United States
Department of
Agriculture

Economic
Research
Service

Outlook

GFA-18
June 2007

USDA

AGRICULTURE AND TRADE REPORTS

FOOD SECURITY ASSESSMENT, 2006

Sub-Saharan Africa is the most food-insecure region and shows no signs of improvement—on average—in food security and poverty levels.

A Report from the Economic Research Service

www.ers.usda.gov

Food Security Assessment, 2006

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Abstract

The number of hungry people in the 70 lower income countries covered in this report rose between 2005 and 2006, from 804 million to 849 million. However, the food distribution gap—an indicator of food access—declined, which means that, although more people are vulnerable to food insecurity, the intensity was less in 2006 than in 2005. By 2016, the number of hungry people is projected to decline in all regions, except Sub-Saharan Africa. The average nutrition gap, the indicator of food availability, was 13.5 million tons (grain equivalent) in 2006 and is expected to increase to 14 million tons by 2016. Sub-Saharan Africa accounts for 85 percent of this gap, the low-income countries of Asia for only 14 percent, and the low-income countries of Latin America and the Caribbean for the remaining 1 percent. The average nutrition gap was much smaller than the distribution gap, which takes into account unequal purchasing power within countries. The distribution gap was an estimated 27 million tons in 2006 for all 70 countries, decreasing to close to 26 million tons by 2016.

Keywords: food security, food aid, production, imports, Sub-Saharan Africa, North Africa, Asia, Latin America and the Caribbean, Commonwealth of Independent States

Preface

This report continues the series of food assessments begun in the late 1970s. *Global Food Assessments* were done from 1990 to 1992, hence the GFA series. In 1993, the title was changed to *Food Aid Needs Assessment* to more accurately reflect the contents of the report, which focuses on selected developing countries with past or continuing food deficits. In 1997, we widened our analysis beyond the assessment of aggregate food availability to include more aspects of food security. We therefore changed the title to *Food Security Assessment*.

Acknowledgments

Cover Photos: World Food Program (background: Diego Fernandez; left: Ulrik Pedersen; right: Diego Fernandez).

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Summary

Preliminary estimates indicate that the number of hungry people in 70 lower income countries rose between 2005 and 2006, from 804 million people to 849 million. The two main factors contributing to this increase were higher food prices and poor economic performance in several countries. By 2016, however, the number of hungry people is projected to decline in all regions, except Sub-Saharan Africa. The most significant improvement is expected in Asia, followed by Latin America and the Caribbean.

In *Food Security Assessment, 2006*, the Economic Research Service (ERS) estimates and projects the number of hungry people globally, regionally, and in each of the 70 lower income countries studied. Hungry people are those consuming less than the nutritional target of 2,100 calories a day. The report also measures the food distribution gap (the amount of food needed to raise consumption of each income group to the nutritional requirement) and examines the factors that shape food security. Food security is defined as access by all people at all times to enough food for an active and healthy life.

What Is the Issue?

Recent oil price hikes have raised concerns for low-income countries over the financial burden of the higher energy import bill and the constraints that might ensue in importing necessities like food and raw materials. If food imports become vulnerable, food security could become more of an issue for some of these countries.

Higher oil prices have sparked global energy concerns, which in turn, have spurred demand for ethanol and biodiesel in some food-exporting countries. The resulting increase in demand for grain, sugar, and vegetable oils (commodities used to produce biofuels and biodiesel) has resulted in higher food prices, which compounds economic pressure for the low-income countries. These commodities constitute a large share of the diets in low-income countries, and therefore, rising prices and their subsequent inflationary effects are likely to further constrain consumers' budgets.

What Did the Project Find?

The average nutritional food gap was 13.5 million tons (grain equivalent) in 2006 and is projected to increase slightly to 14 million tons by 2016. Sub-Saharan Africa accounts for 85 percent of this gap, while the low-income countries of Asia account for only 14 percent and the low-income countries of Latin America and the Caribbean for the remaining 1 percent. The distribution gap, an indicator of food access (as it takes into account unequal purchasing power within countries), is estimated at about 27 million tons for 2006, decreasing slightly to 26 million tons by 2016.

ERS has estimated that there were 849 million undernourished people in 70 low-income developing countries in 2006. **Asia** was home to 47 percent of this number, and this share is projected to decline markedly to 37 percent by 2016 due to improvements expected in India. Given the region's compara-

tively low import dependency (4 percent of total grain availability), the current increase in food prices does not immediately threaten these countries' ability to pay for commercial imports.

Sub-Saharan Africa is the most food-insecure region. The region accounted for 44 percent of the total number of hungry people, but it accounted for only 24 percent of the population of the study countries. While Asia had a higher absolute number of hungry people, it is far less vulnerable than SSA. Asia accounted for 47 percent of the total number of hungry people, but it accounted for a far larger share of the total population—66 percent. Also, unlike Asia, Sub-Saharan Africa 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, at 300 million, does. In 2016, more than half of the region's population is projected to consume below the nutritional requirement.

An estimated 44 percent of the population in **Latin America and the Caribbean** consumed below the nutritional requirement in 2006. This share is expected to drop to 26 percent by 2016 because per capita consumption in the region is projected to rise nearly 16 percent between 2006 and 2016.

How Was the Project Conducted?

All historical and projected data are updated relative to the 2005 *Food Security Assessment* report. Food production estimates for 2006 are preliminary, based on USDA data as of October 2006, with supplemental data from the Food and Agriculture Organization of the United Nations and the World Food Program. 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 and early 2000s or are World Bank projections/estimations. 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.

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.

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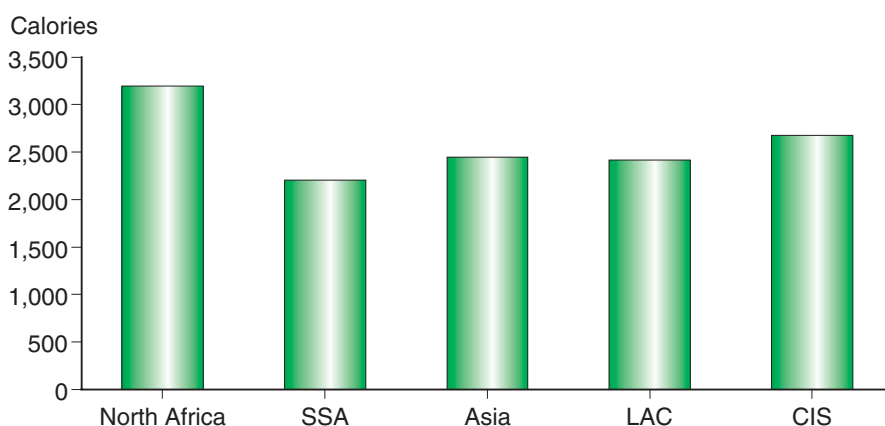
Note: SSA = Sub-Saharan Africa; LAC = Latin America and the Caribbean; CIS = Commonwealth of Independent States.

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

Figure 2

Average growth in per capita calorie consumption between 1992-94 and 2002-04
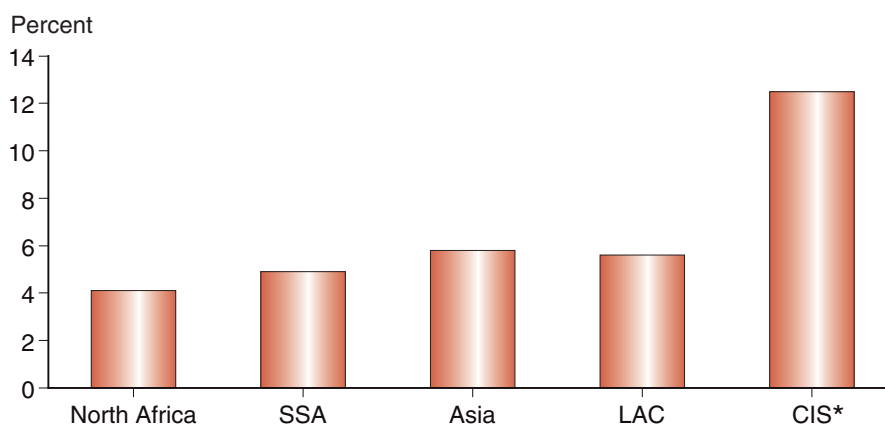
Note: SSA = Sub-Saharan Africa; LAC = Latin America and the Caribbean; CIS = Commonwealth of Independent States.
*CIS reference period is 1993-95 to 2002-04.
Source: USDA, Economic Research Service, using data from FAOSTAT.

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

[2]The 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.

[3]A 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
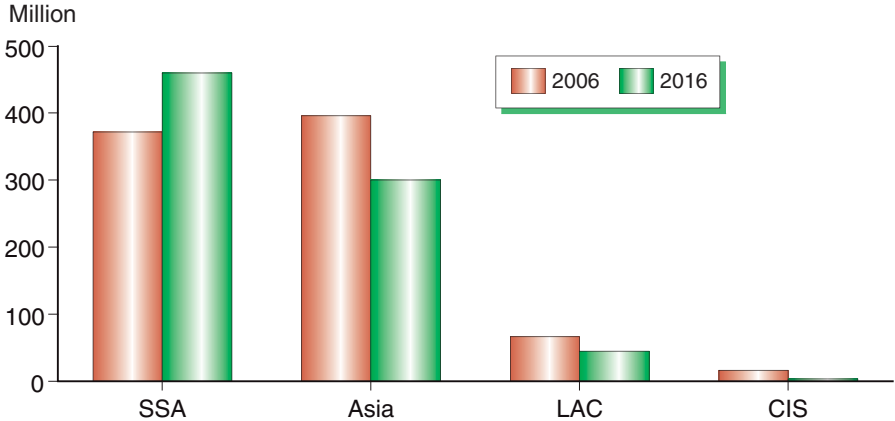
Million

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_	909,110
2011	724,125	88,680	94,316	_13,139_	_24,942_	999,124
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
			1,000 tons			
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*	56,292
2011	39,320	2,019	27,072	*0*	*0*	61,651
2016	42,125	2,197	32,283	*0*	*0*	66,983

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
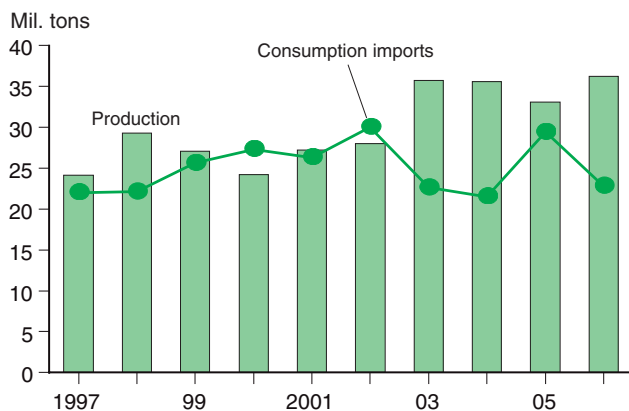
North Africa: Yields in grain production
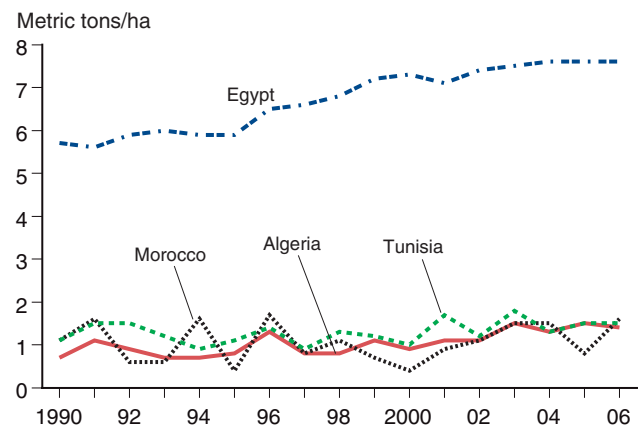
North Africa: Consumption trends

Region/country	Daily calorie consumption		Growth in calorie consumption	Share of cereals in diet	
	1992-94	2002-04	1992-94-2002-04	1992	2002
	Calories		*———————— Percent ————————*		
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*	607,422
2011	523,168	24,108	23,528	*1,877*	*4,657*	660,260
2016	575,267	25,841	27,568	*2,418*	*4,099*	715,042

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
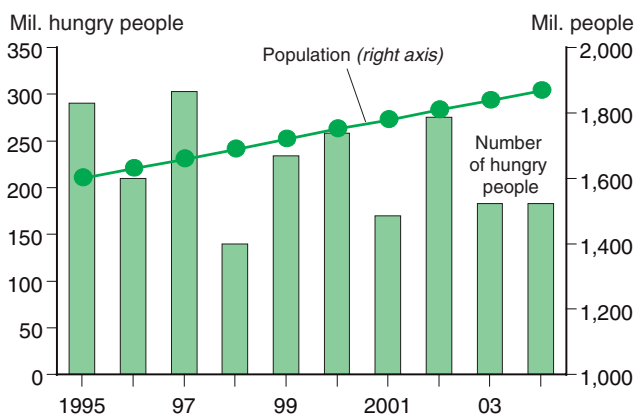
Asia: Distribution gaps
Mil. tons
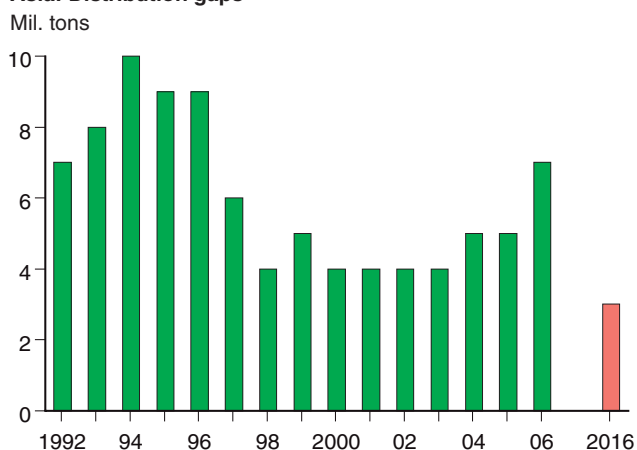
Asia: Consumption trends

Region/country	Daily calorie consumption		Growth in calorie consumption	Share of cereals in diet	
	1992-94	2002-04	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*	175,528
2011	110,420	55,941	22,999	*11,076*	*18,606*	198,461
2016	126,544	60,955	25,973	*11,968*	*20,150*	223,740

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
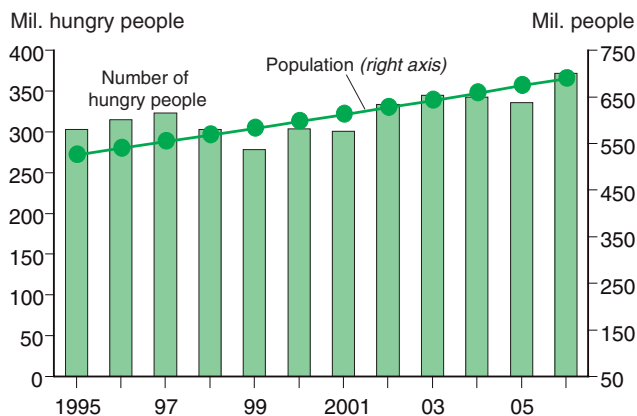
SSA: Distribution gaps
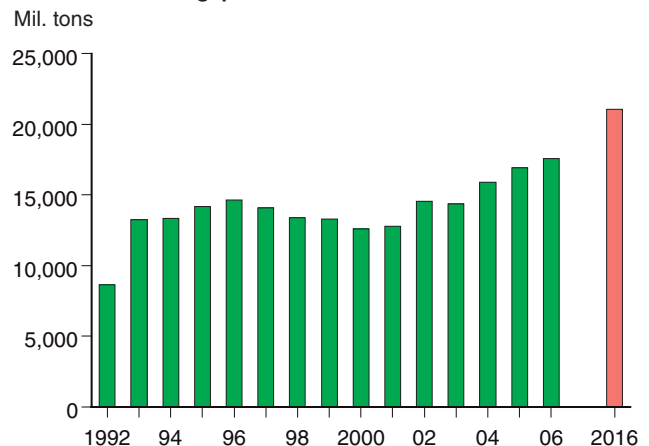
SSA: Consumption trends

Region/country	Daily calorie consumption		Growth in calorie consumption	Share of cereals in diet	
	1992-94	2002-04	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
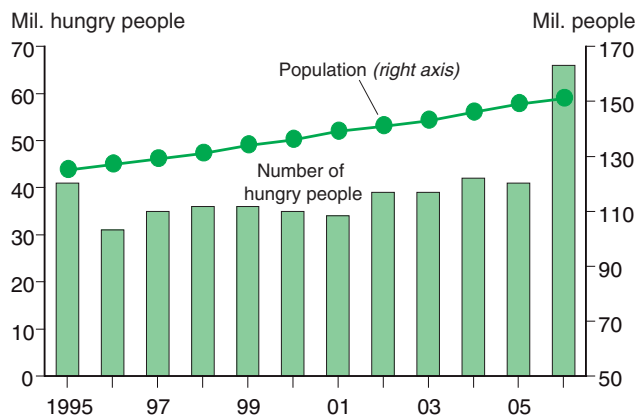
LAC: Distribution gaps
Mil. tons
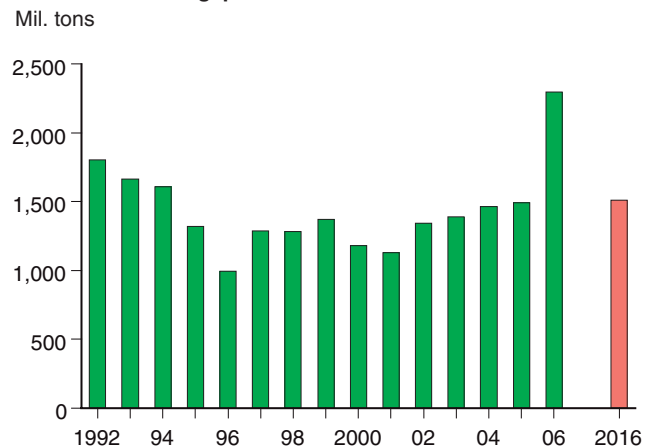
Latin America and the Caribbean: Consumption trends

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*	25,007
2011	31,801	2,293	3,784	*0* *44*	27,794
2016	33,887	2,468	4,288	*0* *42*	30,722

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
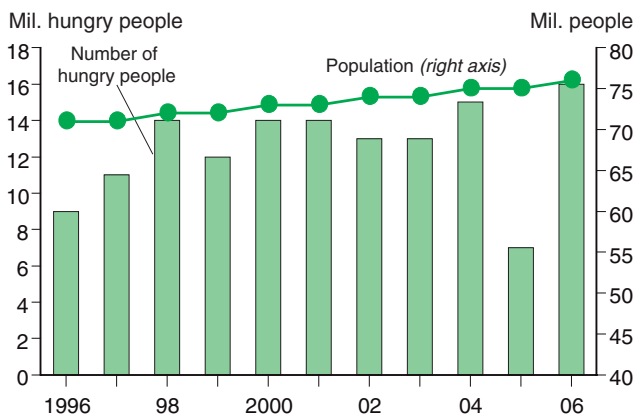
CIS: Distribution gaps
1,000 tons
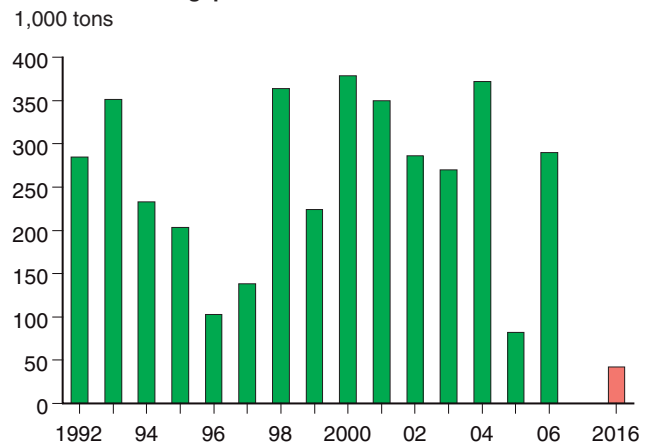
Commonwealth of Independent States: Consumption trends

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
	Calories		——————— *Percent* ———————		
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
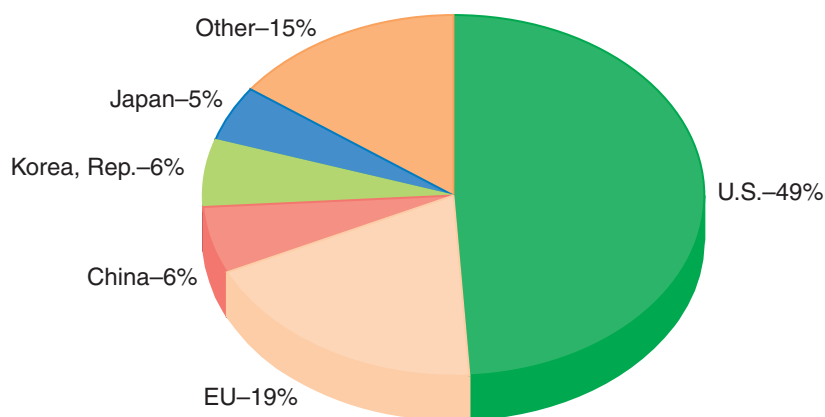
Source: USDA, Economic Research Service.

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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Energy Price Implications for Food Security in Developing Countries

Shahla Shapouri and Stacey Rosen

Concerns over recent oil price hikes are not new. They echo the concerns over the price shocks of 1974 and 1979. Chief among these concerns regarding low-income countries is the financial burden that the higher energy import bill will place on low-income countries and the constraints that might ensue in importing necessities like food and raw materials. The current economic climate is different, however, from the climate of the past in that current conditions could limit the food security vulnerability of the low-income countries. According to a World Bank report *(Global Development and Finance Report,* 2006*)*, the rise in oil prices since 2002 has had little impact on the global economy because of its minimal impact on inflation especially in the higher income countries where interest rates are determined. In addition, the reform policies adopted by many developing countries since the 1980s have facilitated adjustments in relative prices to contain inflationary pressures of the oil price shocks.

For some of the lower income countries, growth in the global economy led to increased prices for their key export commodities, such as metals and some agricultural commodities, thus improving their ability to finance higher oil bills. According to an International Monetary Fund (IMF) report (*Regional Economic Outlook Report: Sub-Saharan Africa,* 2006), 13 of 33 Sub-Saharan African countries gained from these commodity price booms during 2002-05; the remaining 20 countries lost in terms of trade that averaged 1.7 percent of gross domestic product (GDP). During the same period, terms of trade deteriorated by 4 percent in Central America despite the Latin American region's improvement in terms of trade (*Regional Economic Outlook Report: Western Hemisphere,* 2006). Deteriorating terms of trade means that a smaller quantity of imports can be purchased for a given quantity of exports, thereby essentially reducing the import purchasing power of domestic earnings.

The changes in import capacity have direct implications on food security of low-income countries. The baseline food security assessment of 70 lower income countries (see app. table 2 for the list of countries) projects a slight increase in food availability during the next decade mainly because of expected improvements in food security in Asia. This increase in availability is projected to lead to a 5-percent drop in the number of hungry people. The projections of food availability have two main components: domestic production and food imports. In the low-income countries, food import dependency has grown over time because of a combination of demand growth stemming from income and population growth and slow domestic production growth. For the highly import-dependent countries as well as those that are highly food insecure, any decline in import capacity and food imports can have challenging food security implications.

In the following sections, we review the magnitude of the oil and food price hikes and examine their implications for import budgets of lower income countries (70 countries). We also discuss future market uncertainties, examine domestic energy policy options, and review safety net options available to low-income countries.

Energy Price Increase Impact on Income and Imports

Energy is a key input for a growing economy and limited access to and use of energy tends to dampen economic growth, a critical factor behind food insecurity. According to IMF estimates (*World Outlook Report*, 2006), GDP losses relative to their baseline level following a sustained $25-per-barrel oil price increase (from 2003 to 2005) were about 0.8 percent in Asia, but only 0.2 percent in Latin America because of its lower dependence on oil imports. The impact on the economies of lower income countries in general was 1.6 percent. The greatest estimated impact was for Sub-Saharan Africa, more than 3 percent. The reason for this relatively large impact can be attributed to the high value of the region's fuel imports relative to GDP, 14 percent, which is much higher than the other regions' shares.

The increases in fuel prices put pressure on the financial situation of importing countries. For example, from 2002 to 2004 when the oil price jumped from $25 to $37 per barrel, Nicaragua's energy import bill rose by $186 million. This amount was about 50 percent higher than its earnings from exports of coffee—its number one export crop—for the year. During the same period, Kenya's energy import bill increased by $564 million, about equal to the total value received from tea and coffee exports, the country's top two export earners. In the same period, Togo's energy import bill rose by $152 million, equivalent to about 2.6 times the value of its cotton exports for that year.

One concern about increasing oil import costs in lower income countries is related to the potential impacts on other imports, including essential items like food. The of oil import share of total imports varies by country, but in some low-income countries, such as Ghana, Pakistan, and Madagascar, it exceeded 20 percent in 2004. If the price of energy imports rises and countries are faced with import budget constraints, imports of other goods, such as food or essential raw materials, are likely to fall. In Kenya, for example, as the share of oil imports rose between 2002 and 2004, food import shares declined. The 2004 drought led to a 20-percent decline in domestic grain production, but commercial food imports did not increase, leading to a 6-percent decline in per capita consumption. This decline is critical in that grains contribute to more than 50 percent of daily per capita calorie intake in Kenya, a country that barely meets the minimum nutritional requirement of 2,100 calories per capita per day.

For countries that maintain food and oil imports, there is a concern over forgoing imports of essential inputs that are crucial for their economic growth. In Tanzania, for example, the food and oil share of total imports increased 6 percentage points from 2002 to 2004. As a result, in 2004, Tanzania spent more than half of its export earnings on those two import groups. Tanzania is faced with a high trade deficit and relies heavily on external assistance for financial

support. Tanzania is among the lowest income countries in the world with average per capita income at about $300 (in constant U.S. dollars) in 2002-04 and per capita daily calorie consumption of close to the nutritional requirement (2,131). When consumption disparity due to unequal income distribution is taken into account, almost 60 percent of people consume less than the nutritional requirement (2,100 calories per day).

Food and Oil Price Shocks

The higher oil prices have sparked global energy security concerns. This concern, along with growing interest in the environmental benefits associated with the use of renewable energy relative to oil have resulted in wide-ranging government policies promoting biofuel production. The use of food crops for producing biofuels, the subsequent substitution among food crops to higher priced commodities, and the food demand growth fueled by high-income growth in the most populous countries, China and India, has altered the path of declining price trends for several commodities (fig. A-1). According to a Food and Agriculture Organization (FAO) report (*Food Outlook: Global Market Analysis,* 2006), ethanol production derived from starch and sugar increased by 53 percent between 2000 and 2005. For 2006, a preliminary FAO estimate (FAO Newsroom, 10/2006) indicated that the food import bill at the global level had increased by more than 2 percent over 2005 levels. For the developing countries, the import bill is estimated to have grown even more, 3.5 percent; for the low-income countries, this increase was even more dramatic, 7 percent.

During 2002-06, corn prices increased by 50 percent; wheat, 45 percent; and soybean oil, 60 percent. These commodities constitute a large share of the diets in low-income countries, and therefore, rising prices and their subsequent inflationary effects are likely to further constrain consumers' budgets (fig. A-2). In low-income Asian countries, cereals account for 63 percent of the diet, on average. In North African and Commonwealth of Independent States (CIS) countries, cereals contribute to about 60 percent of diets. In Sub-

Figure A-1

Price indices

1990=100
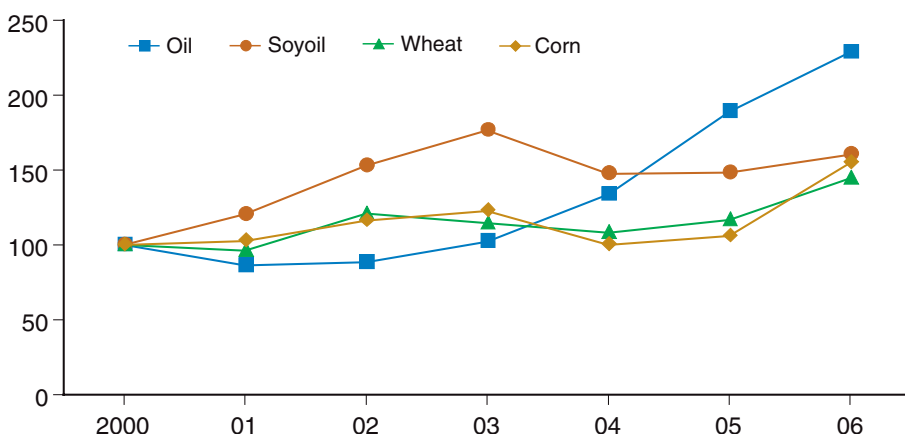
Source: USDA baseline.

Figure A-2
Diet shares of low-income countries by region
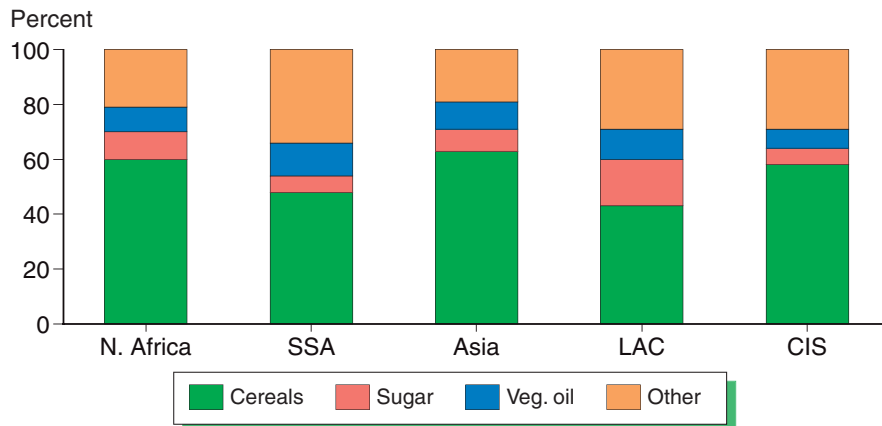
Percent

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.

Saharan Africa, the most vulnerable region to food insecurity, cereals account for nearly half of the calories consumed. In lower income Latin America, the share of cereals in the diet is the lowest, 43 percent. In all regions, the situation varies by country; for example, in Bangladesh, the share is even higher, 80 percent, and in, Eritrea and Ethiopia, both among the most food-insecure countries in the world, the share is around 70 percent.

For the highly import-dependent countries, the higher prices are an issue in terms of the larger import bill, particularly for those countries with limited foreign exchange availability and high vulnerability to food insecurity. The ranking of the 70 low-income countries by grain import dependency and daily calorie consumption identifies countries that are highly sensitive to increases in grain prices. Table 1 shows that six countries (Eritrea, Liberia, Haiti, Georgia, Burundi, and Zimbabwe) depend on grain imports for more than 40 percent of their consumption and also have very low levels of food consumption (less than 2,200 calories per day, on average). Eritrea, for example, is highly dependent on food imports: 87 percent of grains, 51 percent of vegetable oils, and 100 percent of sugar. In terms of foreign exchange availability, however, Eritrea's export earnings cover only 25 percent of its import bill as the remainder is filled by external assistance. Eritrea's food insecurity is deep: Daily calorie availability of 1,465 in 2005 was among the lowest consumption levels in the world. Therefore, higher prices and the possibility of a cut in imports could result in a food crisis in the country.

Note that not all countries are equally affected by the higher food prices. In fact, some countries that are highly import dependent and, therefore, are paying higher food import bills, but they are able to adjust without significant food security implications. One example in this group is Egypt. The country is highly dependent on food imports, with food accounting for 25 percent of total imports in 2002-04. While the increase in food import prices puts pressure on Egyptian consumer budgets, the country has a balance of payments surplus (5 percent of GDP in 2004) and, therefore is able to maintain imports and keep food supplies stable. In addition, because of Egypt's high daily caloric intake, 3,330 in 2005, some decline in food

Table A-1
Import dependency

	Cereal import dependency	Calorie intake
Eritrea	0.87	1,465
Liberia	0.71	1,942
Haiti	0.69	1,944
Georgia	0.52	1,797
Burundi	0.46	1,693
Zimbabwe	0.46	1,869

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

consumption does not result in pervasive hunger or deterioration in the food security situation of the country.

Another set of low-income countries vulnerable to food import price increases are those that have low commercial import dependency simply because they cannot afford to import. Countries such as Ethiopia, Sierra Leone, Malawi, and Niger fall in this group. These countries rely heavily on food aid to augment their food supplies. The United States, the major donor of food aid, sets a budget for food aid allocations and therefore when prices rise, quantities fall. For these countries, a reduction in food aid is as or more important than changes in food import prices.

Uncertainty in Outlook

The growing interest in production of biofuels along with increased investment in new technology to efficiently convert agricultural products into energy provides opportunities and challenges for the lower income countries. In most of these countries population and income growth increase demand for energy and food, and the challenge is how to allocate limited resources (capital, land, and labor) among the two competing needs. However, the benefit from the higher prices is that countries can expand their own production of food. Because many factors are unresolved in this area, the following section discusses the uncertainty in future price trends, examines domestic energy policy options, and reviews safety net options available to low-income countries.

Expected Price Trends

Volatility in oil prices is not a new phenomenon. The first significant spike in oil prices, between 1973 and 1974, followed the Arab oil embargo when prices jumped from about $3 per barrel to $12. The next big increase was spurred by the Iranian revolution and prices increased threefold between 1978 and 1979. From that point, prices held fairly steady until 1986 when they fell to $14 per barrel with moderate fluctuation through the remainder of the 1980s and 1990s. In 2000, as political tensions in the Middle East rose, fuel prices soared to more than $28 per barrel. Price growth has been quite strong since the 2003 U.S.-led invasion of Iraq, with prices rising to nearly $38 in 2004 and exceeding $53 per barrel in 2005. In 2006, prices were volatile, reaching a record nominal level of $73 in July, but declining afterward.

The future impacts of oil prices first depend on their trend. Based on USDA baseline projections (USDA, 2007), oil prices are expected to drop modestly (less than the global inflation rate) between 2007 and 2011. However, after 2011, prices are expected to slightly outpace the general inflation rate. This longer term price increase is due to the expected strong demand in highly energy-dependent economies in Asia. Factors expected to constrain longer term oil price increases include oil discoveries, increasing energy efficiency, and continued expansion in renewable energy sources including biofuels. The growth in production of biofuels, so far, has largely been policy driven, and how governments will meet their commitments to increase biofuel output is not clear. According to the *World Ethanol and Bio-fuels Report*, ethanol production (all types) increased by 49 percent between 2002 and 2006, with the majority of the production concentrated in about 10 countries. The United States is the world market leader, followed by Brazil (F.O.Lichts, 2003).

The *USDA Agricultural Projections to 2016* report argues that, during the next 3-4 years, the rapid expansion in global production of biofuels will change the price relationships among agricultural commodities (USDA, 2007). Increased demand for corn (ethanol) relative to prices of other grains and soybeans (biodiesel) will influence prices of other grain and vegetable oil crops because of crop area substitution and/or their feed value. Based on USDA's projections, grain prices (weighted average based on import composition of developing countries) will increase in 2007 but decline steadily in the following years, retaining less than one-third of the price spike of 2006-07 by 2016.

IMF estimates indicate that most of the expected impact of higher oil and food prices in 2006 on food security was offset by favorable weather leading to record or good crops, and higher commodity prices leading to increases in export earnings of the countries (*World Outlook Report,* 2006). The prices of primary commodities, including agricultural products that are the key sources of foreign exchange earnings for some low-income developing countries, increased at the same or higher rates than oil and food prices. Increases in prices of copper and aluminum stemming from economic growth in emerging markets brought significant financial gains to some of the poorest countries, such as Zambia, Tajikistan, Guinea, and Mozambique. According to the IMF report, the rise in metal prices was due to construction growth in China, which accounted for 50 percent of the growth in consumption for copper and aluminum metals.

Strong demand growth for labor in industrial countries and emerging markets also reduced the impact of food and fuel import price increases in several countries. In Central America, remittances grew to the point where they accounted for about 10-20 percent of GDP in 2005, providing support for growth in consumption. Asia is the largest recipient of remittances, accounting for 45 percent of the world total; they contributed to about 10 percent of GDP in the Philippines and Nepal (*IMF, Regional Economic Outlook: Asia and Pacific,* 2006). Sri Lanka benefited from the economic boom in oil exporting countries because more than 80 percent of its migrant workers were working in the oil-exporting Gulf States.

A question of interest to these countries is whether non-oil prices will continue to grow in the medium term, preventing a decline in the terms of trade of low-income countries. The IMF's *2006 World Outlook Report* argues

that the future price path depends on demand for industrial products in emerging markets and the speed and cost of bringing additional supplies onto the market. The report, however, projects that prices of metals will decline because the reserves of metals are unlimited and unlike oil, the metal market structure is competitive. As for agricultural raw materials, because demand for these commodities is income inelastic, price growth is influenced little by global demand growth. Therefore, their price trend is less predictable because of weather-related price shocks that will continue to create annual price volatility. Increase in input prices, particularly fertilizer, and ensuing higher production costs may not have much impact on production because of expected technological progress. Cotton is a clear example of this situation, where, despite the growth in cotton demand, international prices declined by more than 20 percent between 2003 and 2005 because of the adoption of new cotton varieties by producers.

Overall, the long-term food security impact of commodity price trends is difficult to generalize because of the differences in commodity composition and price prospects of exports and imports of the countries. In the longterm, as the following section discusses, high food prices could boost domestic production and improve food security because domestic production accounts for most of the food consumed in the lowest income countries. However, the net results depend on the magnitude of the supply response to the price increase and the supporting economic policies in the areas of technology adoption and other services to improve the functioning of markets.

Domestic Energy Policy Options

The increases in the prices of energy and food create opportunities and challenges for low-income developing countries. Currently, energy consumption in the low-income countries is very low compared with higher income countries, but access to adequate energy is essential for economic growth, which, in turn, facilitates food security. Per capita energy consumption (as measured by kilograms of use, oil equivalent) in high-income countries is 10 times that of low-income countries (World Bank, 2006). Average per capita income in the lower income countries is less than 5 percent of that of higher income countries and their per capita daily calorie consumption is less than half the level consumed by the high-income countries.

The energy price hike, despite its negative impact on the budget of importing countries, has created an opportunity for advancement in biofuel technology with the potential to fill the growing energy needs of the developing countries. Biofuels include traditional sources of energy, such as wood fuel, which accounts for about one-third of all energy consumed in developing countries. These fuel sources are inefficiently used, however. For example, a kilogram of wood generates only about one-tenth of the heat of a kilogram of liquid petroleum gas. However, the newer sources of biofuels, such as ethanol, are more competitive with petroleum in terms of efficiency and under the assumption of continued oil price growth. This efficiency means that, with the growing investment in new technology, the production of biofuels in low-income countries can provide multiple benefits: increasing the supply of energy by converting crop residues, producing energy crops for ethanol, and increasing farm incomes and rural employment where poverty is deep.

Energy crops also can grow in marginal and degraded lands where the use of wood fuels has contributed to deforestation, soil erosion, and reduced soil fertility in many parts of the world, particularly in Africa (Hazel, 2006). Deforestation and soil erosion, in turn, reduce potential crop yields, thereby increasing vulnerability to food insecurity.

The success of this outlook depends on increasing investment in the development of new technology that is consistent with the structure of the agricultural sectors of low-income countries. However, in low-income countries, financial capacity for investment is limited and increasing investment in producing biofuel energy could compete with food production, thereby intensifying food insecurity vulnerability. To minimize such substitution, policies to promote small-scale investment to enhance agricultural productivity, along with complementary policies to improve the functioning of markets, as well as access to credit, extension, and other services, are essential.

Overall, satisfying the growing energy demand that stems from expanding populations and incomes remains a major concern even without any future oil price pressure. In low-income countries, bioenergy, such as burning wood and dung, will continue to be the principal source of energy, which, in turn, makes increasing bioenergy production and improving the efficiency of the use of resources a high priority.

Safety Net Options

Low-income countries generally do not have domestic safety net programs to deal with economic shocks and often rely on external assistance for support. For oil-importing developing countries, the $137 billion increase in the energy import bill in 2005 far exceeded the $84 billion of official development assistance (World Bank, 2006). Looking ahead, lower income countries may not have much adjustment capacity to absorb a reduction in oil imports without some negative impact on their growth (IMF, *World Outlook Report*, 2007). So far the responses of low-income countries to the oil price hike have not been uniform. Countries such as Madagascar, Malawi, and Sierra Leone have been forced to ration electricity consumption to conserve energy and reduce oil imports. Swaziland and Namibia have drawn down their cash reserves to levels that would cover about 2 months of imports, which is unsustainably low, according to the World Bank. Overall, for most countries, alternatives to oil are limited because of the high production costs associated with most modern, non-oil energy sources. Such options as wind, hydropower, and solar-powered systems are highly capital intensive and require ongoing maintenance.

Food aid plays a critical role in reducing the impact of financial constraints and declines in food availability in low-income countries. However, the global quantity of food aid has fluctuated during the last two decades, and its share has declined relative to both total agricultural exports from food aid suppliers and total food imports of low-income countries. During 1990-2005, food aid received by the 70 low-income countries declined by 2 percent annually. The average quantity of grain food aid received by countries during 2002-05 was about 6.5 million tons. Nongrain aid accounted for about 20 percent of the total food aid, or about 1.2 million tons in grain equivalent.

In 2002-05, the food aid share of total grain imports for the 70 countries was about 9 percent. The highest share was in Sub-Saharan Africa at 17 percent, followed by lower income Asian countries at 10 percent, CIS at 6 percent, and low-income Latin American countries at 3 percent.

Based on the USDA baseline price projections, costs of food aid will increase. In fact, to keep the quantity of food aid constant at the 2002-05 level until 2016, the food aid budget must increase by 9 percent. Under the scenario of a constant share of food aid in total imports of the 70 countries, food aid costs will be much higher, an increase of about 40 percent. However, if the quantity of food aid continues to decline at the historical rate of 2 percent per year, thereby falling by about 20 percent by 2016, the cost of food aid will be obviously lower at that point than it was in 2005. Such a cutback on food aid, in the absence of a careful targeting program, could have significant implications for food security of low-income countries. According to ERS (*Food Security Assessment*, 2005), the gap between recommended nutritional requirements and purchasing power of populations in the world's poorest countries was more than 25 million tons in 2005, about three times larger than the supply of food aid in 2005. Some countries are highly dependent on food aid and some are highly food insecure. In Sub-Saharan Africa, for example, 23 of the 37 countries, on average, consumed at or below minimum daily nutritional requirement in 2005. In such countries as Ethiopia, Eritrea, Afghanistan, and North Korea, food aid was equal to or more than double the level of commercial imports in countries during 2003-05.

In summary, food security of most low-income countries has thus far shown resilience in coping with the oil and food price shocks. Continuation of strong economic growth in the emerging and industrial countries could lead to further oil price increases that could intensify interest in increasing biofuel production. The resource-rich low-income countries with flexible economies can benefit from this scenario. For others, however, the ability to absorb these higher import prices is quite limited without any increase in external assistance. According to a World Bank report (*Prospects for the Global Economy*, 2006), many African countries are imposing blackouts to ration energy and some are depleting their cash reserve at alarming rates. The report argues that, in these countries, either growth will slow down gradually through tightening macroeconomic policies or it will happen abruptly as constraints continue to grow. For countries with high food insecurity at the outset, this scenario will lead to a bleak outcome.

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Appendix—Food Security Model: Definition and Methodology

The Food Security Assessment model used in this report was developed by USDA's Economic Research Service for use in projecting food consumption and access and food gaps (previously called food needs) in low-income countries through 2016. The reference to food is divided into three groups: grains, root crops, and a category called "other," which includes all other commodities consumed, thus covering 100 percent of food consumption. All of these commodities are expressed in grain equivalent.

Food security of a country is evaluated based on the gap between projected domestic food consumption (produced domestically plus imported minus nonfood use) and a consumption requirement. Like last year, we use total food aid data (cereal and noncereal food commodities) provided by the World Food Program (WFP). All food aid commodities were converted into grain equivalent based on calorie content to allow aggregation. 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), one ton of vegetable oil (8 calories per gram) is equivalent to 2.29 tons of grain (8 divided by 3.5).

It should be noted that while projection results will provide a baseline for the food security situation of the countries, results depend on assumptions and specifications of the model. Since the model is based on historical data, it implicitly assumes that the historical trend in key variables will continue in the future.

Two kinds of food gaps are projected:

1) The national average *nutrition gap*, where the objective is to maintain the minimum daily caloric intake standards of about 2,100 calories per capita per day—depending on the region—recommended by the UN's Food and Agriculture Organization (FAO). The caloric requirements (based on total share of grains, root crops, and "other") used in this assessment are those necessary to sustain life with minimum food-gathering activities. They are comparable to the activity level for a refugee—they do not allow for play or work.

2) The *distribution gap*, where the objective is to let each income group reach the minimum caloric standard. Based on a methodology explained below, food availability by income group is calculated. If food availability in a given income group is lower than minimum requirements, that difference is part of the distribution gap for this country.

This nutrition-based target assists in comparisons of relative well-being. Large nutrition-based needs mean additional food must be provided if improved nutrition levels are the main objective. The national average nutritional gap approach, however, fails to address inequalities of food distribution within a country. Those are addressed by the distribution gap.

Structural framework for projecting food consumption in the aggregate and by income group

Projection of food availability—The simulation framework used for projecting aggregate food availability is based on partial equilibrium recursive models of 70 lower income countries. The country models are synthetic, meaning that the parameters that are used are either cross-country estimates or are estimated by other studies. Each country model includes three commodity groups: grains, root crops and "other." The production side of the grain and root crops are divided into yield and area response. Crop area is a function of 1-year lag return (real price times yield), while yield responds to input use. Commercial imports are assumed to be a function of domestic price, world commodity price, and foreign exchange availability. Food aid received by countries is assumed constant at the base level during the projection period. Foreign exchange availability is a key determinant of commercial food imports and is the sum of the value of export earnings and net flow of credit. Foreign exchange availability is assumed to be equal to foreign exchange use, meaning that foreign exchange reserve is assumed constant during the projection period. Countries are assumed to be price takers in the international market, meaning that world prices are exogenous in the model. However, producer prices are linked to the international market. The projection of consumption for the "other" commodities is simply based on a trend that follows the projected growth in supply of the food crops (grains plus root crops). Although this is a very simplistic approach, it represents an improvement from the previous assessments where the contribution by commodities to the diet, such as meat and dairy products, was overlooked. The plan is to enhance this aspect of the model in the future.

For the commodity group grains and root crops (c), food consumption (FC) is defined as domestic supply (DS) minus nonfood use (NF). n is country index and t is time index.

$$FC_{cnt} = DS_{cnt} - NF_{cnt} \tag{1}$$

Nonfood use is the sum of seed use (SD), feed use (FD), exports (EX), and other uses (OU).

$$NF_{cnt} = SD_{cnt} + FD_{cnt} + EX_{cnt} + OU_{cnt} \tag{2}$$

Domestic supply of a commodity group is the sum of domestic production (PR) plus commercial imports (CI), changes in stocks ($CSTK$), and food aid (FA).

$$DS_{cnt} = PR_{cnt} + CI_{cnt} + CSTK_{cnt} + FA_{cnt} \tag{3}$$

Production is generally determined by the area and yield response functions:

$$PR_{cnt} = AR_{cnt} * YL_{cnt} \tag{4}$$
$$YL_{cnt} = f(LB_{cnt}, FR_{cnt}, K_{cnt}, T_{cnt}) \tag{5}$$
$$RPY_{cnt} = YL_{cnt} * DP_{cnt} \tag{6}$$
$$RNPY_{cnt} = NYL_{cnt} * NDP_{cnt} \tag{7}$$
$$AR_{cnt} = f(AR_{cnt-1}, RPY_{cnt-1}, RNPY_{cnt-1}, Z_{cnt}) \tag{8}$$

where *AR* is area, *YL* is yield, *LB* is rural labor, *FR* is fertilizer use, *K* is an indicator of capital use, *T* is the indicator of technology change, *DP* is real domestic price, *RPY* is yield times real price, *NDP* is real domestic substitute price, *NYL* is yield of substitute commodity, *RNPY* is yield of substitute commodity times substitute price, and *Z* is exogenous policies.

The commercial import demand function is defined as:

$$CI_{cnt} = f(WPR_{ct}, NWPR_{ct}, FEX_{nt}, PR_{cnt}, M_{nt}) \qquad (9)$$

where *WPR* is real world food price, *NWPR* is real world substitute price, *FEX* is real foreign exchange availability, and *M* is import restriction policies.

The real domestic price is defined as:

$$DP_{cnt} = f(DP_{cnt-1}, DS_{cnt}, NDS_{cnt}, GD_{nt}, EXR_{nt}) \qquad (10)$$

where *NDS* is supply of substitute commodity, *GD* is real income, and *EXR* is real exchange rate.

Projections of food consumption by income group—Inadequate access to food is the most important cause of chronic undernutrition among developing countries and is related to income level. Estimates of food gaps at the aggregate or national level fail to take into account the distribution of food consumption among different income groups. Lack of consumption distribution data for the study countries is the key factor preventing estimation of food consumption by income group. An attempt was made to fill this information gap by using an indirect method of projecting calorie consumption by different income groups based on income distribution data.[1] It should be noted that this approach ignores the consumption substitution of different food groups by income class. The procedure uses the concept of the income/consumption relationship and allocates the total projected amount of available food among different income groups in each country (income distributions are assumed constant during the projection period).

Assuming a declining consumption and income relationship (semi log functional form):

$$C = a + b \ln Y \qquad (11)$$

$$C = C_o/P \qquad (12)$$

$$P = P_1 + \text{........} + Pi \qquad (13)$$

$$Y = Y_o / P \qquad (14)$$

$$i = 1 \text{ to } 5$$

where *C* and *Y* are known average per capita food consumption (all commodities in grain equivalent) and per capita income (all quintiles), C_o is total food consumption, *P* is the total population, *i* is income quintile, *a* is the intercept, *b* is the consumption income propensity, and *b/C* is consumption income elasticity (point estimate elasticity is calculated for individual countries). To estimate per capita consumption by income group, the parameter *b* was estimated based on cross-country (67 low-income countries) data for per capita calorie consumption and income. The parameter *a* is estimated for each

country based on the known data for average per capita calorie consumption and per capita income.

Data

Historical supply and use data for 1990-2005 are from FAOSTAT as of March 2007. Food aid data are from the UN's World Food Program (WFP) for 1988-2005, and financial data are from the International Monetary Fund and World Bank. The base year data used for projections are the average for 2003-2005, except export earnings, which are 2002-04.

Endogenous projection variables:

Production, area, yield, commercial imports, domestic producer prices, and *food consumption.*

Exogenous projection variables:

Population—data are medium United Nations population projections as of 2004.

World price—data are USDA/baseline projections.

Stocks—USDA data; assumed constant during the projection period.

Seed use—USDA data; projections are based on area projections using constant base seed/area ratio.

Food exports—FAOSTAT data, projections are either based on the population growth rate or extrapolation of historical trends.

Inputs—fertilizer and capital projections are, in general, an extrapolation of historical growth data from FAO.

Agricultural labor—projections are based on United Nations population projections, accounting for urbanization growth.

Net foreign credit—is assumed constant during the projection period.

Value of exports—projections are based on World Bank (*Global Economic Prospects and the Developing Countries*, various issues), IMF (*World Economic Outlook*, various issues), or an extrapolation of historical growth.

Export deflator or terms of trade—World Bank (*Commodity Markets— Projection of Inflation Indices for Developed Countries*).

Income—projected based on World Bank report (*Global Economic Prospects and the Developing Countries*, various issues); or extrapolation of historical growth.

Income distribution—World Bank data; Income distributions are assumed constant during the projection period.

(Shahla Shapouri)

List of countries and their food gaps in 2006

	2006 food gaps			2006 food gaps	
	Nutrition[1]	Distribution[2]		Nutrition	Distribution
			1,000 tons		
Angola	0	150	Algeria	0	0
Benin	0	1	Egypt	0	0
Burkina Faso	0	41	Morocco	0	0
Burundi	485	568	Tunisia	0	0
Cameroon	0	153	**North Africa**	**0**	**0**
Cape Verde	24	28			
Central African Repubic	104	238	Afghanistan	1,372	1,712
Chad	0	87	Bangladesh	0	1,699
Congo, Dem. Rep.	5,251	5,664	India	0	2,133
Côte d'Ivoire	0	328	Indonesia	0	0
Eritrea	486	514	Korea, Dem. Rep.	503	730
Ethiopia	3,029	3,444	Nepal	0	173
Gambia	0	31	Pakistan	0	35
Ghana	0	49	Philippines	0	383
Guinea	0	82	Sri Lanka	0	51
Guinea-Bissau	30	65	Vietnam	0	0
Kenya	184	796	**Asia**	**1,874**	**6,917**
Lesotho	0	40			
Liberia	148	207	Bolivia	0	84
Madagascar	0	398	Colombia	0	707
Malawi	0	90	Dominican Republic	0	154
Mali	0	198	Ecuador	0	68
Mauritania	0	11	El Salvador	0	73
Mozambique	74	399	Guatemala	0	186
Niger	0	399	Haiti	133	361
Nigeria	0	312	Honduras	0	119
Rwanda	51	132	Jamaica	0	3
Senegal	0	32	Nicaragua	17	173
Sierra Leone	156	449	Peru	0	369
Somalia	1,308	1,346	**Latin America and**	**150**	**2,296**
Sudan	0	135	**the Caribbean**		
Swaziland	0	5			
Tanzania	0	267	Armenia	0	0
Togo	79	146	Azerbaijan	0	0
Uganda	0	252	Georgia	0	28
Zambia	0	137	Kazakhstan	0	0
Zimbabwe	99	373	Kyrgyzstan	0	0
Sub-Saharan Africa	**11,507**	**17,569**	Tajikistan	0	79
			Turkmenistan	0	0
			Uzbekistan	0	183
			Commonwealth of	**0**	**290**
			Independent States		
			Total	**13,531**	**27,072**

[1] Nutrition gap: gap between available food and food needed to support a minimum per capita nutritional standard.
[2] Distribution gap: amount of food needed to raise consumption in each income quintile to the minimum nutritional requirement.

Source: USDA, Economic Research Service.

Appendix table-1b
List of countries and their food gaps in 2016

	2016 food gaps			2016 food gaps	
	Nutrition[1]	Distribution[2]		Nutrition	Distribution
			1,000 tons		
Angola	0	303	Algeria	0	0
Benin	0	0	Egypt	0	0
Burkina Faso	82	414	Morocco	0	0
Burundi	318	451	Tunisia	0	0
Cameroon	0	89	**North Africa**	**0**	**0**
Cape Verde	37	42			
Central African Repubic	212	342	Afghanistan	1,868	2,333
Chad	0	222	Bangladesh	0	231
Congo, Dem. Rep.	6,815	7,367	India	0	400
Cote d'Ivoire	0	273	Indonesia	0	0
Eritrea	829	858	Korea, Dem. Rep.	372	667
Ethiopia	312	1,403	Nepal	0	48
Gambia	41	78	Pakistan	0	182
Ghana	0	22	Philippines	0	155
Guinea	0	83	Sri Lanka	0	84
Guinea-Bissau	111	143	Vietnam	0	0
Kenya	0	72	**Asia**	**2,240**	**4,099**
Lesotho	0	19			
Liberia	418	478	Bolivia	0	48
Madagascar	138	732	Colombia	0	308
Malawi	66	474	Dominican Rep.	0	25
Mali	0	202	Ecuador	0	12
Mauritania	30	87	El Salvador	0	23
Mozambique	0	190	Guatemala	0	185
Niger	587	1,025	Haiti	174	425
Nigeria	0	647	Honduras	0	61
Rwanda	109	197	Jamaica	0	4
Senegal	0	38	Nicaragua	0	162
Sierra Leone	179	534	Peru	0	171
Somalia	1,428	1,492	**Latin America and**	**174**	**1,424**
Sudan	0	248	**the Caribbean**		
Swaziland	0	2			
Tanzania	0	642	Armenia	0	0
Togo	0	34	Azerbaijan	0	0
Uganda	0	647	Georgia	0	0
Zambia	0	113	Kazakhstan	0	0
Zimbabwe	0	186	Kyrgyzstan	0	0
Sub-Saharan Africa	**11,714**	**20,150**	Tajikistan	0	42
			Turkmenistan	0	0
			Uzbekistan	0	0
			Commonwealth of	**0**	**42**
			Independent States		
			Total	**14,128**	**25,715**

[1] Nutrition gap: gap between available food and food needed to support a minimum per capita nutritional standard.
[2] Distribution gap: amount of food needed to raise consumption in each income quintile to the minimum nutritional requirement.

Source: USDA, Economic Research Service.

Appendix table 2
Country indicators

Region and country	Population, 2006	Population growth rate	Grain production		Root production growth, 1980-2004	Projected annual growth in supply, 2006-16
			Growth, 1990-2005	Coefficient of variation, 1990-2006		
	1,000			*Percent*		
North Africa:						
Algeria	33,395	1.6	2.9	47.2	-2.5	2.7
Egypt	76,361	2.0	3.5	3.7	0.5	1.8
Morocco	32,049	1.5	0.7	49.1	0.7	2.6
Tunisia	10,148	1.1	-0.4	42.3	3.6	3.0
Central Africa:						
Cameroon	16,799	1.4	4.3	6.8	4.0	1.8
Central African Rep.	4,021	1.5	6.5	6.0	1.7	0.7
Congo, Dem. Rep.	57,709	2.9	0.1	3.7	-2.3	3.1
West Africa:						
Benin	7,286	2.6	5.1	5.4	5.4	4.2
Burkina Faso	14,216	3.0	3.6	13.0	-0.3	1.5
Cape Verde	491	1.9	-0.7	71.5	-0.9	1.5
Chad	9,386	2.9	5.4	18.2	-1.4	2.7
Côte d'Ivoire	17,429	1.5	1.5	11.1	0.7	1.9
Gambia	1,534	2.3	6.4	17.8	2.0	1.6
Ghana	22,272	2.0	3.6	11.7	5.1	2.3
Guinea	9,016	2.6	4.4	5.7	9.6	2.5
Guinea-Bissau	1,630	2.9	-0.7	16.3	2.7	1.9
Liberia	3,703	2.8	2.0	39.8	4.8	0.2
Mali	14,275	2.8	3.2	11.3	3.6	3.5
Mauritania	3,154	2.8	1.4	31.9	0.0	1.1
Niger	13,341	3.6	3.3	15.2	-6.2	2.0
Nigeria	133,232	2.3	1.7	6.6	6.0	1.8
Senegal	10,832	2.3	1.6	18.0	6.8	2.4
Sierra Leone	5,440	1.9	-4.0	23.8	8.8	1.9
Togo	5,244	2.2	3.6	8.0	4.2	3.5
East Africa:						
Burundi	7,555	3.2	-0.4	7.7	1.0	4.7
Eritrea[1]	4,606	3.4	0.5	73.2	--	1.7
Ethiopia[1]	75,970	2.4	5.9	12.8	1.5	3.9
Kenya	33,262	1.3	2.0	10.3	4.1	3.6
Rwanda	8,789	2.1	2.8	27.1	1.4	1.5
Somalia	11,151	3.8	2.3	32.6	6.7	4.2
Sudan	35,673	1.8	2.4	27.6	2.6	1.4
Tanzania	39,053	1.8	2.2	12.6	2.7	1.6
Uganda	28,623	3.6	3.0	7.9	2.2	2.9

See footnotes at end of table.   *Continued——*

Country indicators—Continued

Region and country	Macroeconomic indicators					
	Per capita GNI, 2004	Per capita GDP growth, 2004	GDP growth, 2004	Export earnings growth, 2004	Official development assistance as a share of GNI, 2004	External debt Present value as a share of GNI, 2004
	U.S. dollars	———————————————— *Percent* ————————————————				
North Africa:						
Algeria	2,270	3.6	5.2	3.4	0.4	27.1
Egypt	1,250	2.2	4.2	27.6	1.9	38.5
Morocco	1,570	0.7	4.2	4.7	1.4	35.8
Tunisia	2,650	4.9	5.8	5.2	1.2	69.4
Central Africa:						
Cameroon	810	2.4	4.3	1.7	5.4	67.7
Central African Rep.	310	0.0	1.3	0.00	7.9	81.8
Congo, Dem. Rep.	110	3.2	6.3	0.00	28.6	186.4
West Africa:						
Benin	450	-0.5	2.7	7.1	9.3	47.3
Burkina Faso	350	0.6	3.9	2.4	12.7	40.8
Cape Verde	1,720	3.1	5.5	3.6	14.9	55.2
Chad	250	25.5	29.8	200.8	11.8	63.0
Côte d'Ivoire	760	0.1	1.6	15.7	1.0	79.8
Gambia	280	5.4	8.3	5.4	16.0	171.4
Ghana	380	3.6	5.8	3.5	15.4	80.0
Guinea	410	0.4	2.6	1.2	7.3	92.4
Guinea-Bissau	160	1.2	4.3	4.1	28.3	283.9
Liberia	120	1.8	2.4	0.0	53.4	687.1
Mali	330	-0.8	2.2	-5.0	12.2	71.4
Mauritania	530	3.7	6.9	0.0	11.1	141.9
Niger	210	-2.4	0.9	0.0	17.5	63.6
Nigeria	430	3.7	6.0	3.1	1.0	59.5
Senegal	630	3.7	6.2	4.8	13.9	52.2
Sierra Leone	210	3.0	7.4	0.0	34.3	164.4
Togo	310	0.4	3.0	3.0	3.0	89.6
East Africa:						
Burundi	90	1.9	5.5	8.9	54.6	215.6
Eritrea[1]	190	-2.5	1.8	-7.4	28.5	74.8
Ethiopia[1]	110	10.9	13.1	28.5	23.0	82.8
Kenya	480	2.0	4.3	19.8	4.0	42.8
Rwanda	210	2.5	4.0	4.6	25.8	91.3
Somalia		--	--			
Sudan	530	4.0	6.0	14.0	4.5	98.6
Tanzania	320	4.3	6.3	-7.0	16.2	72.2
Uganda	250	2.1	5.7	6.2	17.3	72.2

See footnotes at end of table.

Appendix table 2
Country indicators—Continued

Region and country	Population, 2006	Population growth rate	Grain production Growth, 1990-2005	Grain production Coefficient of variation, 1990-2006	Root production growth, 1980-2004	Projected annual growth in supply, 2006-16
	1,000	———————————————— *Percent* ————————————————				
Southern Africa:						
Angola	14,968	3.0	7.5	17.6	5.3	2.3
Lesotho	1,789	-0.4	2.7	32.7	4.2	1.7
Madagascar	18,917	2.8	2.0	9.0	0.5	2.5
Malawi	12,808	1.9	2.6	27.1	9.3	1.3
Mozambique	19,789	1.5	10.5	16.9	0.5	2.5
Swaziland	1,086	-0.1	-1.7	27.4	0.6	1.0
Zambia	11,184	1.3	-0.6	29.6	3.8	2.4
Zimbabwe	12,975	0.1	-3.3	42.4	3.6	1.4
Asia:						
Afghanistan	26,947	3.8	2.3	22.2	1.1	3.0
Bangladesh	155,403	1.8	3.4	6.4	5.0	2.8
India	1,111,881	1.4	1.3	4.3	1.9	1.7
Indonesia	227,867	1.1	1.5	2.6	-0.5	1.1
Korea, Dem. Rep.	27,424	1.1	-4.4	34.7	11.6	0.0
Nepal	26,837	2.1	2.7	4.9	3.2	2.5
Pakistan	165,076	2.4	2.8	4.9	3.5	2.2
Philippines	84,139	1.6	2.3	7.5	-0.8	2.1
Sri Lanka	19,500	0.7	1.5	8.8	-3.0	0.7
Vietnam	84,665	1.3	5.0	3.2	-1.1	4.3
Latin America and the Caribbean:						
Bolivia	9,302	1.8	3.8	10.5	0.4	2.2
Colombia	46,253	1.4	1.3	15.0	0.3	2.7
Dominican Republic	9,114	1.3	2.5	15.9	1.3	3.3
Ecuador	13,553	1.3	2.6	13.1	-0.6	2.5
El Salvador	6,796	1.3	-0.2	8.8	4.7	3.2
Guatemala	13,284	2.4	-1.6	9.2	1.7	2.4
Haiti	8,663	1.3	-0.6	9.7	-0.6	0.2
Honduras	7,405	2.0	-1.7	9.3	3.3	2.4
Jamaica	2,727	1.0	-8.8	28.1	-3.8	-0.6
Nicaragua	5,852	2.2	5.0	11.2	6.2	2.0
Peru	28,361	1.4	6.8	10.6	3.9	2.5
Commonwealth of Independent States:[2]						
Armenia	3,033	-0.3	2.7	20.5	0.4	3.1
Azerbaijan	8,616	1.0	4.2	19.5	13.4	1.9
Georgia	4,989	-0.7	2.0	20.0	5.0	2.1
Kazakhstan	15,317	0.0	-2.8	35.9	-3.0	-0.1
Kyrgyzstan	5,345	1.3	2.0	13.5	8.8	1.4
Tajikistan	6,432	1.2	9.7	17.0	10.3	1.7
Turkmenistan	5,092	1.5	13.0	19.1	19.6	1.6
Uzbekistan	27,251	1.4	9.1	10.1	0.7	2.7

See footnotes at end of table.   *Continued——*

Country indicators—Continued

Region and country	Macroeconomic indicators					
	Per capita GNI, 2004	Per capita GDP growth, 2004	GDP growth, 2004	Export earnings growth, 2004	Official development assistance as a share of GNI, 2004	External debt Present value as a share of GNI, 2004
	U.S. dollars			*Percent*		
Southern Africa:						
Angola	930	7.9	11.1	0.0	6.6	55.2
Lesotho	730	2.5	2.3	0.7	6.3	46.8
Madagascar	290	2.4	5.2	-5.6	28.8	80.7
Malawi	160	4.4	6.7	-4.6	25.9	186.3
Mozambique	270	5.1	7.2	23.8	21.4	80.9
Swaziland	1,660	0.8	2.1	1.1	4.9	20.0
Zambia	400	2.9	4.6	12.6	21.2	142.8
Zimbabwe	620	-4.7	-4.0	2.0	4.0	103.4
Asia:						
Afghanistan	--	--	--	--	--	--
Bangladesh	440	4.3	6.3	12.5	2.4	34.2
India	620	5.4	6.9	7.9	0.1	17.9
Indonesia	1,140	3.7	5.1	8.5	0.0	56.5
Korea, Dem. Rep.	--	--	--	--	--	--
Nepal	250	1.4	3.5	0.0	6.4	50.2
Pakistan	600	3.9	6.4	-1.5	1.5	38.0
Philippines	1,170	4.2	6.1	14.1	0.5	66.8
Sri Lanka	1,010	4.5	5.4	7.8	2.7	56.6
Vietnam	540	6.6	7.7	27.9	4.1	40.1
Latin America and the Caribbean:						
Bolivia	960	1.6	3.6	16.1	9.1	72.7
Colombia	2,020	2.5	4.1	10.2	0.5	40.3
Dominican Republic	2,100	0.5	2.0	1.4	0.5	40.5
Ecuador	2,210	5.4	6.9	15.1	0.6	58.6
El Salvador	2,320	-0.2	1.5	6.6	1.4	47.2
Guatemala	2,190	0.2	2.7	12.4	0.8	20.4
Haiti	0	0.0	0.0	0.0	6.7	33.9
Honduras	1,040	2.3	4.6	0.0	9.1	89.5
Jamaica	3,300	0.4	0.9	0.0	0.9	76.1
Nicaragua	830	3.0	5.1	15.8	28.3	117.9
Peru	2,360	3.3	4.8	14.7	0.7	48.0
Commonwealth of Independent States:[2]						
Armenia	1,060	7.4	7.0	14.8	8.1	39.2
Azerbaijan	940	9.2	10.2	10.7	2.2	25.4
Georgia	1,060	7.3	6.2	4.6	6.0	39.3
Kazakhstan	2,250	8.8	9.4	10.5	0.7	85.1
Kyrgyzstan	400	5.9	7.1	14.8	12.2	99.3
Tajikistan	280	9.4	10.6	30.7	12.1	44.9
Turkmenistan	0	0.0	0.0	9.9	0.6	0.0
Uzbekistan	450	6.1	7.7	21.8	2.1	42.0

[1] Data start in 1993.

[2] Data start in 1992.

-- = data unavailable or not applicable due to inconsistent data set.

Source: Population = FAOSTAT, Macroeconomic indicators = World Development Indicators, 2006, World Development Report 2006, World Bank.