladesh, Benin, Burkina Faso, Burundi, Cambodia, Cameroon, Central African Republic, Chad, Comoros, Congo, Côte d'Ivoire, Democratic People's Republic of Korea, Democratic Republic of the Congo, Djibouti, Egypt, Eritrea, Ethiopia, Gambia, Georgia, Ghana, Guinea, Guinea Bissau, Haiti, Honduras, India, Indonesia, Iraq, Kenya, Kiribati, Kyrgyzstan, Lao People's Democratic Republic, Lesotho, Liberia, Madagascar, Malawi, Mali, Mauritania, Mongolia, Mozambique, Nepal, Nicaragua, Niger, Nigeria, Papua New Guinea, Philippines, Republic of Moldova, Rwanda, Sao Tome and Principe, Senegal, Sierra Leone, Solomon Islands, Somalia, Sri Lanka, Sudan, Syria, Tajikistan, Timor-Leste, Togo, Uganda, United Republic of Tanzania, Uzbekistan, Yemen, Zambia, Zimbabwe.
12. In addition to the countries listed in the table, includes: Cape Verde, Comoros, Democratic Republic of the Congo, Djibouti, Guinea Bissau, Gabon, Gambia, Lesotho, Mauritania, Mauritius, Sao Tome and Principe, Seychelles, Somalia, Swaziland.
13. In addition to the countries listed in the table, includes: Antigua and Barbuda, Bahamas, Barbados, Dominica, Grenada, Netherlands Antilles, Saint Kitts and Nevis, Saint Lucia, Saint Vincent/Grenadines, Jamaica, Trinidad and Tobago.
14. In addition to the countries listed in the table includes Belize, Guyana, Suriname.
15. In addition to the countries listed in the table includes: Afghanistan, Maldives.
16. In addition to the countries listed in the table, includes: Myanmar, Brunei Darussalam, Timor-Leste.
17. In addition to the countries listed in the table, includes: Iraq, and Occupied Palestinian Territory.
18. Includes: Fiji Islands, French Polynesia, Kiribati, New Caledonia, Papua New Guinea, Samoa, Solomon Islands, Vanuatu.

### KEY

- < 0.5 number of undernourished less than 0.5 million
- < 5 proportion of undernourished less than five percent
- na not applicable
- ns not statistically significant.

Source: FAO estimates.



# The State of Food Insecurity in the World

## **Economic growth is necessary but not sufficient to accelerate reduction of hunger and malnutrition**

*The State of Food Insecurity in the World 2012* presents new estimates of undernourishment based on a revised and improved methodology. The new estimates show that progress in reducing hunger during the past 20 years has been better than previously believed, and that, given renewed efforts, it may be possible to reach the MDG hunger target at the global level by 2015. However, the number of people suffering from chronic undernourishment is still unacceptably high, and eradication of hunger remains a major global challenge.

This year's report also discusses the role of economic growth in reducing undernourishment. Economic growth is most effective in reducing poverty and hunger when it increases employment and income-earning opportunities that the poor can take advantage of. Sustainable agricultural growth is often effective in reaching the poor because most of the poor and hungry live in rural areas and depend on agriculture for a significant part of their livelihoods. However, growth will not necessarily result in better nutrition for all. Policies and programmes that will ensure "nutrition-sensitive" growth include supporting increased dietary diversity, improving access to safe drinking water, sanitation and health services and educating consumers regarding adequate nutrition and child care practices.

Economic growth takes time to reach the poor, and may not reach the poorest of the poor. Therefore, social protection is crucial for eliminating hunger as rapidly as possible. Furthermore, when properly structured, social protection also promotes economic growth by building human capital and helping farmers manage risk so that they can adopt improved technologies. Finally, rapid progress in reducing hunger requires government action to provide key public goods and services within a governance system based on transparency, participation, accountability, rule of law and human rights.

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