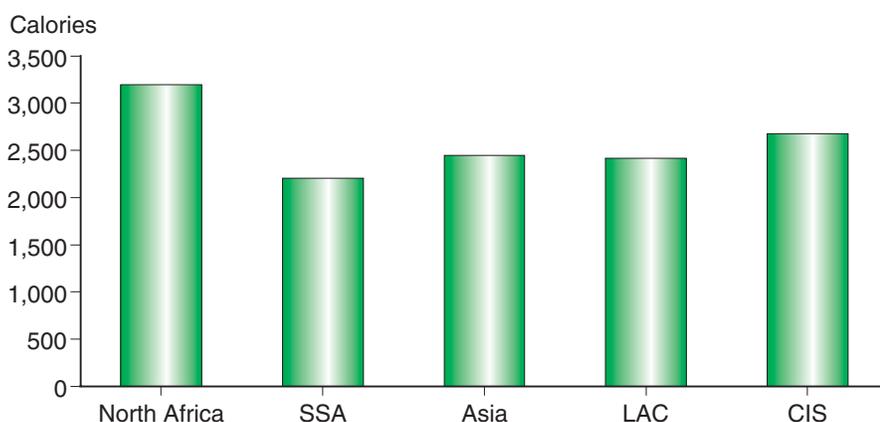


Overview: Food Security Assessment in Lower Income Countries, 2006-16

Global food security has improved over time as food production has grown faster than population over the past two decades. Food availability was about 2,399 kilocalories per person per day in 2002-04, up from 2,277 kilocalories in 1992-94 (figs. 1 and 2).¹ This improvement does not mean, however, that basic nutritional needs of all people in the world are satisfied. Although the share of the developing world's population suffering from hunger has declined since the early 1990s, relief from hunger remains far from a reality among hundreds of millions of people across developing countries.

¹The reference period for countries in the Commonwealth of Independent States (Armenia, Azerbaijan, Georgia, Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, and Uzbekistan) is 1993-95.

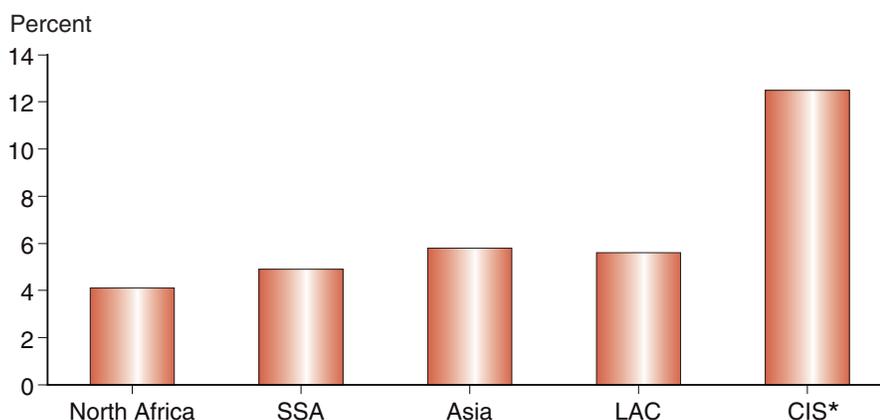
Figure 1
Average per capita calorie consumption, 2002-04



Note: SSA = Sub-Saharan Africa; LAC = Latin America and the Caribbean; CIS = Commonwealth of Independent States.

Source: USDA, Economic Research Service, using data from FAOSTAT.

Figure 2
Average growth in per capita calorie consumption between 1992-94 and 2002-04



Note: SSA = Sub-Saharan Africa; LAC = Latin America and the Caribbean; CIS = Commonwealth of Independent States.

*CIS reference period is 1993-95 to 2002-04.

Source: USDA, Economic Research Service, using data from FAOSTAT.

Even in countries where adequate food is available at the national level, wide income disparity often translates into large differences in food consumption among income groups. Where incomes are insufficient, targeted income transfers or food assistance programs (such as feeding programs or food subsidies) are means to ensure access to food. In most developing countries, however, these types of programs have limited coverage and often are directed toward the urban poor. In rural areas, where a large share of the poor population lives and hunger is the deepest, most of the daily food consumption comes from the farmers' own production. Subsistence farming characterized by low yields is prevalent across most low-income countries. The poor performance of the agricultural sector has direct implications for the food security of most people in these countries.

Food Availability Remains a Serious Problem in Sub-Saharan Africa

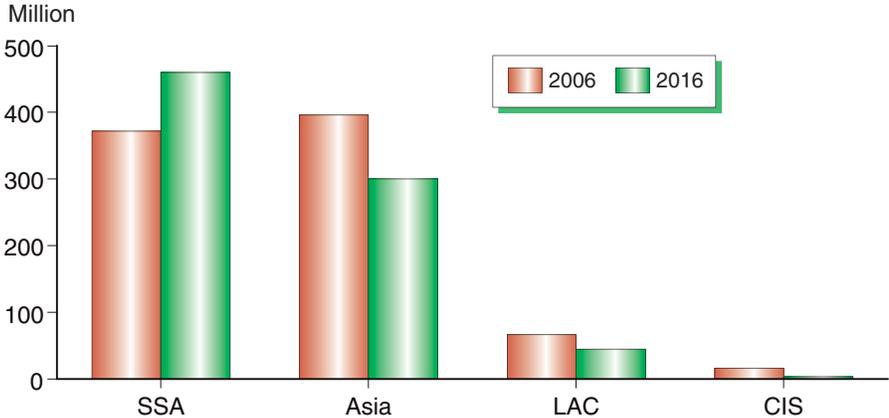
The food security indicators for the 70 lower income countries covered in this report show a higher estimated number of hungry people in 2006 relative to 2005 (849 million for 2006 compared with 804 million in 2005). However, the distribution food gap, an indicator of food access, declined (see box, "How Food Security Is Assessed: Methods and Definitions").² This means that, although more people are vulnerable to food insecurity, the intensity of the problem was less in 2006 relative to 2005. Weather-related food production shocks as well as political instability continue to be the main reasons behind short-term changes in food security of the countries. The sharp increase in global import prices in 2006 was offset largely by the increase in prices of commodities exported by these countries.

By 2016, the number of hungry people is projected to decline in all regions except in Sub-Saharan Africa (SSA) (fig. 3).³ The average nutrition gap, the indicator of food availability, was 13.5 million tons (grain equivalent) in 2006, increasing slightly to 14 million tons by 2016. SSA accounts for 85 percent of this gap, whereas the low-income countries of Asia account

²The estimates of 2006 food security indicators are based on preliminary 2006 food production data and the projections of commercial imports and constant country food aid data at the 2005 level. Therefore, if commercial imports are higher than estimated, or countries decide to draw down stocks, or donors increase food aid commitments to countries in need, these estimates of gaps, as well as the number of hungry people, could fall.

³A person is considered food insecure, or hungry, if average food availability or access to food falls below the Food and Agriculture Organization's recommended average calorie intake levels of approximately 2,100 calories per day, with some differences among regions.

Figure 3
Number of hungry people: Present versus future



Note: SSA = Sub-Saharan Africa; LAC = Latin America and the Caribbean; CIS = Commonwealth of Independent States.

Source: USDA, Economic Research Service calculations.

How Food Security Is Assessed: Methods and Definitions

Commodities covered in this report include grains, root crops, and a group called “other,” which is the remainder of the diet. The three groups account for 100 percent of all calories consumed in the study countries and are expressed in grain equivalent. The conversion is based on calorie content. For example, grain has roughly 3.5 calories per gram and tubers have about 1 calorie per gram. One ton of tubers is, therefore, equivalent to 0.29 ton of grain (1 divided by 3.5), and 1 ton of vegetable oil (8 calories per gram) is equivalent to 2.29 tons of grain (8 divided by 3.5).

Food consumption and food access are projected in 70 lower income developing countries—37 in Sub-Saharan Africa, 4 in North Africa, 11 in Latin America and the Caribbean, 10 in Asia, and 8 in the Commonwealth of Independent States. (See appendix 1 for a detailed description of the methodology and definitions of terms and appendix table 1 for a list of countries.) The projections are based on 2003-05 production data and on 2002-04 macro and supply and utilization account data. The periods covered are 2006 (current), 2011 (5-year projection), and 2016 (10-year forecast). Two food gaps—nutritional and distribution—are presented where projections through 2016 are based on differences between consumption targets and estimates of food availability, which is domestic supply (production plus commercial and food aid imports) minus nonfood use. The estimated gaps are used to evaluate food security of the study countries.

The **food gaps are calculated using the following consumption target:** The goal is for average food availability to meet nutritional requirements (NR). The average *nutrition gap* is the gap between available food and food needed to support a minimum per capita nutritional standard (for definitions of terms used see appendix 1).

The aggregate food availability projections do not take into account food insecurity problems due to food distribution difficulties within a country. Although lack of data is a major problem, an attempt was made in this report to project food consumption by different income groups based on income distribution data for each country. The concept of the income-consumption relationship was used to allocate the projected level of food availability among different income groups (indicator of food access). The estimated *distribution gap* measures the food needed to raise consumption in each income quintile to the minimum nutritional requirement. Finally, based on the projected population, the number of people who cannot meet their nutritional requirements is projected.

The common terms used in the reports are *domestic food supply*, which is the sum of domestic production and commercial and food aid imports; *food availability*, which is food supply minus nonfood use, such as feed and waste; *import dependency*, which is the ratio of food imports to food supply; and *food consumption*, which is equal to food availability.

for only 14 percent and the low-income countries of Latin America and the Caribbean for the remaining 1 percent. The two regions of North Africa and the Commonwealth of Independent States (CIS) do not have any gap in food availability (nutritional gap).

The average nutrition gap is much smaller than the distribution gap, which is an indicator of food access as it takes into account unequal purchasing power within countries. This gap is estimated at about 27 million tons for all 70 countries in the study for 2006, decreasing to close to 26 million tons by 2016 (table 1). In 2006, average grain production for the countries is estimated to have not changed much relative to that for 2005, but grain imports are estimated to decline by 12 percent because of a sharp global price rise of about 24 percent. Despite a decrease in commercial imports of about 11 million tons, these higher grain prices forced import spending up by more than 9 percent.

The estimate of the nutrition gap in 2006 is equivalent to about 18 percent of grain imports, but those shares differ widely across regions; for SSA it is 56 percent and for Asia 9 percent. When unequal purchasing power is taken into account the estimated food gap (distribution gap) is double the average nutrition gap, at 27 million tons in 2006, which is about one-third of estimated grain imports. During the next decade, the distribution gap is projected to decline slightly, to about 26 million tons. Three-quarters of this gap will occur in SSA, or about 18 percent growth for the region.

Can food gaps be closed or narrowed rapidly? The answer lies in the food production performance of the countries. In general, the countries that are

Table 1
Food availability and food gaps for 70 countries

Year	Grain production	Root production (grain equivalent)	Commercial imports (grains)	Food aid receipts (grain equivalent)	Aggregate availability of all food
			1,000 tons		
1997	526,438	62,211	66,119	6,458	777,972
1998	538,496	63,308	76,310	7,629	790,204
1999	568,358	68,398	79,452	8,586	813,431
2000	565,868	70,273	77,969	8,700	825,890
2001	582,021	72,501	79,243	9,601	835,581
2002	555,507	73,094	90,267	8,284	841,087
2003	609,855	75,505	81,395	8,735	863,024
2004	606,644	78,036	81,251	6,940	877,136
2005	630,574	79,275	92,702	8,290	892,337
Projections					
				Food gap*	
				NR	DG
2006	635,504	81,744	81,754	12,561	27,072
2011	724,125	88,680	94,316	13,139	24,942
2016	798,558	96,119	110,184	14,557	25,715
					1,094,478

*NR stands for nutritional requirements and describes the amount of grain equivalent needed to support nutritional standards on a national average level. DG stands for distributional gap and describes that amount of grain equivalent needed to allow each income quintile to reach the nutritional requirement.

Source: USDA, Economic Research Service, using data from FAOSTAT and World Food Program.

most vulnerable to food insecurity rely less on imports, which in most cases, is not by choice but because of limited access to foreign exchange. Closing the food gaps by increasing domestic food production is more feasible than raising imports in most countries. Domestic production contributes to 60-95 percent of food consumption in the study countries. Growth in food production would also increase farm income. Because most of the poor live in rural areas, a boost in agricultural incomes would benefit the lower income groups, thus alleviating income inequality and improving food security.

The World Food Summit set a goal in 1996 to reduce global hunger by half by 2015. As we approach 2015, we would like to know: How close are we? The latest Food and Agriculture Organization (FAO) report, *The State of Food Insecurity in the World, 2006*, states that, in aggregate, the number of undernourished people in developing countries did not change much since 1990-92, but relative to the populations of developing countries, the share of undernourished people declined from 20 percent to 17 percent. According to the report, the number of chronically undernourished people worldwide was estimated at 820 million in 2001-03. The report shows that the incidence of undernutrition declined in Asia and Latin America but rose in the Middle East, North Africa, and Sub-Saharan Africa.

Our estimates mirror those of FAO but are higher in absolute terms. In estimating hunger, we use an average daily requirement of 2,100 calories versus FAO's 1,800 calories. Another difference is that our estimates are based on annual data, which includes both chronic and transitory shortfalls in consumption. In contrast, FAO's estimates are based on 3-year averages. Including the variability is important because it reflects the profound impact of short-term food insecurity. Since 1992, variation from trend in the number of people consuming less than the nutritional requirement ranged from an annual increase of 150 million people to a decrease of 100 million people.

According to ERS projections, the number of people consuming below the nutritional requirement in 2016 will be about 5 percent lower than the 2006 estimate. The historical estimates from 1995-2005, however, show a growing trend of almost 3 percent. The projected improvement over the historical trend is driven by expected sharp improvement in food security performance in the Asian countries. Sub-Saharan Africa, however, is projected to suffer a 24-percent increase in the number of people with a consumption shortfall.

In This Report

Seventy countries are covered in this report. Projections/estimates of food availability include food aid, with the assumption that each country will receive the 2003-05 average level of food aid throughout the next decade. All historical and projected data are updated relative to the 2005 Food Security Assessment (FSA) report. Food production estimates for 2006 are preliminary, based on USDA data as of January 2007, with supplemental data from FAO and the World Food Program (WFP). Financial and macroeconomic data are based on the latest World Bank data. Projected macroeconomic variables are either extrapolated based on calculated growth rates for the 1990s through the early 2000s or are World Bank projections/estimations.

This report includes one special article, “Energy Price Implications for Food Security in Developing Countries.” It reviews the impact of oil and food price hikes and examines their implications on import budgets of the countries covered in this report. The article also discusses the uncertainty in future price trends, examines domestic energy policy options, and reviews safety net options available to low-income countries.

Food Security: Regional and Country Perspectives

In all regions covered in this report, food security is projected to improve in the next decade, but the rates of improvement vary. The most significant improvement is expected in Asia, followed by Latin America and the Caribbean (LAC). In Sub-Saharan Africa (SSA), with the largest number of countries (37), per capita consumption and nutritional adequacy will improve somewhat at the national level. However, the deep poverty that leads to hunger among the lower income populations will remain unchanged.

North Africa

North Africa is and will continue to be a food-secure region at the national level and at the level of all five income groups. Per capita calorie consumption in the region averages well above 3,000 calories per day, which is comparable to most developed countries. The region’s per capita consumption is projected to remain stable over the next 10 years, with only a slight decline in Egypt. This stability compares with a 0.6-percent annual increase from 1980 to the present. The projected lack of growth is a reflection of slowed food production growth—from 1.7 percent per year since 1990 to about 1.1 percent for the projection period. North Africa’s trend mirrors trends in Egypt, the region’s largest grain producer. Egypt’s grain yields are by far the highest in the region—and among the highest in the world—but its growth is not expected to match that of its recent past (table 2).

The main food security issue for North African countries is their ability to finance imports. The region depends on imports for about half of its essential food items, a share that is expected to grow along with income as imports of higher value commodities rise. Food aid, which had been a major source of imports, particularly for Egypt in the early 1980s, currently accounts for less than 1 percent of total food imports in the region, which makes its financial capacity a critical element in projecting the region’s food security. Recent growth in oil prices is good news both directly (as exporters) and indirectly because of the gains from worker remittances. Higher oil prices are expected to stimulate regional labor migration and to increase remittances. Among the four countries in the region, Algeria is the only one in which the value of exports has been higher (15 percent) than imports during 2000-02. External financing accounted for 25 percent of imports in Morocco, 16 percent in Egypt, and 7 percent in Tunisia. Historically, these countries have been successful in accessing credit to finance imports. The food price hike in 2006 could have reduced commercial imports of these countries, but the growth in export earnings at the time was more than adequate to cover the higher costs.

Table 2

Food availability and food gaps for North Africa

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grain equiv.)	Aggregate availability of all food
			<i>1,000 tons</i>		
1997	24,121	1,274	22,011	137	51,552
1998	29,319	1,354	22,093	74	52,727
1999	27,105	1,287	25,628	105	52,376
2000	24,160	1,312	27,265	356	53,684
2001	27,218	1,329	26,332	82	54,084
2002	27,991	1,500	29,961	72	54,000
2003	35,739	1,695	22,601	46	57,773
2004	35,621	1,668	21,486	59	59,813
2005	33,146	1,838	29,435	53	60,934
Projections					
				Food gap*	
				NR	DG
2006	36,239	1,851	22,800	0	0
2011	39,320	2,019	27,072	0	0
2016	42,125	2,197	32,283	0	0

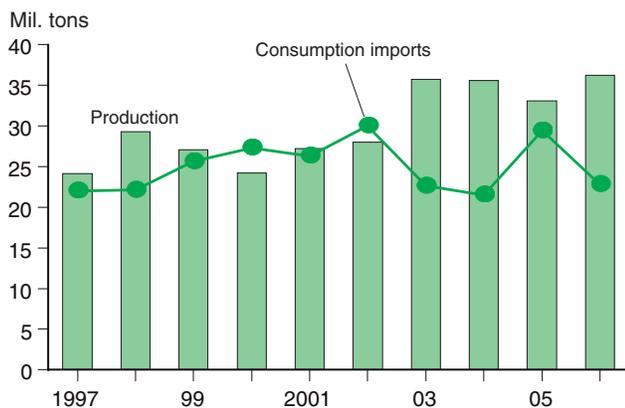
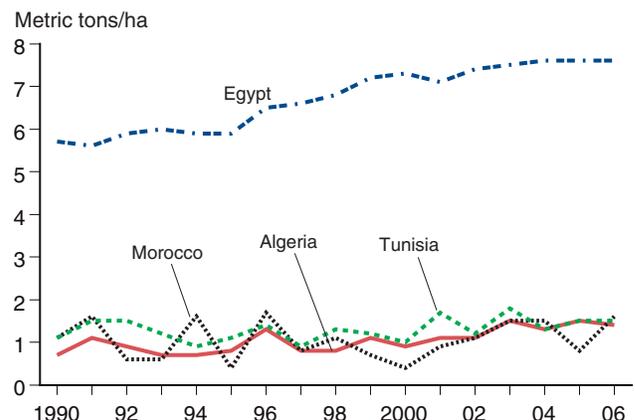
North Africa

(152 million people in 2006)

Calorie consumption, on average, is well above the nutritional requirement of 2,100 calories per day.

Although production growth is projected to slow relative to the historical period, food supplies will be adequate to meet nutritional requirements through the next decade.

Imports contributed about 47 percent of food supplies in 2005. After decreasing temporarily due to high prices, this share is expected to rise again. Therefore, the state of the economies of these countries and export potential play key roles in the food security outlook.

North Africa: Grain production and imports**North Africa: Yields in grain production****North Africa: Consumption trends**

Region/country	Daily calorie consumption		Growth in calorie consumption	Share of cereals in diet	
	1992-94	2002-04	1992-94-2002-04	1992	2002
	<i>Calories</i>		<i>Percent</i>		
North Africa	3,073	3,198	4.1	59.9	57.8
Algeria	2,970	3,070	3.4	56.8	56.6
Egypt	3,220	3,330	3.4	65.7	63.3
Morocco	2,930	3,110	6.1	62.4	62.1
Tunisia	3,170	3,280	3.5	55.4	50.7

*NR stands for nutritional requirements and describes the amount of grain equivalent needed to support nutritional standards on a national average level. DG stands for distributional gap and describes that amount of grain equivalent needed to allow each income quintile to reach the nutritional requirement.

Source: USDA, Economic Research Service, using data from FAOSTAT and World Food Program.

Asia

Asia is home to 47 percent of the 849 million undernourished people that ERS estimated for 70 low-income developing countries in 2006. This share is projected to decline markedly to 37 percent by 2016 due mainly to improvements expected in India. In 2006, an estimated 20 percent of India's population—or 222 million people—fell short of nutritional requirements. By 2016, however, this share is projected to be only 10 percent, or 126 million people. The country's population growth, which averaged about 1.7 percent per year during the 1990s, is projected to average under 1.4 percent during the next decade. Yields will continue to fuel grain output growth as area is expected to remain constant. While yield growth will slow from its 1.5 percent per year since 1990, it will still be strong enough to allow for a positive trend in per capita food supplies. Asia is estimated to have kept its commercial imports virtually constant in 2006, despite the grain price hike of 24 percent (table 3). Import bills were, therefore, about 25 percent higher than in the previous year. Given Asia's comparatively low import dependency—4 percent of total grain availability—this current increase in cost does not immediately threaten these countries' ability to pay for commercial imports.

Afghanistan is the region's most vulnerable country. In 2006 and through the projection period, consumption in each income group is estimated to fall below the nutritional requirement but this is under the assumption of weak data on external assistance. Difficult logistics, unstable political and security environment, limited resources, and very high population growth (near 3.8 percent per year) are projected to contribute to declining per capita consumption over the next decade.

North Korea is one of the few countries in Asia faced with continuous food shortages. The number of hungry people more than doubled between 1990-92 and 2001-03 due to a series of natural disasters and the dissolution of the socialist bloc, which resulted in the collapse of the country's economy in the 1990s. These conditions, in combination with an already unsustainably managed agricultural sector, put the country in a state of severe food shortage, and the population endured a famine that is estimated to have killed between 200,000 and 2 million people. According to the WFP, 70 percent of the country's population depended on cereal distributions through the public distribution system in 2004. This system supplied only 50 percent of the caloric requirements.

While North Korea's grain production has recovered from the lowest levels of the late 1990s, output remains low. In 2006, grain production was estimated at 4.4 million tons, just over half the level achieved in the early 1990s. As a result, 80 percent of the population was estimated to fall below the nutritional target in 2006, and this share is projected to hold through 2016. These projections are based on continued receipt of high levels of food aid. North Korea received an average of nearly 1 million tons of grain food aid per year between 2003 and 2005, but it is impossible to confirm that aid is reaching the intended beneficiaries. If the international community decides to cut aid levels to the country, vulnerability will certainly rise even further. On the other hand, these projections are based on recent low trend levels in agricultural production growth. If the government invests in the agricultural

Table 3

Food availability and food gaps for Asia

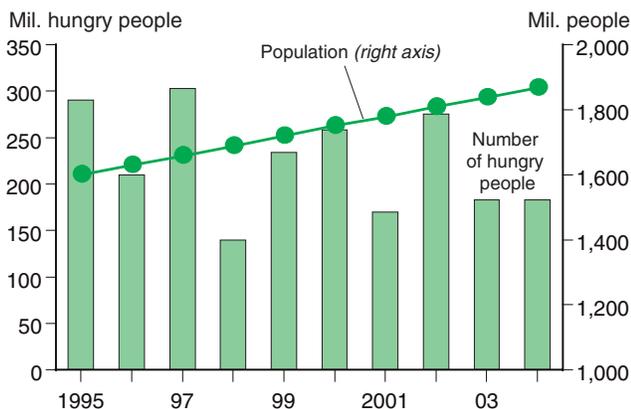
Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grain equiv.)	Aggregate availability of all food
			1,000 tons		
1997	396,258	17,622	18,261	2,591	524,187
1998	406,397	15,965	22,452	3,223	529,202
1999	426,873	18,489	25,792	4,259	547,839
2000	432,739	18,930	20,208	3,070	553,387
2001	435,437	19,234	17,960	4,209	555,962
2002	406,831	19,894	23,000	3,345	561,053
2003	444,166	21,156	21,465	2,382	573,006
2004	445,022	21,495	19,190	2,063	580,658
2005	458,954	21,884	20,041	2,376	586,650
Projections				Food gap*	
				NR	DG
2006	458,266	22,474	20,443	1,350	6,917
2011	523,168	24,108	23,528	1,877	4,657
2016	575,267	25,841	27,568	2,418	4,099

Asia

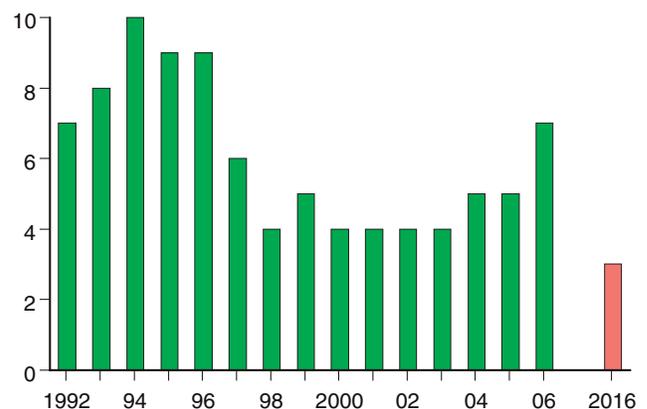
(1.94 billion people in 2006)

The number of hungry people in Asia is projected to decrease from 396 million people in 2006 to 300 million people in 2016. India, with a population of 1.26 billion, of which 10 percent are projected to be hungry in 2016, accounts for almost 42 percent of the number of hungry people in the region.

The most vulnerable country in the region is Afghanistan where hunger is prevalent and is expected to get worse.

Asia: Trend in number of hungry people versus population**Asia: Distribution gaps**

Mil. tons

**Asia: Consumption trends**

Region/country	Daily calorie consumption		Growth in calorie consumption 1992-94-2002-04	Share of cereals in diet	
	1992-94	2002-04		1992	2002
	Calories		Percent		
Asia	2,314	2,444	4.1	65.5	65.3
Bangladesh	1,990	2,200	10.6	83.7	81.8
India	2,340	2,470	5.6	63.9	58.9
Indonesia	2,810	2,890	2.8	63.7	63.2
Korea, Dem.R.	2,270	2,180	-4.0	59.9	58.8
Pakistan	2,370	2,320	-2.1	54.6	51.7
Vietnam	2,290	2,630	14.8	77.0	76.5

*NR stands for nutritional requirements and describes the amount of grain equivalent needed to support nutritional standards on a national average level. DG stands for distributional gap and describes that amount of grain equivalent needed to allow each income quintile to reach the nutritional requirement.

Source: USDA, Economic Research Service, using data from FAOSTAT and World Food Program.

sector, that might allow for area and yields to recover at a faster pace, thereby improving food security.

Bangladesh is another highly vulnerable country in Asia. Only the top two income groups were estimated to exceed the nutritional target in 2006. The per capita food consumption in the country is close to the minimum nutritional requirement (2,199 calories per day in 2004) despite impressive economic performance during the last decade. However, the situation is projected to improve greatly so that, by 2016, only 20 percent of the population will be hungry. The improvement can be attributed to slower population growth (1.8 percent per year as opposed to 2.3 percent since 1990) and continued yield growth, albeit slower than historical rates.

Nepal's food security situation is projected to improve slightly as growth in food production is expected to outpace that of population growth. In 2016, consumption in only the lowest income quintile is projected to fall short of the nutritional requirement. Nepal with close economic ties with India has shown impressive growth in the export sector, about 10 percent per year since 1990.

In contrast to Nepal, Pakistan's food security situation is projected to deteriorate slightly over the next decade. In 2006, just 10 percent of the population was estimated to fall below the nutritional target. By 2016, this is projected to jump to 20 percent as food supplies fail to keep pace with population growth. Output of grains, which account for over half of the diet, depends on yield growth as area has virtually stagnated during the last decade. Yield growth is not expected to match that of the country's high population growth, over 2.4 percent per year. As a result, per capita food supplies are projected to decline slightly through the next decade.

Although 20 percent of the population is projected to fall short of meeting the nutritional requirement through 2016, per capita consumption is expected to rise, albeit slowly, through the decade. While yield growth will likely slow from the high rate of 3 percent per year during the last decade, it will still be more than sufficient to outpace population growth of about 1.6 percent per year.

Despite projections for very slow growth in grain production, per capita consumption in Sri Lanka will remain stable through the next decade. The country's population growth is projected to be the slowest in the region at 0.7 percent per year. As a result, only 20 percent of the population will fall short of the nutritional target in 2016.

Indonesia and Vietnam have the highest per capita calorie intake in the region. They are also the two countries where food supplies are projected to be more than sufficient to meet the nutritional requirement across all income groups through 2016, despite a projected slowdown in grain output growth. The ample supplies stem from several factors: The countries have the highest rice yields in the region, over 4.5 kilograms per hectare; population growth, while already low, is projected to slow to 1.3 percent per year in Vietnam and 1.1 percent in Indonesia; and continued strong growth in the export sector, particularly in Vietnam, is expected to boost import capacity.

One important factor that can change the projection results is the growing income inequality in several countries, including India, Indonesia, and the

Philippines. In our projections, however, income distribution is assumed to stay constant during the next decade. In general, income inequality tends to grow during the industrialization process as skill-based technologies are introduced to the economy. However, growing income inequality will not result in any food security problems as long as per capita income growth outpaces the inequality of income.

Sub-Saharan Africa

Sub-Saharan Africa is the most food-insecure region. Average calorie intake in the region was 2,192 per day in 2004, by far the lowest in the world. In 2005, 23 of the 37 countries, on average, consumed less than the nutritional requirement. With a high concentration of hunger and poverty in rural areas, revitalization of the agricultural sector remains at the heart of altering the region's hunger trend. About 16 percent of the region's grain supplies are imported. Paying for these imports is a challenge for many countries as foreign exchange is limited, and price shocks, such as the 2006 24-percent increase in grain prices, reduced countries' abilities to import sufficient quantities of grain when domestic production was inadequate. Oil- and metal-exporting countries, such as Nigeria, Angola, and Zambia, that benefited from higher prices of these items coped well with the grain import price hike.

Looking ahead, in terms of domestic food production, improvements are possible even in the most vulnerable countries. SSA has arable land that can be brought into production, although this could be costly in some cases. In countries with limited arable land, more intensive agricultural production with newly available technologies can improve yields. Present growth in the production of grains, the most important component of the region's diet, is barely exceeding that of population growth. Historical gains in agricultural production in most countries in the region were largely due to area expansion. In many countries, population pressures and poor farming practices that have led to soil erosion and nutrient-deficient soils have pushed farmers onto marginal lands. These lands are less productive and are more easily degraded than existing cropland. Much of this degraded area is in the Sahel, Sudan, Ethiopia, Somalia, Kenya, and southern Africa. Given this situation, substantial increases in crop yields will be needed.

Improved soil nutrients have been identified as the most important component for sustained yield growth in the region. Fertilizer use in SSA is lower than in any other region in the world. The region accounts for only 1 percent of the world's fertilizer use. Without sufficient soil nutrients, crop yields cannot increase and respond to improved management practices or other inputs. Adoption of high-yielding corn varieties in a few countries, such as Kenya and Zimbabwe, was a milestone in increasing yields, but regional adoption rates remain low. The use of capital inputs is also very low. SSA has 1.2 tractors per 1,000 hectares land, a rate that is low compared with the other developing countries of Latin America and Asia, the rates of which stand at 12.5 and 8.6, respectively. The world average is almost 20 per 1,000 hectares land.

Most countries in SSA are classified by the United Nations (UN) as least developed countries. According to the 2006 World Bank report, *Prospects for the Global Economy*, real gross domestic product (GDP) per capita growth in SSA was -0.5 percent per year during the 1990s. The number of people

living on less than a \$1 per day rose from 227 million to 303 million between 1990 and 2002, the largest increase in the world. SSA is the only region that, under its present pace of growth and circumstances, will not achieve the Millennium Development Goal of reducing poverty by 50 percent from its 1990 level. Instead, by 2015, nearly 40 percent of the region's population will be living on less than \$1 per day, marking a small change from the estimated current level of about 46 percent. Moreover, the absolute number is projected to surpass South Asia, the region that has had the largest number of poor people during the past two decades. Exacerbating the problem of poverty is the disparity in purchasing power that is largely due to a skewed income distribution of the region. Regionally, after Latin America, SSA has the highest income inequality in the world.

Adding to the negative factors affecting the region are the devastating effects of HIV/AIDS, which deprives families of the most productive members of their labor force. This problem is particularly acute in Southern Africa, where over 30 percent of adults between the ages of 18-55 are HIV/AIDS positive. FAO projects that 55 million Africans will die from HIV/AIDS between 2000 and 2020. The human cost of such a tragedy is impossible to estimate, but in economic terms, HIV/AIDS has reduced the economic growth in those countries where the disease is widespread by 2-4 percent, thus deepening the problem of food insecurity. Despite the dampening effect of HIV/AIDS, population growth remains relatively high in Sub-Saharan Africa and is expected to remain so.

In this region, drought is a chronic problem for consumers and producers. Food consumption in most countries is highly correlated with domestic production, which is directly influenced by rainfall. Large areas of the continent outside the forest zone have short growing seasons and highly variable rainfall. The variability in production is measured by the coefficient of variation. The data for 37 countries were adjusted for trends (app. table 2). The region's average variation in grain production for 1990-2006 was 20 percent. The results, however, differ considerably among countries, ranging from less than 4 percent in the Democratic Republic of the Congo to more than 73 percent in Eritrea. In 27 of 37 countries, the coefficients of variation were more than 10 percent. The average correlation between production and consumption was about 80 percent, meaning that a large part of this variation in production is transmitted to consumers. The problem is more severe in rural areas, where most of the poor reside and often have no access to commercial markets to buy food during shortfalls.

Given that rainfall in these countries can be highly variable, irrigation could reduce production shortfalls. However, due to limited water resources and capital, less than 5 percent of arable land is irrigated. This figure is low even when compared with other developing regions. In Latin America, 13 percent of arable land is irrigated, and in Asia, 38 percent is irrigated. The world average is 19 percent.

Poverty and income inequality are some of the factors behind the social and political instability of the region. Civil war and/or unrest in many countries have disrupted agricultural activities. Farming populations have been dispersed from their land, crops and livestock lost, seed supplies exhausted, trees cut, and mines laid on roads and in fields, all of which hinder the

rehabilitation of the agricultural sectors. According to the UN, 15.6 million people, or 2.4 percent of the population, were either refugees or internally displaced in 2003. Despite the tremendous economic impacts, no estimate of the exact costs associated with the loss of health, nutrition, production capacity, and destruction of market infrastructure has been made.

In recent years, some progress has been made in the region's political environment. Since 1990, many countries have held presidential and/or parliamentary elections, some for the first time. With the resolution of long-standing conflicts in such countries as Mozambique and Angola, economic activities were resumed and agricultural output has responded positively and is expected to continue along this newly established growth path. Conversely, conflicts that persist in Burundi, Central Africa Republic, the Democratic Republic of the Congo, and Sudan continue to stifle economic activities.

The region had the second largest number of undernourished people after Asia in 2006, but it accounted for only 24 percent of the population of the study countries as opposed to Asia, which accounted for 66 percent. Also, unlike Asia, SSA shows no signs of improvement—on average—in food security and poverty levels. In fact, by 2016, the region will have more hungry people, 460 million, than Asia does, 300 million (table 4). In 2016, more than half of SSA's population is projected to consume below the nutritional requirement.

Many countries in SSA do not have an adequate supply of food, and the inequality in purchasing power exacerbates the problem. On average, consumption in 2006 was estimated at 6 percent higher than the nutritional requirement. For the highest income group, consumption exceeded the target by 20 percent. In contrast, for the lowest income group, consumption was 20 percent below the target. Obviously, there is a tremendous range of situations and circumstances among the 37 countries in the region. In 2006, the most food-insecure countries—where 80-100 percent of the population fell below the nutritional target—were the Central African Republic, the Democratic Republic of the Congo, Burundi, Eritrea, Ethiopia, Kenya, Rwanda, Somalia, Mozambique, Zimbabwe, Liberia, Sierra Leone, and Togo. About half of those countries have recently been or are currently suffering from some kind of internal conflict. On a positive note, per capita food supplies in 20 of the region's 37 countries were adequate for more than 60 percent of the population.

In 17 countries, the food security situation is projected to remain precarious or even worsen. In more than half of these countries, population growth is projected to be among the highest in the world, ranging from a low of 2.9 percent per year in the Democratic Republic of the Congo and Mauritania to a high of 3.8 percent in Somalia. These countries simply do not have the resources to increase food supplies at rates adequate to compensate for the large increases in population.

Note that improvements are projected for 10 countries in the region, including Cameroon, Burundi, Ethiopia, Kenya, Mozambique, Zambia, Zimbabwe, Benin, Ghana, and Togo. In most of these countries, population growth is quite low, meaning that continued historical production growth rates would result in positive growth in per capita food supplies.

Table 4

Food availability and food gaps for Sub-Saharan Africa (SSA)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grain equiv.)	Aggregate availability of all food
			1,000 tons		
1997	72,063	38,917	12,539	2,497	139,501
1998	74,606	41,581	15,786	2,837	146,426
1999	76,057	43,653	13,285	2,690	149,746
2000	72,695	44,904	14,650	4,027	154,283
2001	77,373	46,581	18,610	3,722	159,365
2002	75,716	46,184	20,176	3,225	160,026
2003	84,092	47,018	20,126	5,536	165,336
2004	82,512	49,044	22,471	3,901	168,600
2005	92,596	49,659	23,563	4,903	174,679
Projections				Food gap*	
				NR	DG
2006	94,994	51,289	20,662	11,025	17,569
2011	110,420	55,941	22,999	11,076	18,606
2016	126,544	60,955	25,973	11,968	20,150

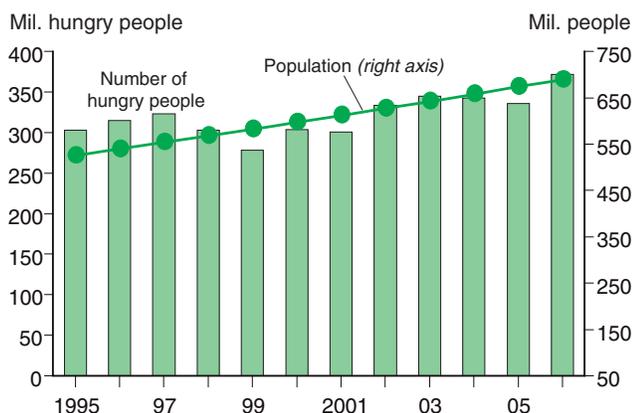
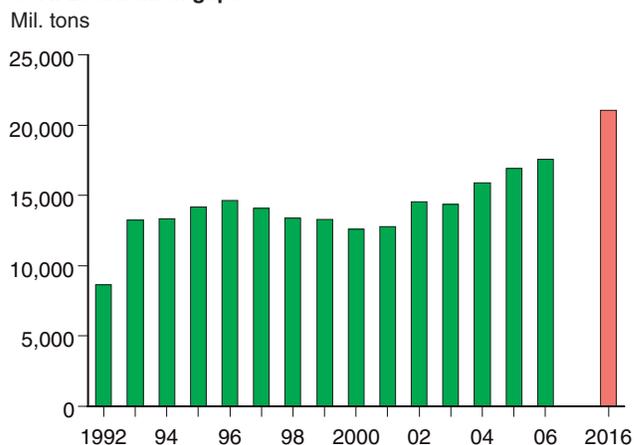
Sub-Saharan Africa
 (689 million people in 2006)

Growth in food production will nearly match that of population.

Imports will continue to play a minor role in total food supplies.

At the regional level, per capita consumption is projected to virtually hold steady through the next decade; however, it will decline in 17 of the 37 countries.

The number of hungry people in the region is projected to rise from 372 million in 2006 to 460 million in 2016; more than half the population is projected to fall short of nutritional requirements in 2016.

SSA: Trend in number of hungry people versus population

SSA: Distribution gaps

SSA: Consumption trends

Region/country	Daily calorie consumption		Growth in calorie consumption 1992-94-2002-04	Share of cereals in diet	
	1992-94	2002-04		1992	2002
	Calories		Percent		
SSA	2,122	2,208	4.1	48.6	48.1
Angola	1,780	2,120	19.1	29.1	31.6
Congo, Dem.R.	2,070	1,590	-23.2	15.7	20.3
Ghana	2,320	2,690	19.9	31.9	29.5
Nigeria	2,680	2,720	1.5	47.2	45.2
Uganda	2,250	2,370	5.3	19.6	21.3
Zimbabwe	1,940	1,980	2.1	61.7	53.5

*NR stands for nutritional requirements and describes the amount of grain equivalent needed to support nutritional standards on a national average level. DG stands for distributional gap and describes that amount of grain equivalent needed to allow each income quintile to reach the nutritional requirement.

Source: USDA, Economic Research Service, using data from FAOSTAT and World Food Program.

Latin America and the Caribbean

The Latin America and Caribbean (LAC) region has ample resources to produce enough food for its population, but the available food is not distributed evenly either among or within countries. The region has the most skewed income distribution of all the regions included in this report. Some of the low-income countries are also highly susceptible to frequent natural shocks, which intensify the vulnerability of its poorest people. Examples of natural shocks that have caused great damage in the region include El Niño, which brought drought to Haiti and the Dominican Republic and heavy flooding to Ecuador and Peru in 1997 and 1998. Also, the Hurricanes Georges and Mitch destroyed lives, crops, and infrastructure in many countries in fall 1998, resulting in a decline in food supplies and severely damaged internal distribution systems.

Food supplies in the region increased at a modest rate of 6 percent during the last decade, increasing the average per capita calorie consumption per day from 2,705 in 1990-02 to 2,867 by 2001-03. In lower income countries, such as Honduras, El Salvador, and Guatemala, staple food imports have grown significantly over time such that grain imports accounted for more than 50 percent of grain supplies during 2003-05. The reason for the growing import dependency is slow domestic grain production growth. Since 1990, grain production in these countries declined while grain import growth was in the range of 9-10 percent per year (table 5). Such high growth in food import dependency raises concern about the continued ability of these countries to finance food imports and to adapt to price shocks. Commercial imports are estimated to have decreased 2 percent in 2006 in response to the 24-percent grain price increase, which resulted in a 22-percent increase in import costs.

Food imports are supported by foreign exchange availability, particularly export earnings. While export earnings growth is strong in most countries in the region, some heavily import-dependent countries, such as Honduras and Guatemala, had export earnings growth in the range of 2-4 percent during the last decade, far less than the 9-percent annual grain import growth. Other sources of foreign exchange earnings are external credit and foreign assistance, which have contributed to roughly 10-15 percent of the total annual value of imports during the last decade, although contributions from these sources vary widely among countries. For a number of countries, the debt burden continues to dampen growth prospects and the risks of setback are considerable. Therefore, financial conditions could remain difficult. According to the World Bank, the ratio of debt to exports exceeded 200 percent in the low- and middle-income countries of Latin America, implying that performance of exports will be the key determinant of food imports. Metals, minerals, and agricultural products make up a significant share of exports of these countries. For example, in Honduras, coffee and bananas account for more than a third of export earnings. In El Salvador, coffee alone accounts for a third of the earnings. Therefore, price prospects for these commodities play an important role in the future export trends and ability of these countries to import commercially.

In general, the cross-country root cause of food insecurity in Latin America is due to high income inequality. Although the region's per capita GDP is about five times higher than Sub-Saharan Africa's, poverty levels of countries like

Table 5

Food availability and food gaps for Latin America and the Caribbean (LAC)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grain equiv.)	Aggregate availability of all food	
			1,000 tons			
1997	12,675	3,295	11,611	658	39,136	
1998	12,455	3,274	12,768	1,013	39,640	
1999	13,977	3,611	12,208	1,178	40,782	
2000	14,839	3,742	12,517	887	41,949	
2001	14,944	3,693	13,533	1,067	43,001	
2002	15,437	3,752	14,173	1,127	42,737	
2003	16,802	3,729	14,279	499	43,394	
2004	16,741	3,848	14,897	615	44,221	
2005	17,678	3,833	14,916	697	45,098	
Projections				Food gap*		
				NR	DG	
2006	15,142	4,001	14,458	186	2,296	44,862
2011	19,416	4,320	16,934	186	1,635	50,958
2016	20,736	4,659	20,071	171	1,424	57,991

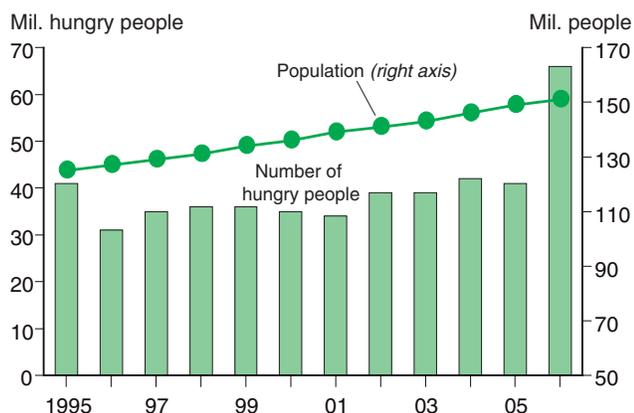
Latin America and the Caribbean
(151 million people in 2006)

Food security in the region is projected to improve over the next 10 years, with the number of hungry people projected to decline from 66 million in 2006 to 45 million in 2016.

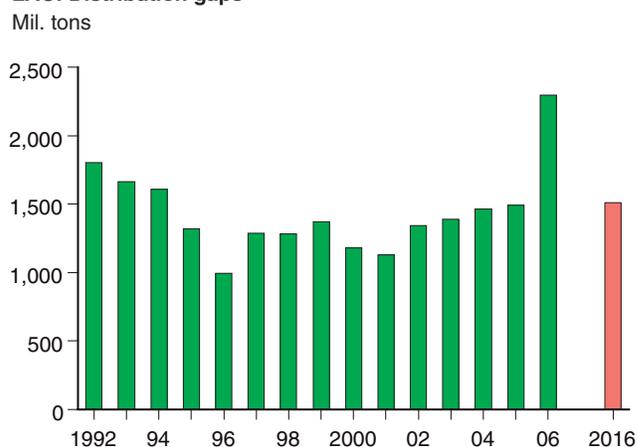
Commercial food imports will continue to replace domestic production as the main food source.

Haiti is the only country with ongoing shortfall in food availability, but several other countries continue to have distribution gaps. Food aid will remain important to fill these gaps.

LAC: Trend in number of hungry people versus population



LAC: Distribution gaps



Latin America and the Caribbean: Consumption trends

Region/country	Daily calorie consumption		Growth in calorie consumption	Share of cereals in diet	
	1992-94	2002-04	1992-94-2002-04	1992	2002
	Calories		Percent		
LAC	2,298	2,415	5.1	42.0	42.9
Guatemala	2,350	2,230	-5.1	60.1	57.5
Haiti	1,760	2,110	19.9	39.6	43.9
Honduras	2,330	2,340	0.4	53.6	51.0
Nicaragua	2,190	2,290	4.6	46.9	50.4
Peru	2,120	2,580	21.7	41.7	43.3

*NR stands for nutritional requirements and describes the amount of grain equivalent needed to support nutritional standards on a national average level. DG stands for distributional gap and describes that amount of grain equivalent needed to allow each income quintile to reach the nutritional requirement.

Source: USDA, Economic Research Service, using data from FAOSTAT and World Food Program.

Bolivia, Honduras, Haiti, Guatemala, and Nicaragua are comparable. The lowest income quintile in the region's 11 countries held less than 4 percent of total income, while the highest quintile held 57 percent. In contrast, in the 11 Asian countries in this study, the lowest group held 7.5 percent while the high group held 46 percent.

An estimated 44 percent of the population in Latin America and the Caribbean consumed below the nutritional requirement in 2006. This is quite high when compared with the 2005 estimate of 28 percent. This apparent deterioration in the food security situation is likely temporary as it is a result of below-average grain output in several countries, including Columbia, the Dominican Republic, Ecuador, and Peru. Per capita consumption in the region is projected to rise nearly 16 percent between 2006 and 2016, and as a result, only 26 percent of the population is expected to consume below the nutritional target. The most vulnerable countries in the region are Haiti and Nicaragua, where only the top income group is estimated to have exceeded the nutritional target in 2006. The biggest improvements for the next decade in terms of rising per capita consumption and decreases in the number of hungry people will be in the Dominican Republic, El Salvador, and Honduras. In all three cases, this success depends on continued strength in foreign exchange earnings, which will boost import capacity.

Commonwealth of Independent States

The review of food security indicators shows that, in 2006, an estimated 21 percent of the population of the CIS region consumed below the nutritional target (table 6). This estimate is somewhat misleading as conditions varied widely within the region. For example, consumption exceeded the target in all income groups in Armenia, Azerbaijan, Kazakhstan, Kyrgyzstan, and Turkmenistan. In contrast, Tajikistan is the most vulnerable country in the region, where an estimated 60 percent of the population fell below the nutritional target in 2006. In Uzbekistan, roughly 40 percent of the population fell below the target.

By 2016, every country, except Tajikistan, is projected to be food secure across all income groups. Per capita consumption in Tajikistan is projected to rise during the next 10 years, but in 2016, 40 percent of the population, or nearly 3 million people, still will fall below the target. Among CIS countries, Tajikistan is the poorest. The country became independent in 1991 but was plagued by a civil war from 1992 to 1997. The civil war severely damaged the already weak economic infrastructure and caused a sharp decline in industrial and agricultural production. Since then, economic activities have rebounded, but the overall economic picture remains fragile due to uneven implementation of structural reforms, weak governance, widespread unemployment, and an external debt burden. Therefore, the country is highly dependent on external assistance. In 2001-03, Tajikistan was the top recipient in the region in terms of the share of official development assistance relative to its economy and the quantities of food aid received.

The country remains primarily an agricultural state, but the productivity of the sector remains low. In 2000-02, agriculture value added per worker was \$412, while the regional average was \$4,228. Despite development of an extensive irrigation network in the Soviet era, water supply problems

Table 6

Food availability and food gaps for Commonwealth of Independent States (CIS)

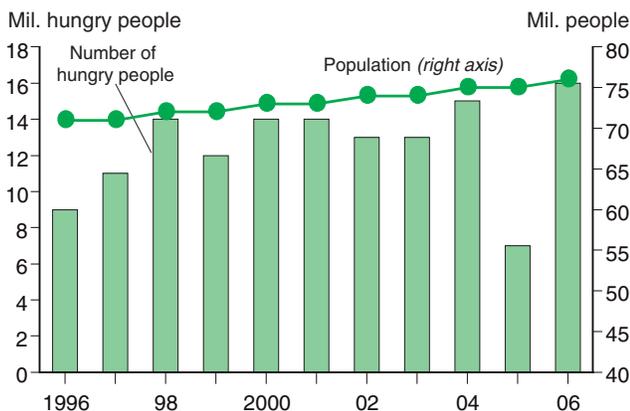
Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grain equiv.)	Aggregate availability of all food
			1,000 tons		
1997	21,322	1,104	1,696	575	23,596
1998	15,718	1,134	3,212	481	22,210
1999	24,346	1,358	2,540	353	22,689
2000	21,434	1,385	3,330	360	22,587
2001	27,050	1,664	2,808	521	23,168
2002	29,532	1,764	2,957	516	23,271
2003	29,056	1,907	2,924	272	23,516
2004	26,749	1,982	3,208	302	23,844
2005	28,201	2,060	4,748	262	24,974
Projections				Food gap*	
				NR	DG
2006	30,863	2,129	3,391	0	290
2011	31,801	2,293	3,784	0	44
2016	33,887	2,468	4,288	0	42

Commonwealth of Independent States (76 million people in 2006)

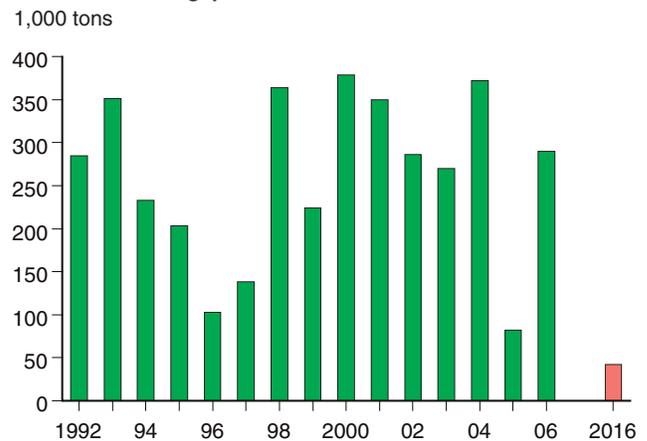
Only Tajikistan is projected to have longrun nutritional food gaps in this region. Food access is a problem for the lowest income quintile in Uzbekistan in 2006, but the situation is expected to improve. The number of hungry people is projected to decline from 16 million in 2006 to 3 million in 2016.

Grain consumption has declined sharply for most countries, primarily related to grain imports for the feed sector. Food aid historically served as an important buffer to shocks in food availability. Only a few CIS countries today still rely on food aid to a significant degree.

CIS: Trend in number of hungry people versus population



CIS: Distribution gaps



Commonwealth of Independent States: Consumption trends

Region/country	Daily calorie consumption		Annual growth in calorie consumption	Share of cereals in diet	
	1993-95	2002-04	1993-95-2002-04	1992	2002
	<i>Calories</i>		<i>Percent</i>		
CIS	2,434	2,677	10.0	59.8	58.1
Armenia	1,860	2,340	19.4	61.6	56.3
Azerbaijan	2,140	2,730	27.6	65.3	63.1
Kazakhstan	3,280	2,820	-14.0	50.1	44.7
Kyrgyzstan	2,400	3,110	29.6	50.5	60.3
Uzbekistan	2,660	2,290	-13.9	60.7	59.2

*NR stands for nutritional requirements and describes the amount of grain equivalent needed to support nutritional standards on a national average level. DG stands for distributional gap and describes that amount of grain equivalent needed to allow each income quintile to reach the nutritional requirement.

Source: USDA, Economic Research Service, using data from FAOSTAT and World Food Program.

combined with Tajikistan's mountainous topography limit agriculture to only 5-6 percent of the land area. Through the mid-1990s, agricultural output declined as a consequence of the civil war. By 1995, overall agricultural production was estimated at about half the 1990 level, and food shortages continued in urban areas.

With the country moving from a post-conflict to a development scenario, donors continued to redirect aid from food security programs to development projects, concentrating on schemes that target infrastructure, agriculture, energy, and microenterprise creation. The recent boost in the price of aluminium, a key export commodity should help economic recovery of the country. Currently, social programs are either weak or nonexistent. For example, only half of the people have access to clean water. Any investment in these areas will have significant implications on improving food security in the country. The recent signing of bilateral agreements between Russia and Tajikistan should increase remittances from migrants, which could provide additional resources for the country's economic growth.

Role of Food Aid

Food aid has been a major means by which the international community improves food access and augments food supplies in low-income countries. The global quantity of food aid has fluctuated during the last two decades, and its share has declined relative to total food imports of low-income countries. The share of food aid in total grain imports was around 18-20 percent in the early 1990s but has since declined to about 6 percent in 2005. Sub-Saharan Africa is by far the largest recipient of food aid, receiving about 50 percent of the volume allocated to the 70 countries during 2003-05. Severe droughts in the early 1990s resulted in higher food aid shipments to SSA, while political change, financial collapse, and natural disasters in the late 1990s shifted donations to Asia. Food aid per capita received by SSA, however, is much higher than Asia's because of the difference in population size: SSA countries have less than half the population of lower income Asian countries. North African countries, among the top food aid recipients two decades ago, now receive less than 2 percent of total food aid.

Most food aid is in the form of grains, but nongrain food aid rose from about 15 percent in 1990 to 20 percent in 2005. The most important nongrain food items are vegetable oils (10 percent share) and beans (6 percent). The top five recipients of nongrain food aid in 2005 were Sudan, Ethiopia, Afghanistan, Guatemala, and India. The growing share of noncereals may be problematic for food security because grains are the least expensive source of calories, and more expensive nongrain commodities will likely not reach the poorest segments of the population. The distribution of noncereal food aid is not uniform among recipients. In 2005, the share of nongrain food aid in Columbia, Georgia, Guatemala, India, and Pakistan was higher than cereal food aid (converted to grain equivalent). Pakistan had the largest share of noncereal food aid, more than three times the average received by the other study countries. Commodities included in the nongrain package were vegetable oil, beans, dried fish, pulses, sugar, and dry milk.

Regionally, Sub-Saharan Africa is the largest recipient of nongrain food aid, receiving about half of the total food aid available to the 70 countries in

2005, followed by low-income Asian countries at 25 percent. Country rankings show that, by far, the largest recipients of food aid in 2005 (all in grain equivalent) were North Korea and Ethiopia, at 1.2 million tons, and Sudan at about 1 million tons. In 2005, 12 of the 70 countries covered in the report received food aid while, according to our estimates, they did not have any food gap. An example of food aid going to a country with no apparent need is Algeria, with per capita food consumption of more than 3,000 calories per day, a much higher level than recommended, even when skewed income distribution and access to food is taken into account.

The major food donors have traditionally been the United States, the European Union (EU), Japan, Canada, and Australia. In the early 1990s, the United States provided roughly 7 million tons of food aid per year, or 56 percent of global food aid. The EU share at that time was about 29 percent. U.S. donations fell considerably through the mid-1990s. This decline was partially offset by donations from the EU, whose share rose above 40 percent, and from Japan, whose share jumped from 2-3 percent to close to 10 percent. U.S. donations rebounded considerably, and in 2003-05, the U.S. share of the world total matched the levels of the early 1990s. Conversely, EU donations have slipped, and its share of the total has averaged 20 percent in recent years.

Food aid shipments have been partly replaced by cash donations, which can be less disruptive to local markets. In situations of food shortages, the cash donations can be used to buy supplies available in other parts of the afflicted country or in neighboring countries without depressing local prices, which would depress subsistence farmers' incomes and discourage them from producing the following year. Some of the major donors are shifting their contributions of food aid from shipments to cash donations. Between 2003 and 2004, food aid shipments decreased 27 percent, but in the same year, official development assistance and aid increased 10 percent.

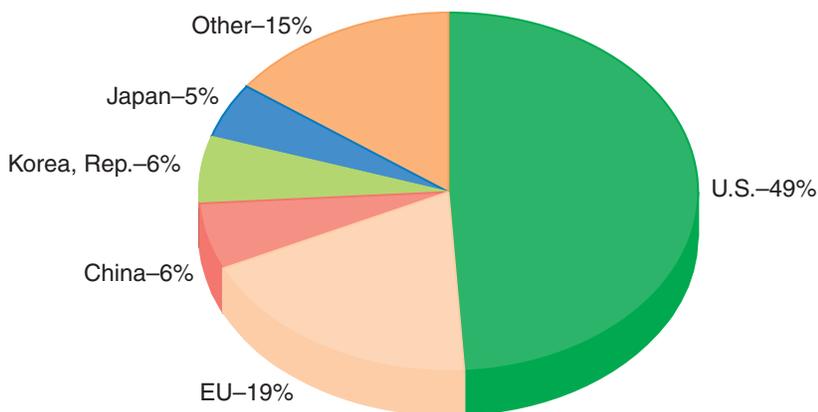
In 2005, total food aid shipments, as reported by the World Food Program, were close to 8 million tons, up 10 percent from the previous year. The U.S. contributed 3.86 million tons, or 48.5 percent of the total, the EU followed with about 1.5 million tons, or 19 percent of the total. China and South Korea surpassed Japan, Canada, and Australia as donors, with close to half a million tons of food aid, or 6.2 percent each, compared with 388,000 tons donated by Japan, 274,000 by Canada, and 135,000 tons by Australia (fig. 4).

Conclusions

The analysis in this report indicates that the number of hungry people in 70 lower income countries increased between 2005 and 2006, but the food gap that represents intensity of food insecurity declined. Weather-related production declines and political instability remain the key reason for changes in short-term food insecurity. In resource-poor countries, frequent economic shocks erode the coping capacity and accelerate chronic vulnerability to food insecurity. Political conflict is fostered where poverty, food insecurity, and unequal distribution of resources are prevalent. Rising oil and some nonfuel commodity prices are welcome news for many countries. However, in countries where food insecurity is deep, there is a concern in terms of the financial burden of a higher import bill and the possible resulting constraints on imports of food.

Figure 4

2005 food aid donors



Source: USDA, Economic Research Service.

Over the next decade, the number of hungry people and food gaps are projected to decline in all regions, except Sub-Saharan Africa. The close relationship between low agricultural productivity and poverty and food insecurity are well documented in the literature. Expanded use of new technologies will enhance productivity and increase farm income and assets, thereby improving the coping capacity of the farmers when confronted with short-term production shocks. The recent increase in food prices can provide an opportunity for low-income countries to increase their food production. Unfortunately, in most of these countries, agricultural supply response to higher prices is low because of inefficient marketing systems. In Sub-Saharan Africa in particular, the potential to increase yields for staple crops consumed by the poor is significant. Crop yields in the region are among the lowest in the world. Developing rural markets will create a low-risk environment that is essential for sustainable economic growth and the elimination of hunger, which, in turn, will reduce the likelihood of political conflicts.

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