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Sub-Saharan Africa is the only region that has not made progress toward the World Food Summit goal of cutting hunger in half by 2015.

Food Security Assessment, 2005

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Abstract

In 2005, 777 million people were food insecure in 70 lower income countries. For the 70 countries, on average, there has been a slight (7 percent) decline in the number of hungry people from 688 million in 1992-94 to 639 million in 2002-04. The largest decrease occurred in North Africa. Both Asia and the Commonwealth of Independent States experienced a 30-percent drop in the number of hungry people. The number of hungry people in Latin America and the Caribbean has varied slightly over time, but there has been no discernible trend across the region as a whole. Despite strong growth in food production, Sub-Saharan Africa is the only region where the number of hungry people has risen—over 19 percent—during the last decade. In 2002-04, more than half of the region's population—roughly 350 million—were hungry. Between the 2002-04 base period and 2015—the World Food Summit target date for reducing the number of the world's undernourished people by half—results indicate a 10-percent increase in the distribution gap (the amount of food needed to raise consumption levels to nutritional requirements) and a 16-percent jump in the number of hungry people.

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: Food and Agriculture Organization of the United Nations (top: A. Conti; bottom: P. Cenini).

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In previous issues, data on the countries/regions reported on here were available in printed format. With this issue, please see *http://www.ers.usda.gov/publications/GFA17/* for data and charts in six Microsoft Excel spreadsheets.

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Summary

At the World Food Summit (WFS) in November 1996, 186 countries committed themselves to reducing the number of undernourished people by half by 2015. Donors pledged to provide support, in particular, in the area of technological transfers. The commitment to providing food aid was also reinforced. In 2002, the 186 countries reaffirmed their commitment. Now, 10 years after the 1996 summit, there is growing concern about the progress toward meeting the goal.

What Is the Issue?

In *Food Security Assessment, 2005*, 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 Did the Study Find?

At the aggregate level, there was a slight improvement in food security in the time period starting in 1992, just before the proclamation of the WFS, through the current period. The number of hungry people in the countries studied in this report has declined slightly (7 percent) from 688 million in 1992-94 to 639 million in 2002-04. With the exception of Sub-Saharan Africa, all regions experienced a decrease in the number of hungry people during this 10-year time frame. Both Asia and the Commonwealth of Independent States (CIS) experienced a 30-percent drop in the number of hungry people. The number of hungry people in Latin America and the Caribbean (LAC) has varied slightly over time.

Between the 2002-04 base period and the 2015 target, ERS projects a 10-percent increase in the distribution gap and a 16-percent jump in the number of hungry people. If these projections are realized, the goal of the WFS will not come close to being met. It should be noted, however, that there are large variations in results among countries and regions.

The greatest improvement in food security is projected for the LAC region. ERS projects a continuation of the positive trend over the past decade and, as a result, the WFS goal is projected to be met in this region. In 1992-94, there were an estimated 74 million hungry people in the region. By 2015, this number is expected to be cut in half to 37 million. The distribution gap in the LAC region is projected to fall by 32 percent between 2002-04 and 2015. The food security situation in North Africa is expected to remain good, and a slight improvement in food security is projected for the CIS region.

The food security situation in Asia is projected to remain virtually unchanged through the next decade, at the aggregate level. The number of

hungry people is projected to rise from 214 million in 2002-04 to 228 million in 2015. Obviously, there will be material variations at the country level. Bangladesh, Indonesia, the Philippines, Sri Lanka, and Vietnam are projected to meet the goals set at the WFS.

The food security situation in Sub-Saharan Africa, already the most vulnerable region, is expected to deteriorate even further. The number of hungry people in the region is projected to reach 471 million in 2015, marking a 34-percent increase from 2002-04. The distribution gap is projected to increase 19 percent during the same time period.

Among the 70 countries included in this report, three countries can be considered success stories: Ghana, Peru, and Vietnam. All three countries introduced major reforms in the late 1980s or 1990s. These reforms were based on a stronger reliance on market forces, which fostered economic stability. The agricultural sectors, in particular, benefited from improvements in access to credit and government support of research and extension services.

How Was the Study Conducted?

All historical and projected data are updated relative to last year's Food Security Assessment report. Food production estimates for 2005 are preliminary, based on USDA data as of October 2005, with supplemental data from the UN Food and Agriculture Organization 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 or are World Bank projections/estimations. Projections/estimates of food availability include food aid, with the assumption that each country will receive the 2002-2004 average level of food aid throughout the next decade.

Food Security Review

ERS research shows that in 2005, 777 million people were food insecure in 70 lower income countries. Our projections indicate a 14-percent increase in this number in the next decade, with the situation becoming particularly severe in the poorest countries. Ironically, most of the hungry live in rural areas, where food is produced. Food security is dependent on food availability, food access (ability to purchase food), and proper food utilization, which is affected by many factors such as safe water, education, and health. Food insecurity can be either temporary or chronic, and overcoming each requires a different set of strategies. The reasons for food insecurity are many: war, poverty, inadequate agricultural technology, inappropriate policies, high population growth, environmental degradation, and poor health.

Noticeably absent from that list, however, is large-scale food scarcity. The growth rate in food production worldwide—nearly 3 percent per year during the last decade—has surpassed the population growth rate, leading to increased food availability per person. This abundance, however, is distributed unevenly. Many low-income countries do have difficulty producing adequate supplies of food and are thus food insecure at the national level. But more widespread is inequality in food consumption within countries— the result of uneven purchasing power, which can afflict even the highest income countries such as the United States.

At the World Food Summit in November 1996, 186 countries committed themselves to reducing the number of undernourished people by half by 2015. Donors pledged to provide support, in particular, in the area of technological transfers. The commitment to providing food aid was also reinforced. Ten years later, there is growing concern about the slow progress toward meeting the goal. There are many cases of failure that raise questions about the effectiveness of the strategies adopted and the adequacy of the resources devoted to meeting the challenge. These failures have dire implications for millions of people. Despite the gloomy overall picture, there are many success stories of countries achieving improvements that appeared very unlikely a decade ago.

This report provides an overview of the food security indicators developed by ERS and compares them with other complementary global indicators. This is followed by an examination of the forces that have shaped food production and consumption trends, and an evaluation of the likely changes in food security using alternative scenarios. The final section presents the projections for 2015 (see box, "How Food Security is Assessed: Methods and Definitions").

Food Availability and Access Are the Basic Elements of Food Security

Daily per capita calorie consumption and its change over time are one measure of nutritional well-being closely connected with food security. Changes in food production affect changes in consumption because most of the food is consumed where it is produced. Access has two components:

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 one 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 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 2002-2004 data. The periods covered are 2005 (current), 2010 (5-year forecast), and 2015 (10-year forecast). Projections of food gaps for the study countries through 2015 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 two consumption targets:** 1) maintaining base per capita consumption or status quo (SQ), which is the amount of food needed to support 2002-2004 levels of per capita consumption; and 2) meeting nutritional requirements (NR), which is the gap between available food and food needed to support a minimum per capita nutritional standard (for definitions of terms used see Appendix). Comparison of the two measures, either for countries, regions, or the aggregate, indicates the two different aspects of food security: consumption stability and meeting the nutritional standard.

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. 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.

access to the domestic market that is determined by income level and income distribution, and access to the international market that is determined by the ability to import.

Trends in Food Consumption

Per capita calorie consumption at the global level has increased 0.4 percent per year since 1992, and in 2002 was roughly 2,800 calories. Consumption in developed countries grew at a slower rate during that time, but was still significantly higher than the world average, measuring over 3,300 calories in 2002. While growth in consumption in the developing world exceeded that at the world level (fig. 1), absolute intake levels were still lower than the global average, equaling about 2,660 calories in 2002. The 70 study countries consumed an average of 2,360 calories per capita per day in 2002, 11 percent lower than the average for all developing countries and almost 30 percent lower than the average of the developed countries (fig. 2).

In North Africa, calorie consumption increased at a slower rate than the developing-country average, but actual consumption levels are much higher than those in the rest of the developing world. Consumption in the region is only about 5 percent below levels in developed countries. The problem of food insecurity in North Africa is one of great variability in food supplies due to susceptibility to losses from drought.   While per capita consumption in Asia, Latin America and the Caribbean (LAC), and the Commonwealth of Independent States (CIS) is roughly equal at more than 2,400 calories, consumption growth rates differ widely, with Asia and LAC far ahead of the CIS region. Sub-Saharan Africa (SSA) has by far the lowest intake levels of the study countries. Per capita consumption in the region averaged only 2,200 calories in 2000-02. Within this region there are large variations. Eritrea, Burundi, and the Democratic Republic of Congo have an average per capita consumption of less than 1,700 calories, which indicates severe food insecurity. Nigeria and Mauritania, on the other hand, have surpassed 2,700 calories.

Figure 1

Growth in calorie consumption between 1990 and 2002
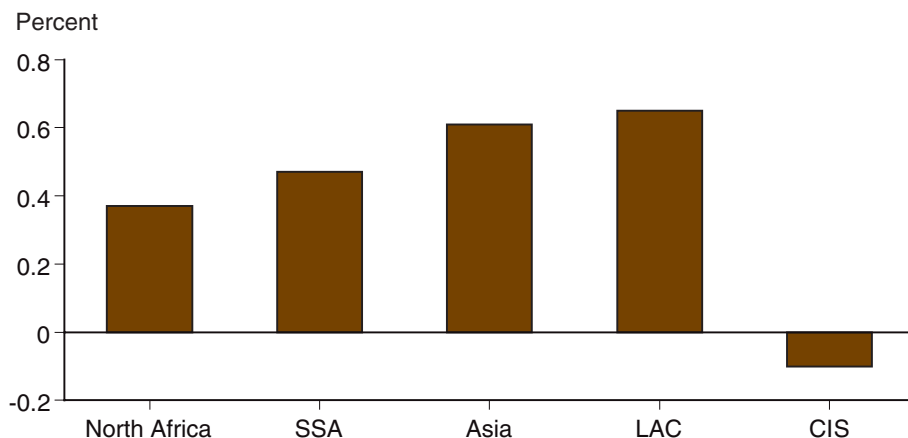
Percent

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, (http://faostat.fao.org).

Figure 2

Daily per capita calorie consumption in 2002

Source: USDA, Economic Research Service, using data from FAOSTAT, (http://faostat.fao.org).

Most of the countries studied in this report had positive per capita consumption growth over the last decade. Only 14 out of 70 c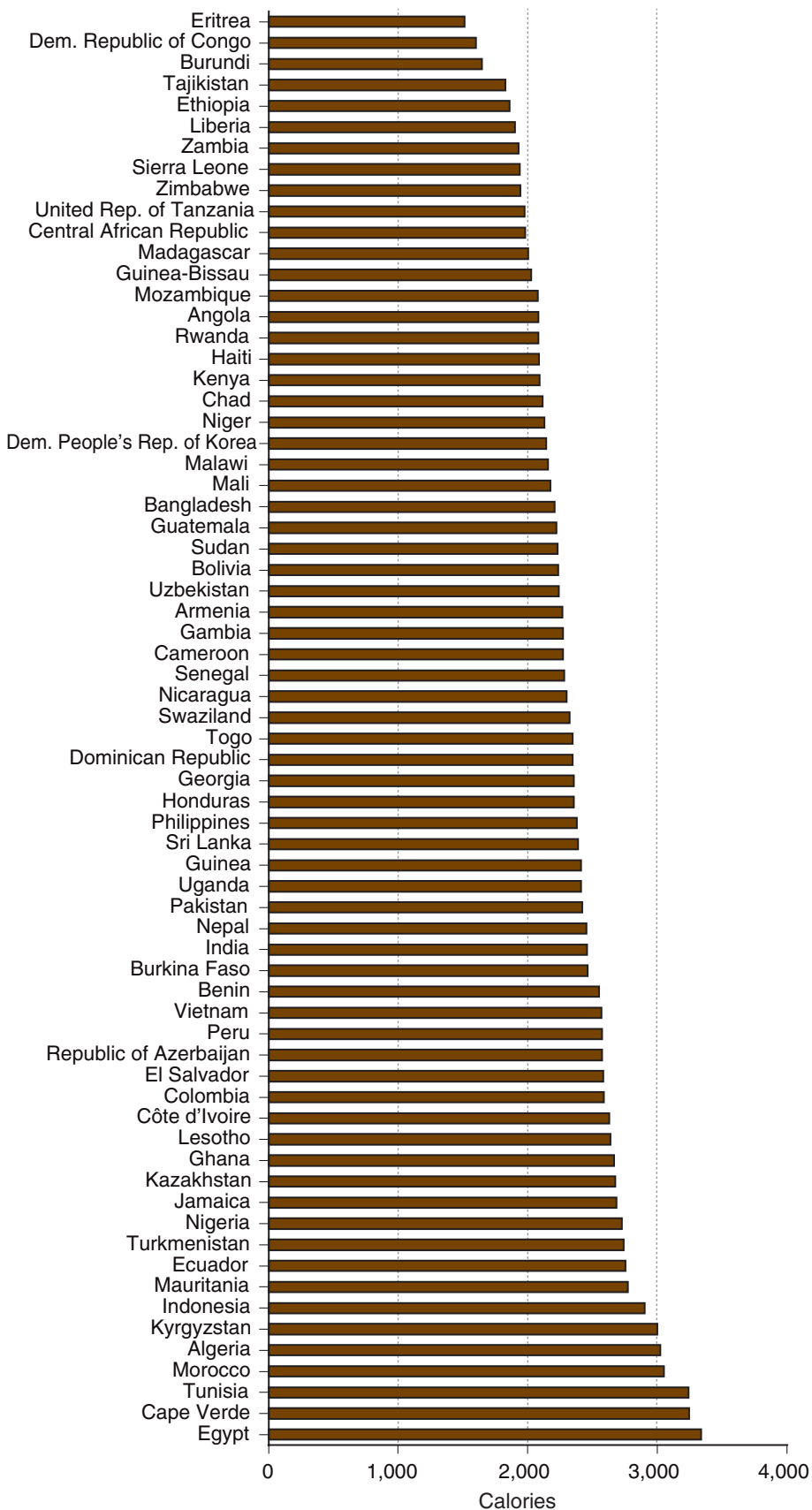ountries experienced declines. Progress is slowest in SSA, with 0.4-percent growth per year. Growth was higher in Asia and the LAC regions—0.6 percent. In the CIS region, Kazakhstan, Tajikistan, and Uzbekistan faced a serious contraction in consumption, while steady growth was the norm in Armenia, Azerbaijan, and Georgia.

Grains account for the bulk of the consumption in the study countries. In North Africa, grains comprise the largest share of the diet—58 percent in recent years. This share has held steady over the last two decades. The most notable change with respect to diet composition in the region has been the increase in the shares of fruits and poultry meat, although these shares remain negligible relative to the overall diet.

While grains account for the largest share of the diet in SSA, this share is lower than that for other developing countries—less than half. The reason for this is the high level of consumption of low-priced roots and tubers. The share held by this group—more than 16 percent—far exceeds that of any other world region. Mirroring the change in the rest of the world, the share of vegetable oils in the diet increased notably over time and reached 8.6 percent in 2000-02, thus surpassing the developing-country average.

In the Asian study countries, the share of grains in the overall diet was about 63 percent. In Bangladesh, Nepal, and Vietnam, this share exceeds 70 percent. Rice accounts for the bulk of these cereals. As in the other regions, consumption of vegetable oils has risen as a share of the total diet, now at more than 6 percent. The shares held by meat and milk also increased considerably, reflecting rapidly rising incomes in several of the countries. In Vietnam, for example, the meat share of the diet increased more than 40 percent in the last decade to 8.5 percent in 2000-02.

In the LAC countries, grains comprise a much smaller share of the diet than other developing countries—roughly 40 percent. Conversely, the sugar share is the largest in the world at more than 16 percent. Again, consistent with the pattern observed in other regions, the vegetable oils share has jumped considerably and now accounts for more than 10 percent of calories consumed. Another notable change is the increase in meat consumption, particularly that of poultry. This reflects higher incomes in countries such as the Dominican Republic, Ecuador, and Guatemala.

During the last decade, the countries of the CIS region were in transition from state-controlled economies to market-based economies and many of the consumer and producer subsidies they enjoyed were eliminated. As a result, there were vast changes in the production sectors and, in turn, in consumption patterns. Therefore, it is difficult to draw any definitive conclusions from trends in the data. In general, the grain share of the diet has risen considerably. Prior to the breakup of the Soviet Union, grains accounted for less than 40 percent of the diet in these countries. In recent years, this share was closer to 60 percent. During the same time, the shares declined for sugar and meats. Meat and sugar production and consumption were subsidized during the Soviet era, thus resulting in higher consumption. When markets were liberalized, meat production and consumption fell.

Review of Production Performance

As indicated above, cereals remain the key component of consumption in most of the study countries. In most cases, the bulk of these cereals come from domestic production rather than imports. As a result, production performance plays an important role in the food security of the countries. Since 1990, Sub-Saharan Africa (SSA) had the highest growth in grain production—1.65 percent per year—but this growth was outstripped by the region's high population growth. In fact, all regions except Asia experienced negative per capita growth in grain production. In Asia, grain production and population growth rates were virtually identical. In SSA, nearly 90 percent of the growth in production came from area expansion. The region's yields are the lowest in the world, measuring about one-third of the world average. In the other regions, yields were the driving force behind the growth. In fact, yield growth in Asia accounted for 97 percent of production growth. In the other regions, area devoted to grains actually declined through the 1990s. The yield growth was realized as a result of increased fertilizer use, adoption of higher yielding varieties, or increased irrigation. Many developing countries are close to their maximum technical potential for growing crops. Therefore, maintaining recent growth rates will be unlikely in these areas with current technologies and practices. However, in many countries—particularly those in SSA—potential exists for improved productivity. In order to achieve these goals, these countries must promote investment in agricultural research, education, and rural infrastructure.

Imports

Domestic food production is less critical to food security if countries can import required foods. For low-income, food-insecure countries, however, financial constraints severely limit their ability to do this. These countries depend on imports not only for food, but for other essential commodities like fertilizers, fuels, medicine, and essential manufacturing inputs and products. These nonfood items can comprise a large share of the total import bill. In Sub-Saharan Africa (SSA), for example, fuel imports were about 14 percent of the total value of imports in 2002. Given the current hike in oil prices, these countries must make hard choices in importing commodities.

Of the regions studied in this report, North African countries spend the largest share of import budgets on food, 15 percent in 2001-02. The SSA countries devoted 14 percent of import budgets to food, and Latin American and Caribbean countries spent 10 percent of their import budgets on food in 2001-02. These import shares have not changed much through time. In the Commonwealth of Independent States (CIS) countries, the share of food in import budgets dropped from 55 percent in 1992-93 to 8 percent in 2001-02. The reason for this significant decline is both a rebound in domestic production and a more than twofold expansion of import budgets during this period. In the Asian countries, food captured just 5 percent of the total import budget for much of 1992-2002.

Therefore, with the exception of the CIS countries where food markets have undergone a major transition, the food share of total imports has remained stable. This pattern holds despite the differences in import budget growth

among regions. On average, there is almost a one-to-one relationship between growth in food imports and total import budgets in the regions studied. This means that foreign exchange earnings will largely determine whether imports can contribute to food security in these countries. Food import prices, of course, are critical. Given the constant share of food import value in total imports, any increase in food prices would mean a reduction in the quantity of food imports and, in turn, a reduction in food available for consumption.

Food aid has been a major means by which the international community improves food access and reduces food insecurity in low-income countries. The global quantity of food aid has fluctuated during the last two decades, and its share has declined relative to both total exports from food aid suppliers and total food imports to low-income countries. The share of food aid in total cereal imports was around 18 to 20 percent in the early 1990s, but has since declined to about 7 percent in 2002. SSA and Asian countries have been by far the largest recipients of food aid, receiving more than 60 percent of the volume during the last 15 years.

Purchasing Power and Access To Food

Hunger in many of these lower income countries is primarily a result of households having insufficient resources to purchase the food they need from available food supplies. This is a function of both the level of income and its distribution among households. Average gross national income (GNI) per capita in 2003 was $727 for the 70 countries studied. This is about 57 percent of the average for the low- and middle-income countries. Incomes in these countries vary considerably, from GNI per capita as low as $90 in Burundi and Ethiopia to $2,980 in Jamaica. North Africa and Latin America and the Caribbean (LAC) have the highest average per capita GNI at $1,718 and $1,650, respectively. The 37 countries in Sub-Saharan Africa (SSA) have an average per capita GNI of $381 per year, less than half the average in Commonwealth of Independent States countries and 40 percent lower than the Asian countries included in this study, which have the second lowest average income.

Even in countries in Southeast Asia and the LAC region, where per capita income is relatively high, poverty and hunger continue to be major problems. Income inequality is measured by the Gini index that ranges from 0 to 1, with 1 indicating perfect income inequality. Income inequality among the study countries ranges from a low of 0.27 in Uzbekistan to a high of 0.63 in Lesotho. The degree of inequality also varies by region, with Asia having the lowest rate of inequality at 0.36 and LAC, at 0.49, the highest.

While the Gini index measures the degree of income inequality, it provides no insight into its determinants. For the low-income countries, the size and productivity of the agricultural sector is an important factor in income inequality. Most of the poor live in the rural areas and they depend greatly on the agriculture sector for employment and income.

Overall, income inequality compounds the problems of chronic hunger in low-income countries. Increasing the growth rate of the economy and devel-

opment of the rural/agricultural sector can reduce inequality in income distribution. These results are important to countries that are not only faced with income distribution problems, but also have very low per capita income.

Review of Food Security Progress of the Last Decade

As mentioned earlier in this report, the objective of the World Food Summit of 1996 was to reduce the number of hungry people by half by 2015. With only 10 years left to reach this goal, we focus on the progress made so far. Obviously, there is great variation within and among regions with respect to rates of success or failure.

We use 1992-94 as our base reference point—a period of time prior to the 1996 Summit. We then compare that base period to the most recent 3-year average of our historical data—2002-04. We use two criteria: changes in the number of hungry people (or the number of people who fall short of consuming the nutritional target of 2,100 calories per day), and changes in the distribution gap (or the amount of food needed by income groups within a country to meet the nutritional requirement), which is an indicator of the severity of food insecurity. The countries included in this report are low- and middle-income countries with a population of close to 3 billion people or about 46 percent of the world population in 2005. The countries are in North Africa (4 countries with about 150 million people), Sub-Saharan Africa (SSA) (37 countries with about 690 million people), Asia (10 countries with 1.89 billion people), Latin America and the Caribbean (LAC) (11 countries with about 150 million people) and the Commonwealth of Independent States (CIS) (8 countries, close to 74 million people).

For the 70 countries, on average, there has been a slight—7 percent—decline in the number of hungry people: from 688 million to 639 million between 1992-94 and 2002-04. With the exception of SSA, all regions experienced a decrease in the number of hungry people during this 10-year time frame (fig. 3). According to the data, the largest decrease occurred in North Africa. This result should be put in the context of the fact that, in most years, there are no hungry people in the region—calorie consumption, on average, equals that of the high-income countries in Europe. However, the climate in Algeria and Morocco is volatile and severe drought often cuts the production of staple crops by more than half leading to a surge of hunger among the poorest segment of population. This happened during 1992-94 in Morocco and again during 1999-2000. These shocks are, in general, followed by consumption recovery, as was the case during 2002-04. This means that the hunger situation in these countries is transitory and what seems like a decline in the number of hungry people in the region is in actuality a recovery from a weather-induced shortfall.

Both Asia and the CIS regions experienced a 30-percent drop in the number of hungry people. In the CIS, this result was due principally to improvements in three countries: Armenia, Azerbaijan, and Georgia. In Azerbaijan—where grains account for nearly 60 percent of the diet—grain production nearly doubled between 1992-94 and 2002-04. Armenia and Georgia also experienced smaller increases in grain production, but it was the decline in popula-

Figure 3
Number of hungry people: Change during the last decade*
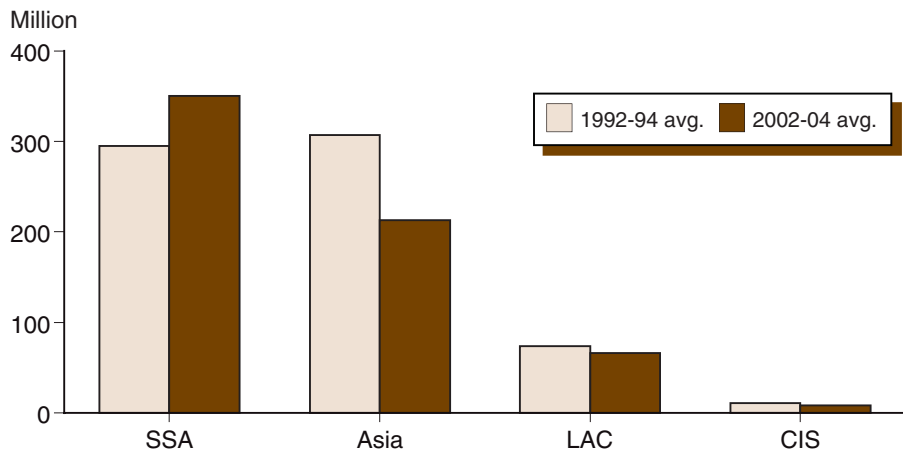
Million

* North Africa is not included because, according to our assessment, there is not a significant number of hungry people in the region.

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

Source: USDA, Economic Research Service.

tion that contributed most significantly to rising per capita food supplies in the countries. In Armenia, population declined about 1 percent per year during this period. In Georgia, the decline was even greater.

In Asia, the decline in the number of hungry people was largely driven by successes in Bangladesh and Vietnam. In Bangladesh, per capita food consumption increased roughly 2 percent per year from 1992-94 and 2002-04; as a result, the number of hungry people in the country declined 70 percent. During this time, grain output grew more than 3 percent per year and a rapidly growing export sector—which resulted in increased export earnings—supported strong import growth. Most of the gains in agriculture were a result of increased productivity rather than expansion of area. Bangladesh is one of the most densely populated countries in the world and therefore there is little room to increase area. Policy reform undertaken by the government to encourage private sector involvement in the supply and trade of inputs such as irrigation equipment, seeds, and fertilizer had a positive impact on the sector. For example, irrigated area has increased nearly 50 percent during the last decade. Also during this time, Bangladesh's food supplies were boosted by higher imports which were made possible by its strong export performance; export earnings tripled during the last decade. Textiles account for more than half of the country's export earnings and guaranteed textile quotas protected Bangladesh from competition with China and India. However, these quotas were removed in early 2005, which may make it difficult for the country to compete with its Asian neighbors.

Vietnam enjoyed even higher growth in per capita consumption—2.5 percent—than Bangladesh. All indicators support the sustainability of Vietnam's progress. As a result, the country has more than achieved the goal of the World Food Summit in that the number of hungry people fell from an average of nearly 19 million in 1992-94 to close to zero in 2002-04. Grain production expanded rapidly at more than 4 percent per year from 1990

through the present. At the same time, population growth slowed and averaged around 1.5 percent per year. The dramatic growth in the agricultural sector occurred at a time when the economy was moving from a centrally planned system to one that was more market oriented. The country evolved from a food importer to a major food exporter at the global level. This growth, coupled with gains in the oil and textile industries, allowed for strong growth in imports, further expanding food supplies. Revenues from oil—which account for more than 20 percent of the country's export earnings—increased as global prices strengthened through the 1990s to the present.

The number of hungry people in the LAC region has varied slightly over time, but there has been no discernible trend across the region as a whole. However, there are success stories among individual countries, most notably the Dominican Republic. This country has met the World Food Summit goal as the number of hungry people was cut in half from 1992-94 to 2002-04. During this time, export earnings grew more than threefold. This allowed for an increase in imports, and, in turn, food supplies. Once dependent on sugar, the country has diversified its economy and export sector by promoting mining, manufacturing, and tourism. The experience of Peru is also noteworthy because of the major policy changes during the last decade that brought prosperity for large segments of the population. Although Peru's economy faltered by the end of the 1990s, policy initiatives in the early 2000s are expected to revitalize the situation.

Despite strong growth in food production, SSA is the only region where the number of hungry people has risen—over 19 percent—during the last decade. In 2002-04, roughly 350 million people, more than half of the region's population, fell into this category. The region's production of grains and root crops (staple foods) grew at a rate of 2.4 percent per year, much higher than the growth achieved in the Asian countries (1.7 percent) or LAC countries (1.9 percent). However, SSA's high population growth, relative to other regions, negated these gains in production. While population growth has slowed from historical levels, it is still by far the highest of all the regions included in this study—2.6 percent per year since 1992. In contrast, in Asia and LAC, population growth was, on average, roughly 1.8 percent per year. Moreover, SSA's import capacity is more limited by financial constraints than other regions, thereby increasing the dependency on domestic production. Roughly 90 percent of the region's food supplies come from domestic production.

There were a handful of countries in the SSA region, however, where improvements did occur and the number of hungry people actually fell. These countries include Angola, Mozambique, and Ghana. Angola has far exceeded the goal of the World Food Summit. According to ERS estimates, in 1992-94, consumption for the entire country—roughly 12 million people at the time—was below the nutritional requirement. By 2002-04, however, consumption was below that target for only about 3 million people. This progress was achieved during a time when the country reached a peace agreement following more than two decades of civil war. As a result of the new-found security and stability, food production and export earnings rose considerably. For example, grain area harvested nearly doubled between 1992-94 and 2002-04, resulting in nearly 6-percent annual growth in grain

output. Roots are a staple of the diet, accounting for more than one-third of all calories consumed. During this same time period, root crop output roughly tripled as area harvested and yields soared. Oil accounts for the bulk of the country's export earnings and the combination of political stability and higher oil prices led to considerable earnings growth and thus allowed for higher food imports.

The experience in Mozambique mirrors that of Angola. The end of a long-standing civil war in 1992—coupled with strong growth in food production and import capacity—led to marked progress toward food security. In 1992-94, consumption for the entire population of roughly 15 million was estimated to have fallen below the nutritional requirement. By 2002-04, this was the case for only a third of the population. During this time, production of corn, a significant part of the country's diet, increased more than 10 percent per year as area harvested doubled and yields rose. Production of another important crop—roots—nearly doubled during this time. Export earnings have more than tripled since 2000 as a depreciated currency has made the country's exports relatively less expensive. Expanded output, coupled with record-level prices, has boosted earnings of aluminium, which now account for more than half of the country's total export earnings. Production of cashews—an important export crop that suffered during the war—is now at a 25-year high.

One of the key factors that influenced the achievements of Angola and Mozambique is that both countries benefited from strong support of donors during their peace process. For Mozambique, external assistance accounts for 86 percent of gross domestic capital formation and in Angola it accounts for 12 percent. In Angola, foreign direct investment related to the oil industry also played a key role in economic recovery of the country.

In contrast, Ghana's success in food security was achieved during peace-time as the country gained external support by demonstrating improvement in governance. In Ghana, the number of hungry people fell from an average of 10 million in 1992-94 to roughly 4 million in 2002-04. This was achieved through increased import capacity as well as a reduction in population growth. Export earnings have doubled in the last decade due to a depreciating currency, which has made the country's exports more competitive, and a strengthening of prices for major exports. Gold and cocoa comprise nearly two-thirds of the country's export earnings. The price of gold has increased nearly 50 percent since 2000. While the price of cocoa has not matched that growth, it has generally risen during the last decade. Also contributing to the increase in food supplies on a per capita basis was a slowdown in population growth over the last decade—from an annual rate of 2.75 percent to 2.2 percent.

Growth Needed to Cut Hunger

Hunger and poverty are highly correlated, and food insecurity tends to be deep in the lowest income group in the study countries. As discussed earlier, the food security situation has deteriorated in many countries during the last decade. In this section, we used the 1992-94 food consumption level of the lowest income group in these vulnerable countries as a benchmark, and esti-

mated the consumption growth required to meet the World Food Summit (WFS) goal. We then compared that growth to actual growth during the last decade. The estimation of the consumption growth requirement was based on two scenarios: the consumption growth that is mainly achieved by increasing food production, and the consumption growth that is achieved by growth in food imports.

In Latin America and the Caribbean, Honduras is the only country where the situation deteriorated between 1992 and 2004. Grain production peaked in the mid-1990s, then decreased an average of 2.4 percent per year due to a decline in area planted. Area was shifted into other commodities including fruits, vegetables, potatoes, beans, and oilseeds. Honduras, like other countries in the region, has grown increasingly reliant on imports to compensate for production shortfalls. Between 1992 and 2004, grain imports grew nearly 11 percent per year. However, to move toward cutting hunger in half by 2015, imports would had to have grown at nearly twice that rate, an unlikely scenario.

The Democratic Republic of Congo is one of the most vulnerable countries in the world with respect to food security. Per capita calorie consumption was 1,600 in 2002. Between 1992 and 2004, grain production fell 0.5 percent per year largely due to political instability which disrupted agricultural activities. In order for the country to move toward the WFS goal, production would have had to grow over 1 percent per year. During the 1980s, output grew roughly 2 percent per year, so the target growth rate was not unattainable. On the other hand, the required import growth of over 9 percent per year far exceeded actual growth of 3.3 percent.

Another vulnerable country in Sub-Saharan Africa is Ethiopia. Following the end of the civil war in 1992 and the return of farmers to their land, grain production expanded rapidly—by 5.4 percent per year. However, production would have to grow by over 7 percent per year in order to cut hunger in half by 2015. Imports account for only a small share of Ethiopia's food supplies and most imports are in the form of food aid. Therefore, meeting the WFS goal through imports is not a viable option.

Per capita consumption in Tanzania declined almost 1 percent per year from 1992 through 2004. Grain production growth of 1.5 percent per year—well below the projected 2.6-percent rate needed to reach the WFS target—was not sufficient to offset high population growth. The situation in Madagascar was nearly identical, only population growth was even higher at nearly 3 percent per year and production growth was slightly lower.

In Zambia, a decline in area growth and stagnant yields led to a slow decline in grain output between 1992 and 2004. Grain output growth needed to exceed 2 percent per year to move toward the WFS goal. Imports declined by more than 2 percent annually, so meeting the goal with higher imports was not realistic.

The estimated domestic production growth rates needed to reach a trend line to meet the WFS goal were within a reasonable range (i.e., either these growth rates were realized by the country at an earlier period or achieved by other countries with similar market structures). In contrast, the estimated

import growth rates required to meet the WFS goal are much higher than the range realized by many of the countries, mainly because of financial constraints. Agricultural products, which constitute the bulk of exports from food-insecure countries, are faced with weak global demand leading to declining price trends. However, the fact that the domestic production growth rates needed to meet WFS are within the expected range is a positive factor. Agriculture is the main source of employment and income of the poor. Any rebound in agricultural performance will have a widespread positive impact on global hunger.

Assessments from Other Organizations

Other reports, while varying in scope and methodology, agree that success in food security and reduction in poverty is not distributed evenly. East and Southeast Asia, the regions with the largest absolute number of hungry and poor people, have made the greatest strides in improving food security. Sub-Saharan Africa, however, the region with the largest share of hungry and poor people, has seen little or no improvement.

The United Nations Food and Agriculture Organization (FAO) publishes an annual report, "The State of Food Insecurity in the World," which compares current estimates with the baseline estimate from 1990-92. It then projects the number of hungry people in 2015, based on past trends. For 2000-02, FAO estimated the number of hungry people to be 852 million, just 19 million less than 10 years earlier. World population increased by 800 million during that time and it can be considered a success that the number of hungry people declined. However, the decline is not sufficient to reach the World Food Summit goal by 2015.

The Millennium Project is an effort by the United Nations aimed at providing guidelines that make it possible to reach the Millennium Development Goals. There are eight Goals, the first of which is to eradicate extreme poverty and hunger. The Project's report indicates that the world poverty rate has been reduced from almost 1.5 billion people (or 28 percent of global population) to 1.1 billion (21 percent) over the last decade. These estimates present the most optimistic view on the rate of progress made over the last decade and, based on this rate of success, they predict that the number of extremely poor people (those who live on less than $1 a day) could indeed be halved by 2015.

Prospects (10 years out)

As mentioned above, at the aggregate level, there was an improvement—albeit slight—in food security in the time period starting in 1992, just before the proclamation of the World Food Summit (WFS), through the current period. This is not the case for the projection period, however. Between the 2002-04 base period and the 2015 target, ERS results indicate a 10-percent increase in the distribution gap (the amount of food needed to raise consumption in each income group to the nutritional target) and a 16-percent jump in the number of hungry people (see box, "How Food Security is Assessed: Methods and Definitions"). If these projections are realized, the goal of the

WFS will not come close to being met. It should be noted, however, that there are large variations in these results among countries and regions (fig. 4).

The greatest improvement in food security is projected for the Latin America and Caribbean region. ERS projects a continuation of the positive trend achieved between 1992 and 2004, and as a result, the WFS goal is projected to be met in this region. In 1992-94, there were an estimated 74 million hungry people in the region. By 2015, this number is expected to be cut in half to 37 million. The distribution gap is projected to fall by 32 percent between 2002-04 and 2015. The Dominican Republic and Peru are expected to continue on the path established between 1992 and 2004 and to meet the WFS goal. In fact, the Dominican Republic is expected to eliminate food gaps, as is El Salvador. Both countries are continuing to benefit from large inflows of foreign exchange, which have expanded import capacity. Other countries expected to meet the WFS goal are Bolivia, Colombia, and Ecuador. In contrast, the food security situation is projected to deteriorate significantly in Haiti, where political instability has resulted in limited agricultural and economic growth. The situation is not expected to change drastically in the near term.

The food security situation in the North African region is expected to remain good, although drought continues to be a threat. When drought occurs in this region, production can fall 50 percent and sometimes as much as 80 percent. At these times, imports are required to compensate for the shortfall. In most cases, these countries have the import capacity to fill the gap. However, a decline in oil prices or political instability could increase their vulnerability. Thanks to extensive irrigation, Egypt is the only country in the region that is not vulnerable to consumption shortfalls due to drought.

A slight improvement in food security is projected for the Commonwealth of Independent States region. Both Kazakhstan and Uzbekistan are expected

Figure 4

Number of hungry people: Present versus future*
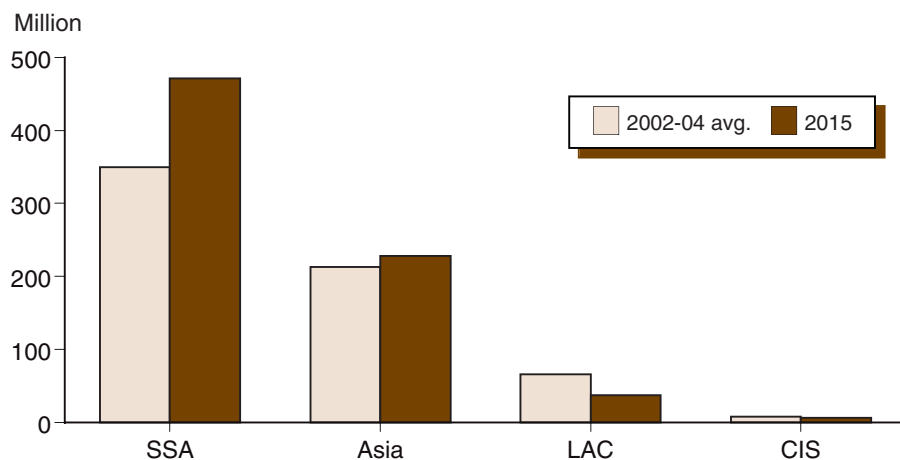
* North Africa is not included because, according to our assessment, there is not a significant number of hungry people in the region.

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

Source: USDA, Economic Research Service.

to eliminate their food gaps. Despite slow growth in production, per capita consumption is projected to rise in Kazakhstan due to stagnating population growth. Uzbekistan's growth in grain production will not match the rapid historical rates of 9 percent per year. However, it will still be strong enough to enable an increase in per capita consumption such that consumption across all income groups will exceed the nutritional target. The food security situation in Tajikistan, which performed poorly between 1992 and 2004 with per capita consumption declining 3.6 percent per year, is projected to deteriorate slightly through 2015. Both the distribution gap and the number of hungry people in the country are projected to rise.

The food security situation in Asia is projected to remain virtually unchanged through the next decade, at the aggregate level. The number of hungry people is projected to rise nominally from 214 million in 2002-04 to 228 million in 2015. Obviously, there will be material changes at the country level. Bangladesh, Indonesia, the Philippines, Sri Lanka, and Vietnam are projected to meet the goals set at the World Food Summit. In fact, all but the Philippines are expected to eliminate their food gaps by 2015. The food security situation is projected to deteriorate in Afghanistan, India, and North Korea. Despite the expected continued recovery in Afghanistan's agricultural sector, growth will not be sufficient to compensate for the high population growth rate of 3.6 percent per year. In the case of India, the deterioration will be relatively slight. In 1992-94, consumption even in the lowest 10 percent of the population was very close to the nutritional target. Therefore, very few people were considered hungry in 2002-04. By 2015, consumption in the lowest 10 percent will fall just short of the target and, as a result, 124 million people will be considered hungry. In North Korea, the agriculture sector suffered along with the economy as a whole during the last decade. Continued financial difficulties are expected to hinder growth in the sector during the decade and, as a result, per capita consumption is projected to decline. By 2015, we project that approximately 60 percent of the population will consume below the nutritional target.

The food security situation in Sub-Saharan Africa (SSA), already the most vulnerable region, is expected to deteriorate even further. The number of hungry people in the region is projected to reach 471 million in 2015, marking a 34-percent increase from 2002-04. The distribution gap is projected to increase 19 percent during the same time period. The greatest declines are expected in Rwanda, Uganda, Angola, Benin, Burkina Faso, Cape Verde, Mauritania, Niger, and Senegal. Even among this group there are some countries where this trend is of more concern than others. Projections of a steady decline in per capita grain production in countries such as Rwanda, Mauritania, and Niger signal a clear food security problem. In all three cases, by 2015, approximately 80 percent of the population in these countries will be considered hungry if current trends go unchanged.

In Rwanda, per capita consumption is projected to decline roughly 1 percent per year through the next decade. The country's agricultural sector is constrained by two main factors: land shortages and low yields. Expansion of arable land is not feasible because the country has the highest population density in Africa. In addition, farming is dominated by smallholders who cannot afford the fertilizer necessary to raise yields. Mauritania is 80

percent desert and therefore unfavorable for agriculture. As a result, the country depends heavily on imports to boost food supplies. Growth in export earnings—more than half of which come from the mining sector—has been minimal, thereby constraining import growth. These factors, combined with very high population growth of 2.8 percent per year, are expected to result in a 2.6-percent annual decline in per capita consumption in the next decade. Niger's population growth is projected at 3.3 percent per year, one of the highest growth rates in the world. This is a poor country that has seen almost no area expansion in recent years for grains—the staple of the diet—and has among the lowest yields in the world. Assuming current trends continue, per capita consumption in the country will decline roughly 1 percent per year through 2015.

There are some potential success stories in the region, however. Most notable are Ghana and Mozambique. These two countries have made progress during the last decade and they are expected to continue on this path. As a result, they will exceed the WFS goal. Approximately 10 million people in Ghana were considered hungry in 2002-04. This number is expected to fall to 3 million by 2015. In Mozambique, the decline is expected to be even more precipitous—from 15 million in 2002-04 to 2 million in 2015. Both countries are expected to benefit from relative strong export sectors, continued growth in grain output, and population growth rates of under 2 percent per year.

In sum, progress toward achieving the WFS goal has been constrained by slow growth in domestic food production, inadequate financial capacity to import, and income inequality. The projection results also show that the study countries as a group would fail to reach the WFS goal in 10 years, and for SSA the food security situation is expected to deteriorate. The projection results do not take into account any positive shocks (such as a major increase in investment) or negative shocks (such as financial breakdown or political unrest in the countries). During the last 10 years, several countries have made remarkable and unforeseen progress in reducing their hunger situations. The case studies of Ghana, Peru, and Vietnam in the following section of this report clearly show that improvements in food security are not constrained by shortcomings in economic structure and resource base.

Table 1

Food availability and food gaps for 70 countries

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grain equiv.)		Aggregate availability of all food
			1,000 tons			
1996	434,335	62,887	53,987	6,203		690,781
1997	423,638	64,842	58,956	6,458		697,399
1998	440,877	66,169	64,262	7,629		714,966
1999	455,478	71,157	65,054	8,586		745,897
2000	455,840	73,060	66,290	8,700		744,808
2001	472,856	75,422	64,578	9,601		772,191
2002	445,405	76,186	75,215	8,284		784,792
2003	488,817	78,676	64,752	8,595		806,191
2004	487,176	81,307	70,979	7,257		812,734
Projections				**Food gap***		
				SQ	NR	
2005	488,687	81,679	77,411	*5,974*	*12,977*	815,161
2010	549,073	88,791	89,961	*7,815*	*15,012*	899,965
2015	605,044	96,427	104,145	*12,153*	*16,719*	991,029

*SQ stands for status quo and describes the amount of grain equivalent needed to support 2002-2004 levels of per capita consumption. NR stands for nutritional requirements and describes the amount of grain equivalent needed to support nutritional standards.

Source: USDA, Economic Research Service, using data from FAOSTAT (http://faostat.fao.org).

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		
1996	33,267	1,465	16,578	193	42,739
1997	22,439	1,192	20,691	137	45,243
1998	26,699	1,261	20,084	74	42,986
1999	24,476	1,202	21,590	105	46,078
2000	21,312	1,224	24,530	356	46,034
2001	25,442	1,239	23,989	82	47,192
2002	24,852	1,402	27,456	72	51,967
2003	31,903	1,583	19,365	46	49,448
2004	32,521	1,559	22,280	58	50,572

Projections				Food gap*		
				SQ	NR	
2005	26,331	1,588	25,080	*0*	*0*	55,724
2010	32,029	1,735	29,907	*0*	*0*	59,502
2015	34,120	1,891	35,216	*0*	*0*	66,194

North Africa
(146 million people in 2005)

Calorie consumption, on average, is well above the nutritional require-ment 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 contribute about 45 percent of food supplies and the share is projected to increase. Therefore the state of the economies of these countries and export potential play a key role in the food security outlook.

North Africa: Grain production and imports

Mil. tons
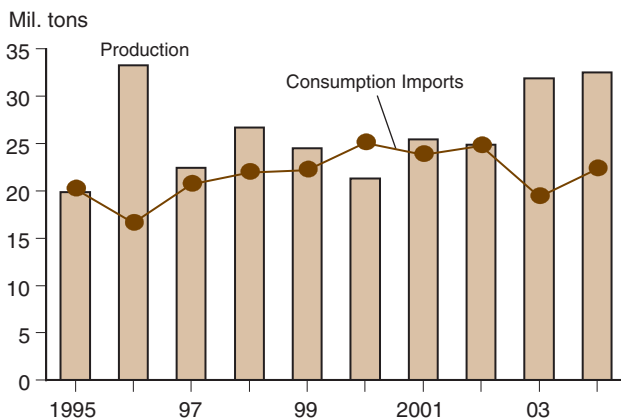
North Africa: Distribution gaps

1,000 tons
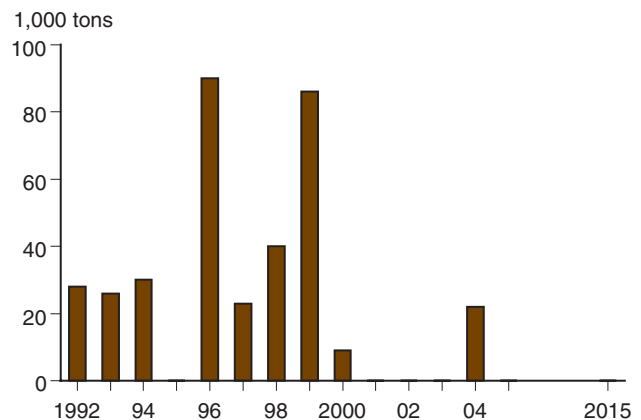
North Africa: Consumption trends

	Daily calorie consumption		Annual growth in calorie consumption	Share of cereals in diet	
	1992	2002	1992-2002	1992	2002
				Percent	
North Africa	**3,081**	**3,162**	**0.34**	**59.9**	**57.8**
Algeria	3,011	3,022	0.22	56.8	56.6
Egypt	3,198	3,338	0.45	65.7	63.3
Morocco	2,918	3,052	0.18	62.4	62.1
Tunisia	3,199	3,238	0.48	55.4	50.7

*SQ stands for status quo and describes the amount of grain equivalent needed to support 2002-2004 levels of per capita consumption. NR stands for nutritional requirements and describes the amount of grain equivalent needed to support nutritional standards.

Source: USDA, Economic Research Service, using data from FAOSTAT (http://faostat.fao.org) and World Food Program.

Table 3

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		
191996	68,799	41,364	7,581	2,707	138,503
1997	63,592	42,701	9,894	2,497	140,215
1998	71,237	45,493	11,775	2,837	152,091
1999	67,570	47,734	9,587	2,690	151,437
2000	68,512	49,084	11,105	4,027	156,844
2001	73,849	50,880	13,213	3,722	168,339
2002	68,158	50,745	14,477	3,225	167,662
2003	75,829	51,710	12,147	5,495	176,747
2004	77,242	53,858	16,053	3,941	184,246
Projections				**Food gap***	
				SQ **NR**	
2005	80,389	54,117	15,167	*4,471 12,362*	181,301
2010	92,359	59,034	16,215	*7,259 14,189*	201,595
2015	106,200	64,328	17,390	*11,198 15,292*	225,397

Sub-Saharan Africa
(690 million people in 2005)

At the regional level, per capita consumption is projected to increase nominally through the next decade. However, at the national level, it will decline in 9 of the 37 countries.

The number of hungry people in the region is projected to rise from 363 million in 2005 to 471 million in 2015. This means that more than half of the region's population will consume less than their nutritional requirements throughout the next decade.

Sub-Saharan Africa: Trend in number of hungry people versus population
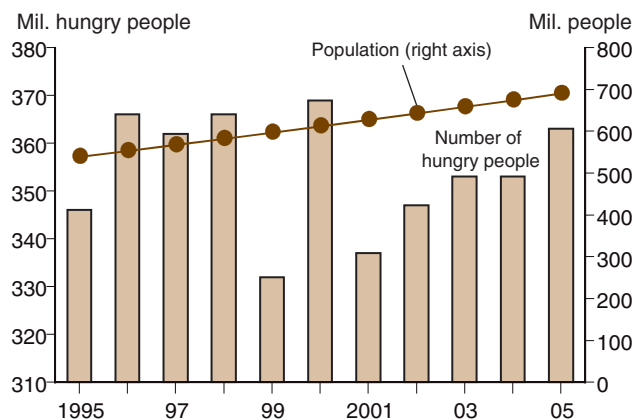
Sub-Saharan Africa: Distribution gaps
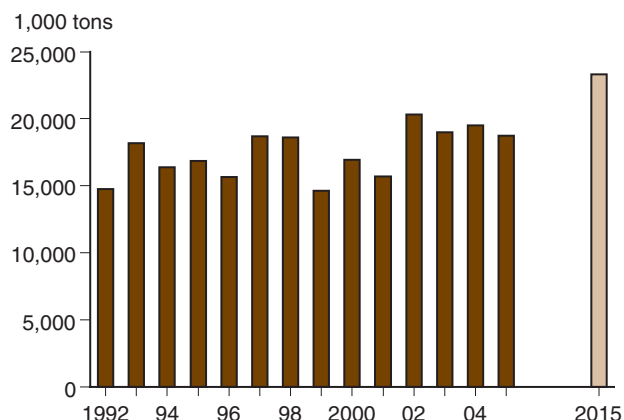
Sub-Saharan Africa: Consumption trends

	Daily calorie consumption		Annual growth in calorie consumption	Share of cereals in diet	
	1992	**2002**	**1992-2002**	**1992**	**2002**
				Percent	
Sub-Saharan Africa	**2,162**	**2,207**	**0.40**	**48.6**	**48.1**
Angola	1,793	2,083	1.64	29.1	31.6
Kenya	1,913	2,090	1.13	47.2	47.7
Senegal	2,193	2,280	0.10	63.5	59.5
Sudan	2,168	2,228	0.20	59.6	52.9
Tanzania	1,983	1,975	0.13	47.4	51.3
Zambia	1,901	1,927	-0.04	65.0	63.7
Zimbabwe	1,912	1,943	0.57	61.7	53.5

*SQ stands for status quo and describes the amount of grain equivalent needed to support 2002-2004 levels of per capita consumption. NR stands for nutritional requirements and describes the amount of grain equivalent needed to support nutritional standards.

Source: USDA, Economic Research Service, using data from FAOSTAT (http://faostat.fao.org) and World Food Program.

Table 4
# 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			
1996	303,603	16,277	16,194	1,834		455,055
1997	307,099	17,183	14,001	2,591		457,123
1998	317,150	15,644	17,048	3,223		463,976
1999	328,699	17,988	19,510	4,259		488,907
2000	333,637	18,374	16,715	3,070		485,308
2001	335,920	18,778	13,574	4,209		496,995
2002	311,374	19,398	18,437	3,345		499,797
2003	341,385	20,660	18,181	2,289		517,676
2004	339,115	21,011	18,163	2,278		517,101
Projections				**Food gap***		
				SQ	NR	
2005	342,069	20,993	20,901	*1,469*	*226*	512,153
2010	380,337	22,584	23,260	*443*	*453*	561,897
2015	416,871	24,278	24,377	*665*	*897*	606,726

Asia
(1,898 million people in 2005)

The number of hungry people in Asia is projected to decrease from 342 million people in 2005 to 228 million people in 2015. Twenty percent of India's population of 1.25 billion are projected to be hungry in 2015, which accounts for almost 55 percent of the number of hungry people in the region.

The most vulnerable country in the region is Afghanistan where roughly 80 percent of the country's population is projected to be hungry in 2015.

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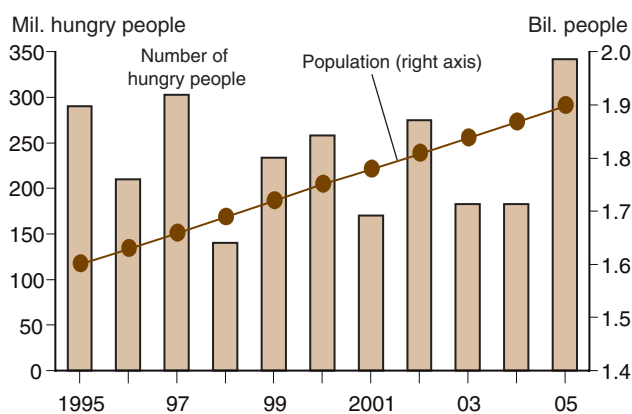
Asia: Distribution gaps
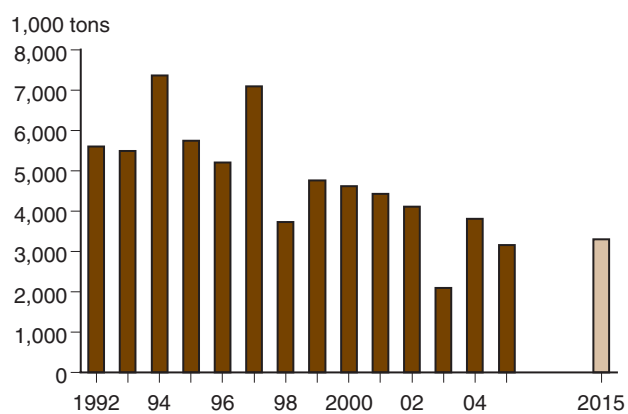
Asia: Consumption trends

	Daily calorie consumption		Annual growth in calorie consumption	Share of cereals in diet	
	1992	**2002**	**1992-2002**	**1992**	**2002**
			Percent		
Asia	**2,304**	**2,435**	**0.60**	**65.5**	**65.3**
Bangladesh	2,065	2,205	1.22	83.7	81.8
India	2,416	2,459	0.33	63.9	58.9
Indonesia	2,774	2,904	0.36	63.7	63.2
Korea, Dem.R.	2,298	2,142	-0.67	59.9	58.8
Pakistan	2,341	2,419	0.31	54.6	51.7
Vietnam	2,230	2,566	1.46	77.0	76.5

*SQ stands for status quo and describes the amount of grain equivalent needed to support 2002-2004 levels of per capita consumption. NR stands for nutritional requirements and describes the amount of grain equivalent needed to support nutritional standards.

Source: USDA, Economic Research Service, using data from FAOSTAT (http://faostat.fao.org) and World Food Program.

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		
1996	9,971	3,047	9,035	722		33,016
1997	9,547	3,005	9,773	658		33,741
1998	10,131	2,989	10,460	1,013		34,737
1999	11,120	3,296	9,716	1,178		35,014
2000	11,808	3,424	10,209	887		36,527
2001	11,658	3,376	11,094	1,067		37,794
2002	12,160	3,425	11,837	1,127		39,380
2003	12,131	3,408	11,966	493		39,143
2004	12,194	3,513	11,944	678		39,555
Projections				**Food gap***		
				SQ	**NR**	
2005	12,751	3,589	13,524	*0*	*281*	40,967
2010	13,974	3,918	17,773	*113*	*344*	49,951
2015	15,112	4,271	24,217	*287*	*442*	62,665

Latin America and the **Caribbean** (148 million people in 2005)

Food security in the region is projected to improve over the next 10 years, with the number of hungry people projected to decline from 59 million in 2005 to 37 million in 2015.

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

Haiti and Honduras, the chronically food insecure countries in the region, are likely to continue to require food aid.

Latin America and the Caribbean: Trend in number of hungry people versus population
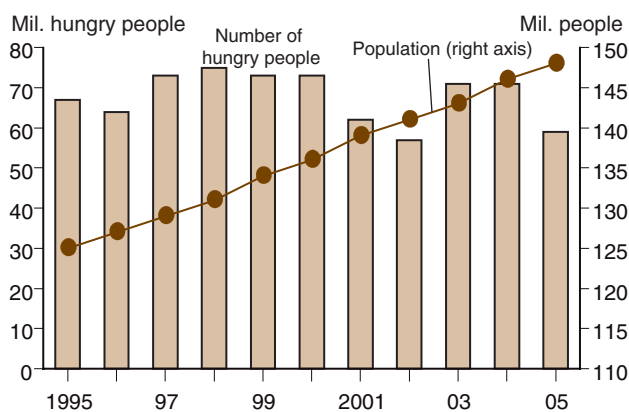
Latin America and the Caribbean: Distribution gaps
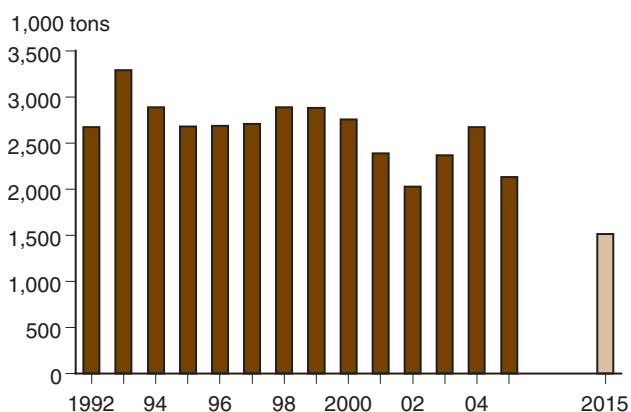
Latin America and the Caribbean: Consumption trends

	Daily calorie consumption		Annual growth in calorie consumption	Share of cereals in diet	
	1992	**2002**	**1992-2002**	**1992**	**2002**
			Percent		
LAC	**2,277**	**2,429**	**0.6**	**42.0**	**42.9**
Guatemala	2,308	2,219	-0.9	60.1	57.5
Haiti	1,765	2,086	2.1	39.6	43.9
Honduras	2,324	2,356	0.1	53.6	51.0
Nicaragua	2,212	2,298	0.5	46.9	50.4
Peru	2,023	2,571	2.4	41.7	43.3

*SQ stands for status quo and describes the amount of grain equivalent needed to support 2002-2004 levels of per capita consumption. NR stands for nutritional requirements and describes the amount of grain equivalent needed to support nutritional standards.

Source: USDA, Economic Research Service, using data from FAOSTAT (http://faostat.fao.org) and World Food Program.

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			
1996	18,695	735	4,138	747		21,468
1997	20,961	761	3,120	575		21,077
1998	15,660	782	3,113	481		21,176
1999	23,613	937	3,038	353		24,462
2000	20,571	955	3,413	360		20,095
2001	25,987	1,148	2,536	521		21,871
2002	28,861	1,216	2,830	516		25,986
2003	27,569	1,315	2,775	272		23,177
2004	26,104	1,366	2,164	302		21,260
Projections				**Food gap***		
				SQ	**NR**	
2005	27,147	1,392	2,739	*34*	*108*	25,015
2010	30,374	1,520	2,807	*0*	*25*	27,021
2015	32,742	1,659	2,945	*2*	*88*	30,048

Commonwealth of Independent States (CIS)
(74 million people in 2005)

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 2005, but the situation is expected to improve. The number of hungry people in the region is projected to decline from 10 million in 2005 to 6 million in 2015.

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.

Commonwealth of Independent States: Trend in number of hungry people versus population
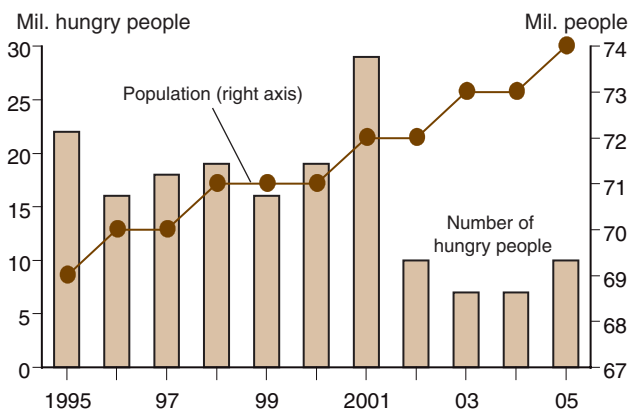
Commonwealth of Independent States: Distribution gaps
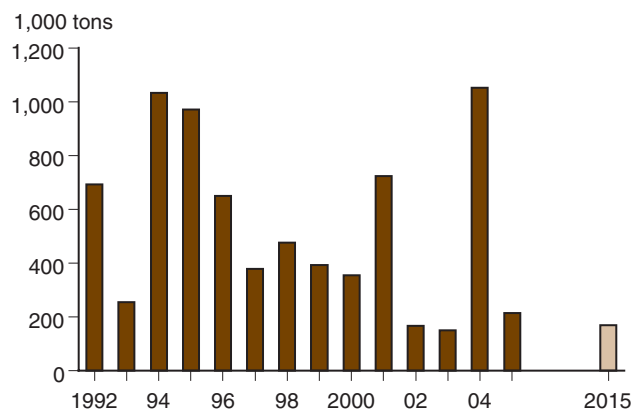
Commonwealth of Independent States: Consumption trends

	Daily calorie consumption		Annual growth in calorie consumption	Share of cereals in diet	
	1992	**2002**	**1992-2002**	**1992**	**2002**
			Percent		
CIS	**2,476**	**2,460**	**-0.2**	**59.8**	**58.1**
Armenia	1,844	2,268	2.0	61.6	56.3
Azerbaijan	2,283	2,575	1.4	65.3	63.1
Georgia	2,179	2,354	1.2	67.2	56.9
Kyrgyzstan	2,665	2,999	2.4	50.5	60.3
Tajikistan	2,338	1,828	-3.1	67.0	62.4

*SQ stands for status quo and describes the amount of grain equivalent needed to support 2002-2004 levels of per capita consumption. NR stands for nutritional requirements and describes the amount of grain equivalent needed to support nutritional standards.

Source: USDA, Economic Research Service, using data from FAOSTAT (http://faostat.fao.org) and World Food Program.

Making Strides in Achieving Food Security: The Cases of Ghana, Peru, and Vietnam

The focus of this year's report is a review of progress made since the 1996 World Food Summit and an analysis of the potential for achieving food security in the next decade. After studying the progress of the 70 countries included in this report, we have identified three countries that we consider to be success stories: Ghana, Peru, and Vietnam. All three countries introduced major reforms in the late 1980s or 1990s. These reforms were based on a stronger reliance on market forces, which fostered economic stability. The agricultural sectors, in particular, benefited from improvements in access to credit and government support of research and extension services.

Ghana

Ghana has achieved impressive success in improving its food security during the last decade and it is one of the best performers in the Sub-Saharan Africa (SSA) region. This success must be evaluated in the context of recognizing that the country remains among the world's poorest with a per capita income of $380 in 2004, less than the average for SSA. Ghana's food security success can be attributed to the economic reforms of the late 1980s that brought a new approach to agricultural policies in the country. The key elements of economic reform during 1986-2002 included a fully flexible exchange rate system, simplification and lowering of tariffs, fiscal reforms, the establishment of a new value-added tax system, liberalization of the banking system, and the elimination of credit controls. With respect to the agricultural sector, the new policy initiatives included privatization of state farms, reducing subsidies on inputs such as fertilizer, and removing commodity price controls. The government, in collaboration with the World Bank, embarked on an Agricultural Rehabilitation Project, with the goal of improving the delivery of public sector services such as research, extension, irrigation, and planning institutions. Improvements in agricultural performance, however, did not happen instantly. There was a sluggish response in the early 1990s, but the efforts eventually paid off, leading to agricultural growth of 4-5 percent in nearly every year during 1995-2003. The improvement in agricultural performance had a strong impact on the performance of the overall economy because almost 70 percent of the population depends on the agricultural sector for their incomes. This high dependency on the agriculture sector, and the fact that the share of agriculture in gross domestic product (GDP) is low (about 36 percent in 2003), is an indication of unequal

Table A-1

Indicators for case study countries in 2004

	Ghana	Peru	Vietnam
GNI per capita, Atlas method (current US$)[1]	380	2,360	550
Population (million)[1]	21.1	27.5	82.2
Agricultural machinery (tractors per hectare of arable land)[2]	0.1	0.4	2.4

[1]Source: World Development Report 2006.

[2]Source: World Development Indicators 2005.

purchasing power between the urban and rural population, leading to a high concentration of poverty and food insecurity in rural communities.

During the last decade, Ghana experienced improvements in food production and increased agricultural and mineral—in particular gold—exports, which helped finance food imports. This led to overall increases in food availability and food consumption across all income groups. However, continuation of this progress depends on the country's ability to increase investment in the agricultural sector and rural development. Poverty remains deep among the lower income population in rural areas, and inequality in purchasing power continues to exacerbate food insecurity problems of the poor.

Food Availability

Ghana's food availability has increased from about 2,000 calories per day per person in the early 1990s to 2,667 calories per day in 2003, a jump of more than 30 percent. The success was largely due to the promotion and adoption of a high yielding variety of corn, a staple food, and cassava, the main source of food for the poorest segment of the population. Corn yields increased 36 percent during 1990-2003 and production doubled. The growth in cassava was even more impressive, with a 51-percent growth in yields leading to more than threefold increase in production. A new cassava variety introduced to farmers in 1993 is resistant to pests and well-matched with Ghana's soil and climate conditions. This is an important achievement because cassava can be grown in poor soil, is tolerant to drought, and can be harvested 8-24 months after planting. This flexibility in harvesting also can stabilize annual consumption during drought years and lessen the risk of price hikes. Currently, cassava contributes to about one-third of daily calorie consumption in the country.

In addition to higher domestic food production, the increase in food availability was a result of rising food imports that were fueled by increased export earnings. The correlation between the value of food imports and the

Figure A-1

Cassava and corn yields have increased in Ghana

Mt/ha

Source: USDA, Economic Research Service, using data from FAOSTAT (http://faostat.fao.org).
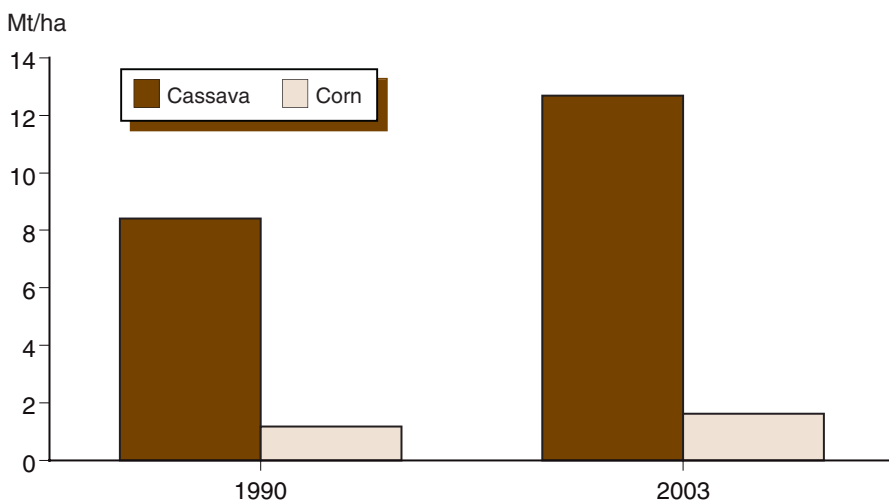
value of total export earnings was high—70 percent during 1990-2003. During this period, exports grew 8 percent per year, and food imports grew by 8.5 percent. Market liberalization in the agricultural sector, particularly for cocoa, reversed the declining trend in exports and resulted in 6.6-percent annual growth during 1990-2003. Another increasingly important agricultural export commodity is wood, both sawnwood and in finished form. However, there are serious concerns about the sustainability of wood as an export item and concern over the environmental impact of the current high rate of logging.

Nonagricultural exports also performed well as an income source for imports, but the country remains highly dependent on external assistance, which accounted for about 12 percent of gross national product (GNP) during 2000-03. Despite the government's policy adjustments, the flow of foreign direct investment remains low, less than 2 percent of GNP. In fact, in terms of receiving foreign direct investment (FDI), Ghana was ranked 15th among 47 SSA countries in 2002 (South Africa, Nigeria, and Angola accounted for 62 percent of the total). The principal reasons for the low FDI rates are inefficient financial institutions, poor infrastructure, and inadequately skilled labor, according to a report by the International Monetary Fund (IMF).

Overall, the high export growth and reductions in import tariffs—which made imports more affordable—were the reasons behind the high food import growth of 8 percent per year during 1990-2003. The growth in grain imports was less than total food imports, meaning that imports of higher valued food items became more prevalent. The volume of grain imports (mainly rice and wheat) increased by 3.3 percent per year, leading to grain import/supply dependency of 38 percent by 2003. In recent years, there has been a surge in imports of higher-value products; meat imports more than doubled, and imports of animal and vegetable oils increased fourfold during 2000-03.

Food Access

The successful adoption of new technology led to increased food production, and also slowed the growth in food prices relative to overall inflation. However, inflation remains very high despite the government's fiscal policy efforts. The annual inflation rate (as measured by the consumer price index) during 1990-2003 was 27 percent per year, and the food price index grew at a slower rate of 24 percent. The latest World Bank reports indicate that inflation was cut in half in 2004, which could have a positive impact on consumer food prices. Another factor contributing to improved food security was income growth between 4-5 percent, exceeding population growth and thus leading to real per capita income growth of about 2 percent. Income growth improved purchasing power and food security of all income groups but, according to the IMF country report, economic growth did not change the income distribution. The income distribution remains skewed and, according to the latest statistics in 1999, the top 20 percent of income earners received 46 percent of all income and the bottom 20 percent received only 5 percent.

ERS analysis shows that the number of people who consumed less than the nutritionally required level declined from 13 million in 1992, or 80 percent of the population to 4 million in 2004, or less than 20 percent of the population. The depth of food insecurity as measured by the nutritional distribution food gap—the amount of food required to increase the consumption of all food deficit income groups to the nutritional requirement—declined dramatically from 136,000 tons (measured in tons of grain equivalent) in 1992 to 30,000 tons in 2004, a decline of roughly 80 percent.

Other indicators of food security also point to improvements in food security. The trend in undernutrition among children declined, but this improvement was slower than for the aggregate population. Malnutrition among children under 5 declined from 27 percent in 1990 to 25 percent by 1999. It should be noted that improvements in child nutrition depend on improvements in a variety of factors, in particular general sanitary and health conditions. Another indicator of food security, poverty, also showed a decline: the share of population living below the poverty line ($1 per capita per day) dropped from 52 percent in 1992 to 40 percent by 1999. Poverty, however, is unevenly distributed between rural and urban areas. About two-thirds of the population live in rural areas but, in 1999, they accounted for 84 percent of the poor. According to the World Bank report, poverty is deepest among the subsistence farmers and landless agricultural laborers who account for over half of the population. Rural poverty could worsen if growth in the agricultural sector does not keep pace with the rest of the economy. During 1990-2003, the share of agriculture in the total economy declined from 45 percent to 36 percent and the growth in agricultural value added per worker was 0.9 percent, or about half of the aggregate per capita GDP growth.

Looking Ahead

Ghana's improving macroeconomic performance of the past decade has substantially reduced poverty and improved access to food by the poor. In addition, economic growth raised government revenues, which were used to

Figure A-2

Daily per capita calorie consumption in Ghana

Calories

Source: USDA, Economic Research Service, using data from FAOSTAT (http://faostat.fao.org).
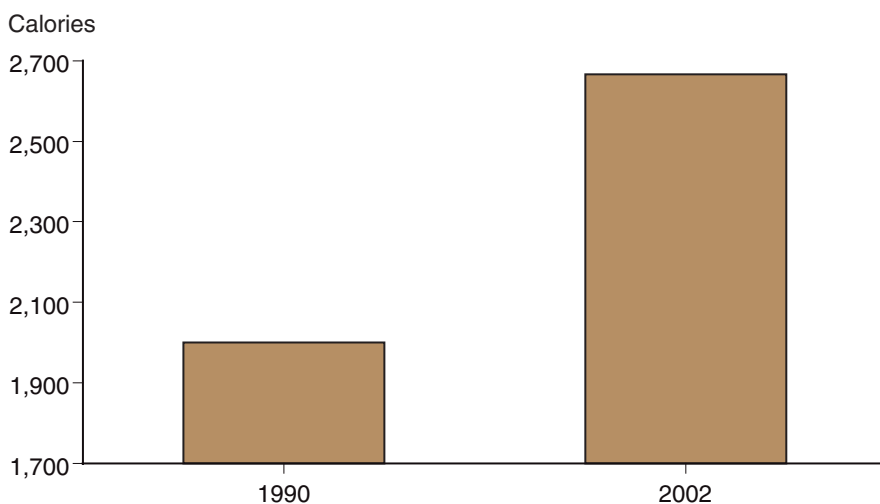
strengthen public investment. The World Bank's projected annual growth rates of 4-5 percent for GDP and personal income over the coming decade provide a basis for believing that Ghana's food security will improve rather than worsen. Based on ERS assessments, food security in Ghana will improve and the number of people consuming less than the nutritionally required level is projected to be cut by half, or to about 10 percent of the population, by 2015.

This successful outcome could be achieved if agricultural, economic, and foreign exchange growth trends continue and income distribution does not deteriorate. The last decade's impressive agricultural growth was achieved through changes in policies as well as promotion and adoption of new technologies in crop varieties, particularly corn and cassava. The sustainability of this trend is not guaranteed. Any change in technology introduces changes in resource allocations, which, in turn, calls for new technology. For example, the adoption of new cassava varieties led to reductions in consumer prices, which were followed by a sharp increase in demand. On the production side, this change increased the real income of small farmers. Now, according to a recent study by the International Food Policy Research Institute (IFPRI), labor shortages could hinder harvesting of the expanded production area. This means that the technology-induced production growth cannot be sustained if it is not followed by new processing technologies such as harvesting and peeling machines that are suitable for small farmers. The IFPRI study argues that without such technologies, increases in labor costs can easily bring the production expansion to a halt. The case of cassava is not unique; other agricultural commodities with impressive past performances can run into resource and technological constraints. According to the IMF report, the agricultural sector has not had much success in attracting FDI both for food production and export crops. Agricultural exports account for 25 percent of total export earnings, with cocoa and timber accounting for the bulk of the earnings. Exports of agricultural commodities increased about 250 percent since 1990, but most of the gains are driven by land expansion, threatening the country's natural resources. According to the World Bank, the cost of overexploitation of natural resources in the country is about 5.5 percent of Ghana's GDP. Growth in the nonagricultural sector is closely correlated with the performance of the agriculture sector and, so far, economic growth in Ghana has been achieved by shifting employment out of farming into other sectors.

Other food insecurity issues, such as concentration of poverty and hunger among the landless and the rural labor force, require long-term investment in education and rural development to help speed the movement of the labor force out of the agricultural sector. The slow rate of improvement in undernutrition among children, in addition to poverty, is related to discrepancies in access to services such as clean drinking water, health care, and sanitation. According to a United Nations Millennium report, only 40 percent of the rural population had access to safe water, compared with 70 percent in urban areas in 2000. Similarly, 44 percent of the rural population received improved access to sanitation, compared with 71 percent in urban areas.

Overall, Ghana's food security achievements have surpassed those of many countries with much higher incomes and more resources. The remaining

challenges, however, are not trivial. All food security and health indicators show deep problems among the lower income group, particularly in rural areas. While the continuation of recent economic growth can help the situation, the experiences of other developing countries indicate that growth alone will not solve the problem. This means targeted safety net programs to augment food consumption will be necessary if the goal is to eradicate food insecurity and poverty.

Peru

Peru's success in improving food security during 1992-2002 was impressive and the country is the best performer in the Latin America and Caribbean region (LAC). Average food consumption grew from 1,993 calories per person per day in 1990 (close to the target dietary energy requirements of 2,050 calories) to 2,571 calories by 2002, a jump of 29 percent. Peru's success in food security can be attributed to political stability that was a result of a newly instituted set of macroeconomic policies in the early 1990s. The trend has faltered in recent years, raising serious questions about Peru's future path. In terms of overall economic status, Peru's per capita income was $2,050 in 2002, considerably less than the LAC regional average of $3,280. During the 1990s, the country's economic agenda focused on controlling hyperinflation, which included liberalizing the exchange rate, lifting price controls, and tightening fiscal policy.

Within the context of fiscal policy there was a major overhaul of laws and regulations for the private sector. For example, the government offered a "Stability Agreement"—basically a pledge to keep the rules relevant to foreign investment, such as those related to taxes and profits, in place regardless of changes in national policies—to encourage foreign investment. In agriculture, laws related to land transactions and entitlements were introduced, leading to improvements in access to credit. In the area of trade, the tariff system was simplified to a two-level *ad-valorem* tariff of 12 and 20 percent. Agricultural trade protection, however, did not change much, and

Figure A-3

Daily per capita calorie consumption in Peru

Calories

Source: USDA, Economic Research Service, using data from FAOSTAT (http://faostat.fao.org).
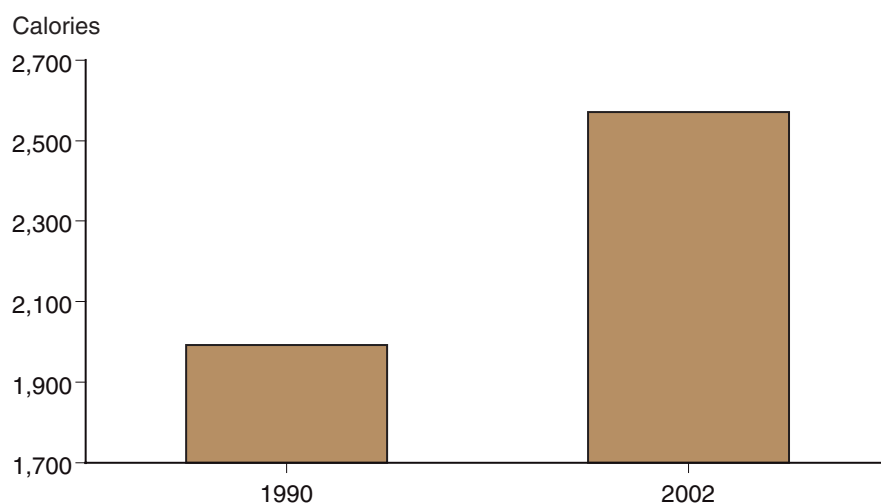
tariffs for commodities such as sugar and milk exceeded the 20-percent ceiling during the 1990s. Tariff levels were lowered in the early 2000s, but, because of the decline in global agricultural prices, protection for some key commodities remained.

The policy initiatives led to dramatic improvements in the economy. Hyper-inflation of 300 percent a year in 1990-91 was reduced to about 3 percent in the early 2000s. The response was strong in all sectors. Agricultural value added per worker increased by more than 4 percent annually during the 1990s, and the share of agriculture in the economy increased from 8.5 percent in 1990 to 10.5 by the early 2000s. By the end of the 1990s, however, there was a visible slowdown in the economy that was worsened by domestic political instability and a border dispute with Ecuador. Although agricultural performance maintained its course, poverty and food insecurity grew in the early 2000s after a decade of positive trends.

The lesson of the last decade of Peru's experience is that political stability and improvements in macroeconomic conditions lead to a strong performance of the agricultural sector, including food production. Agricultural production growth, however, had high annual variability, with growth of as high as 75 percent in 1994 and a decline of 22 percent in 1998 (due mainly to the effects of El Niño). This uneven growth increased the pace of migration from rural to urban regions and, with the downturn of the economy in the early 2000s, there was an increase in food insecurity and poverty across the country.

Food Availability

During the 1990s, Peru showed an impressive food security record, largely due to improvements in the performance of the agricultural sector. Annual agricultural value added per worker increased 4.2 percent per year, a much larger increase than the 2.4-percent per capita GDP growth during 1990-2003. The growth in the value of agricultural exports (9.3 percent) also surpassed growth in overall merchandise exports (8.2 percent).

Agricultural growth was not uniform across all types of producers. Although detailed data are not available, a report by Peru's Institute of Developing Economics found that privatization of the banking system in general, and the Agriculture Bank in particular, led to a sharp decline in the amount of credit given to small farmers. In fact, from 1989 to 2000, the value of credit given to smaller farms was cut by more than half, while the value given to larger farms increased more than fourfold. In 2000, about 83 percent of credit offered by commercial banks for agriculture was given to 4.3 percent of the producers. This change in credit availability boosted the agricultural production of large farmers and weakened the competitiveness of small producers. The farmers, in particular large farmers in the coastal areas, were in a good position to take advantage of the liberalized economic environment, and thereby increased their productivity both in food and export crops. This led to a decline in agri-cultural commodity prices—including staple food prices—despite relatively high tariffs that had dampened import growth.

The small farmers in the highland areas, hindered already by high costs associated with the poor transportation infrastructure, were hit by the decline in prices. About 25 percent of the country's farms are smaller than

1 hectare, and half are less than 3 hectares. The large size of rural families exacerbates the problem of poverty. The majority of these households rely entirely on agricultural production for their livelihood, mainly production of staple foods such as beans and potatoes. In the rural Sierra area, for example, about 1.5 million farmers operate on less than 5 hectares of land with an average household size of about 7 people and a per capita income of less than $1 a day (extremely poor according to the World Bank definition). For these farmers, productivity did not increase much during the 1990s because of poor land quality, and the reduction in credit availability exacerbated their situation. During 1991-2002, annual real producer prices for potatoes and rice declined by 6 percent and 3 percent, respectively. The decline in producer prices led to a decline in incomes, thus widening the income disparity between subsistence farmers in the highland areas and commercial farmers in the coastal areas.

Growth in agricultural and food production slowed the pace of food import growth, thereby reducing the food share of total imports from 7 percent in 1990 to 5 percent in 2002. Among different food categories, imports of vegetable oils had the highest growth (9 percent) during 1990-2002, followed by wheat (3 percent). Peru remains highly dependent on exports of primary goods, which have declining price prospects. The main export commodities are minerals and fishery products, which accounted for about 60 percent of total merchandise exports in 2000. Agricultural exports (not including fishery products) hold a small share of total exports—5 percent in 2000. There have also been changes in the product composition of primary commodity exports. For example, traditional agricultural exports such as coffee, sugar, and cotton are losing their shares to new products such as fruits and vegetables. In 1990, traditional agricultural exports accounted for 64 percent of total agricultural exports; this share declined to 39 percent by 2000. Overall, the improvement in productivity led to relatively higher growth in exports than for imports, which resulted in the significant trade deficit of the mid- to late-1990s becoming a trade surplus in 2002 through 2004.

Figure A-4

Peru's merchandise imports and exports

$ bil.

Source: USDA, Economic Research Service, using data from FAOSTAT (http://faostat.fao.org).
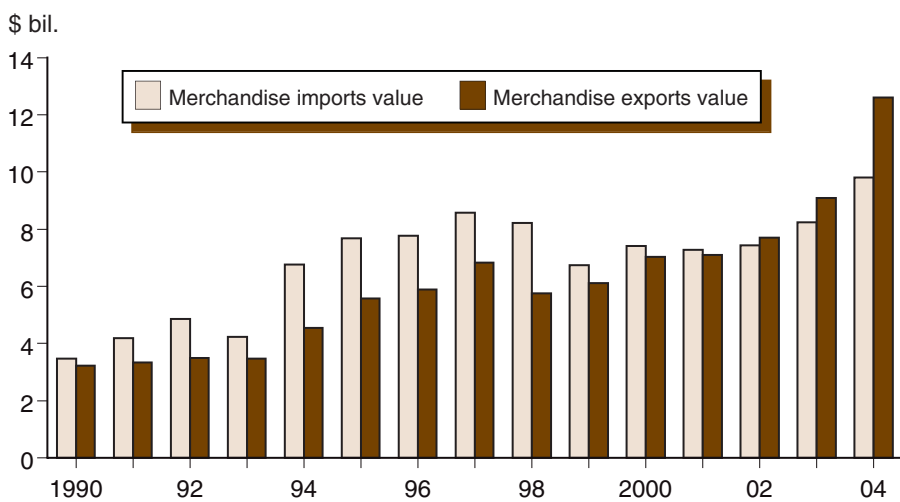
Food Access

Economic liberalization based on controlling inflation paid off, leading to an increase in domestic productivity since 1990. The annual inflation rate (as measured by the Consumer Price Index) fell from 44 percent during 1990-97 to 3.3 percent during 1997-2002 as a result of the government's fiscal discipline. The consequence was a stable food price index and a decline in real prices of staple foods. The growth in per capita income also was a key factor leading to an improvement in food security at the national level.

Overall economic growth was not smooth between 1992 and 2002. Annual growth was about 6 percent between 1992 and 1997, but declined to a low of 0.2 percent in 2002. During the high-growth period, social expenditures doubled, leading to a decline in poverty from 55 percent of population in 1992 to 50 percent in 1997. After 1997, Peru experienced some internal political instability due to alleged government corruption. This led to a deterioration of the policy environment and a slowdown of the economy. The end result was a contraction of social expenditures and an increase in the poverty rate to 54 percent by 2000. There is no independent data available but, according to a recent message from the Peruvian President (July 28, 2005), poverty (income of less than $2 a day) was reduced to 51 percent and extreme poverty (less than a $1 a day) was reduced from 24 percent to 19 percent between 2001 and 2004.

In the early 1990s, the incidence of poverty was much higher in the rural areas relative to urban areas, but migration caused the number of urban poor (those who live on less then $2 a day) to surpass the number of rural poor by the year 2000. However, poverty is more pervasive in rural areas, which account for 70 percent of the country's extremely poor people (those who live on less than $1 a day).

ERS research showed a decline in the number of hungry people from 1990 to 2000, but an increase during 2000-02. According to ERS estimates, the number of people who consumed less than the nutritionally required level was 18 million in 1992 or 80 percent of the population. That number declined to 5 million or 20 percent of the population in 2001-02, but the estimates for 2004 show an increase to 11 million or 40 percent of the population (see Appendix for methodology). The nutritional distribution food gap—the amount of food required to increase the consumption of all food deficit income groups to the nutritional requirement—measures the depth of food insecurity. This gap declined by 38 percent, from 427,000 tons of grain equivalent in 1992 to 265,000 tons in 2002. By 2004, there was an upturn of 10 percent to 289,000 tons. The slower rate of decline of the food gap versus the decline in number of hungry people indicates an intensification of hunger among the lowest income segment of the population.

Other indicators of food security also show support for the generally positive trends of the 1990s. The infant (under 1 year) mortality rate fell from 52 per 1,000 in 1991 to 32 in 2000, a 38-percent decline. Most of the drop in the child mortality rate occurred in urban areas where access to sanitary and health services is easier.

Looking Ahead

The review of macroeconomic indicators in Peru shows a considerable improvement in all dimensions: low and stable inflation, strong growth of trade and the economy as a whole, improved laws, regulations, and institutions, and better access to public services. Economic growth, however, remains volatile and income inequality is persistently high. An analysis of Peru prepared by the International Monetary Fund provides a positive profile of the economy, noting a rebound during 2002-03 and forecasting continued growth based on low inflation and strength of external trade and capital balances. Based on the ERS assessment, food security in Peru will improve and the number of people consuming less than the nutritionally required level is projected to be cut by half or to about 10 percent of the population by 2015.

This successful scenario can be achieved if agricultural, economic, and foreign exchange growth trends continue, and there is no deterioration in the income distribution. The last decade of economic growth was achieved through market liberalization policies and fiscal discipline. Although these policies appear to be sustainable, political instability such as the events of the late 1990s can increase investment risk, thus threatening the cornerstone of economic growth. In 1996, Peru was among the top 10 recipients of foreign direct investment among developing countries, and in 1998 it was in fourth place among Latin American countries. The mining and trade sectors were the largest recipients. This investment, however, did not markedly change the structure of trade, and exports continue to depend on primary products. Within that structure, however, a number of new export commodities have emerged, making exports more diversified than before. Another positive development was the investment in improving performance and sustainability of exports. For example, Peru was among the top fishing countries in the world in the 1950s, but then lost its market share because of overfishing in the 1970s when the government took over the sector. Now, through privatization and increased investment, the sector has rebounded, contributing to 15 percent of total exports in 1999.

The lack of export diversification in manufacturing, however, remains a problem in the face of the growing import dependency of the economy. Peru depends on imports of key commodities such petroleum and petroleum products, industrial goods, consumer goods, and key food items including wheat and vegetable oils. Prices for raw materials that dominate the country's export profile remain weak. Also, agricultural exports face weather-related shocks that can create earnings instability. Finally, agricultural exports are faced with stiff competition from neighboring countries that have stronger quality control institutions.

Related to food access, the high disparity and deterioration of the income distribution coupled with social problems, particularly for the indigenous population, remains a major challenge. Despite some progress, the experience of Peru in the last decade shows that economic growth alone is not adequate to address deep income inequality and food insecurity.

Vietnam

Food security success in Vietnam is not only an important triumph in terms of the human dimension, but it also provides an impressive model for many low-income countries that rely on agriculture for employment and incomes. The government considers achieving food security to be a national priority and has a comprehensive plan to promote and monitor food security. Vietnam's experience illustrates how a country can evolve from a government-controlled market to a liberalized economy while maintaining strong public service institutions. When studying the case of Vietnam, however, one should keep in mind that the country is still among the lowest income countries with per capita income of $550 in 2004.

Policy reforms, known as "doi moi," began in the late 1980s. At that time, agriculture employed 70 percent of the population and contributed 40 percent of gross domestic product (GDP). Poverty was deep in rural areas, but per capita food consumption was near the target nutritional requirement (2,149 calories per day). Initial reform efforts targeted the agriculture sector. The pillars of the reform were a shift away from collective farming to distributing land to farmers through long-term leases, and liberalization of input and output markets. The reform was complemented by government service support in the form of introducing new crop varieties, improving accessibility to extension services, and subsidizing the credit system. The results were dramatic: production of the main staple food, rice, doubled between the late 1980s and 2004, and the country moved from being a net cereal importer to a net exporter. In 2003, the volume of cereal exports was 3 times larger than cereal imports. The policy reforms did not stop with agriculture and soon expanded to the rest of the economy, leading to an overall boost in growth. Annual average economic growth was 8 percent during the 1990s, much higher than other East Asian countries (excluding China). Moreover, the success of the agricultural sector, which grew at an average annual rate of almost 4 percent, receives a high mark for improving food security and reducing poverty.

Figure A-5

Daily per capita calorie consumption in Vietnam
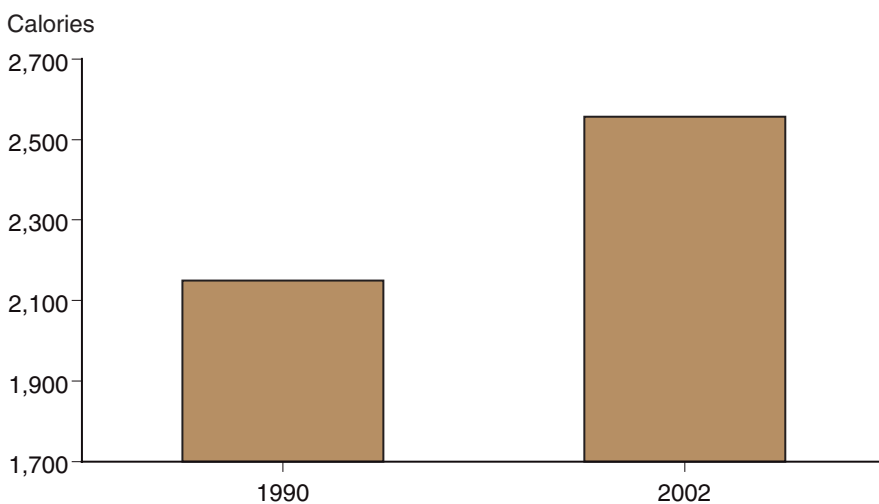
Calories

Source: USDA, Economic Research Service, using data from FAOSTAT (http://faostat.fao.org).

The lesson of the last decade of Vietnam's experience is that improvements in the agricultural sector in general and food production in particular led to overall improvements in food availability and food consumption across different income groups. Currently, food insecurity and poverty are mainly concentrated in the rural areas, but the government is committed to improving the situation. This is an achievable goal given the fact that the country is in a solid economic position in terms of resources and policies to reach the food insecure and poor.

Food Availability

The dramatic improvement in food availability in Vietnam was a result of improved access to new technology that was supported by policies of market liberalization for inputs and outputs and privatization of agricultural land. Per capita agricultural production increased 71 percent and food production increased 64 percent from 1990 to 2004. How did Vietnam succeed while many other countries have failed? The review of a detailed study in Vietnam's northwestern upland region provides a comprehensive picture of the impacts of introducing new technology on reducing poverty and enhancing sustainability of the production system.

Vietnam's northwestern uplands region was one of the poorest regions in the country, with 78 percent of the hills and mountains covered with dense forest. In 1990, agricultural production contributed to 92 percent of the region's employment and the main commodities produced were rice, corn, and cassava. The production system was rain-fed with few irrigated areas for rice production. To increase production, the only option was the expansion of area into the forest land. Land degradation and deforestation became a concern of the government. These factors, along with the poor state of food insecurity and poverty, led to a major change in government policy toward the agricultural sector. The government increased investment in roads and irrigation. An extension service introduced high-yielding varieties of rice and corn, and micro-credit was provided to enhance the financial situation of farmers. The high-yielding rice varieties were drought-resistant and required a shorter growing period. The impact was profound: rice yields that were 2.5-3 tons per hectare in 1990 increased to 5-6 tons by 1993. In the following years, growth continued and some varieties produced up to 8 tons per hectare, and expansion of irrigated areas allowed farmers to harvest two to three times per year. The growth was not limited to rice. Hybrid corn varieties were introduced as cash crops and they replaced the traditional cassava crop. The market for corn grew rapidly in response to the growing demand for meat and thus animal feed. By 2001, hybrid corn was grown in 70 percent of the northwestern upland region. The impact of the adoption of new technologies on farm income and poverty reduction was remarkable: poverty declined from 50 percent in 1989 to 21 percent in 2000. The higher production intensity had also the side benefit of reducing the rate of deforestation by 1.3 percent during 1994-2000.

The growth in agricultural production in Vietnam's northwestern upland areas was not an isolated case. The entire agricultural sector, including agricultural exports, followed a similar path, and growth in the agriculture sector helped fuel growth in the rest of the economy. As in other countries,

Figure A-6

Vietnam's food imports

$ mil.

Source: USDA, Economic Research Service, using data from FAOSTAT (http://faostat.fao.org).
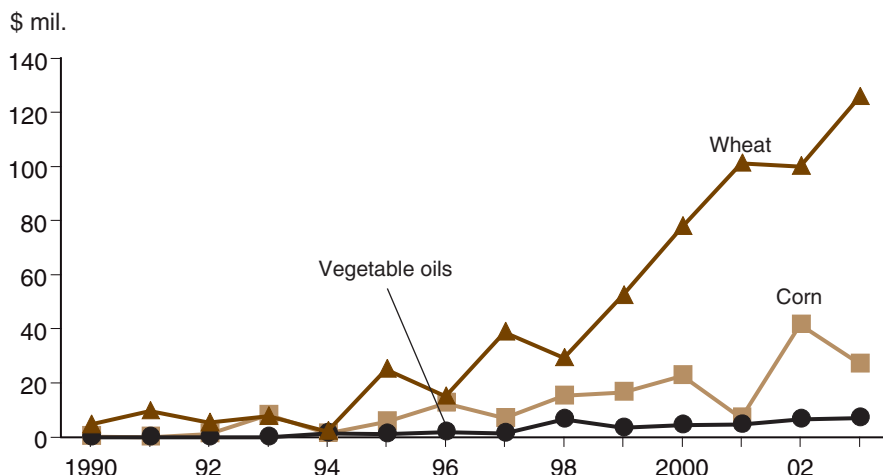
the supply response of the nonagricultural sectors was much stronger than that of the agricultural sector. Consequently, the export sector showed a remarkable tenfold increase in earnings during 1990-2003. This provided a secure platform for financing imports, including food.

From 1990 to 2003, food imports increased 9 percent per year. Specifically, imports of wheat, corn, and vegetable oils, soared. Wheat increased twenty-fivefold, corn twentyfold, and vegetable oils eighteenfold, between 1990 and 2003. Responding to expansion of domestic production livestock and poultry production, imports of soybean meal increased from near zero in 1990 to more than 1 million tons by 2003. The increase in food imports led to a diversification of the diet. The share of animal products in total calorie consumption increased from 8 percent to 12 percent between 1990 and 2002.

The share of food imports to export earnings, however, remained small, less than 1 percent in 2002. This means that further diet diversification is possible, given the strong import financing capacity of the country. From 1991 to 2002, export value increased eightfold and its share of GDP increased from 24 percent in 1991 to 48 percent in 2002. The export composition also changed dramatically from oil-dominated exports in the early 1990s to manufacturing by the early 2000s. In 2001, the manufacturing share of exports was 67 percent (including marine products), followed by oil at 21 percent, and agriculture at 12 percent. Manufacturing exports are diversified, but are mainly labor-intensive products such as textiles and apparel, footware, furniture, and processed foods.

Vietnam is in the process of becoming a member of the World Trade Organization (WTO) and to that end, trade policy reforms are on the top of the government agenda. Since 1996, tariffs have been gradually reduced. Agricultural tariffs have been lowered such that, of the total 840 tariff lines, 74 percent have tariffs of 0-5 percent. Most of the remaining tariff lines have either been reduced or have a set timetable for reduction. The improvements resulting from working toward joining the WTO—expanded market access

and the harmonization and transparency of domestic policies—also led to a sharp increase in private and foreign investment, creating robust future growth prospects. Investment in the economy has also shown strength. In just one year (2003-04) private investment increased by 23 percent and foreign direct investment increased by 30 percent. These trends are expected to continue, and a 2004 survey showed that more than two-thirds of foreign businesses already investing in Vietnam planned to expand their investment in the country in the following 2-3 years.

Food Access

During the last decade, food access improved as a result of high income growth and declining inflation rates, including food prices. Per capita income growth was about 6 percent per year during 1990-2003, second only to China (9 percent). Consequently, food consumption rose and food security improved across all income levels. Average daily per capita calorie consumption, already close to the minimum requirement in 1990 (2,149), increased by 19 percent to 2,556 by 2002. The ERS food security estimate provides a positive picture of the hunger situation in Vietnam during the last decade. The number of hungry people was estimated to be 28 million, or 41 percent of population, in 1992, declining to less than 10 percent in 2004. Based on these estimates, food security improvements in Vietnam exceed the World Food Summit (WFS) target trend.

Other indicators of food security show similar trends. The number of undernourished children declined from about half to about a quarter of all children during 1993-2003. Also, according to the World Bank, Vietnam's poverty rate declined from 58 percent in 1993 to 29 percent in 2002. The rate of poverty reduction was similar in both urban and rural areas, and across regions. The gap in poverty between rural and urban areas, however, remains large. In 2002, 6.6 percent of the urban population was considered poor, compared with 35.6 percent in rural areas. A recent report published by the International Monetary Fund indicates that, despite drought in 2004 and the outbreak of Avian Influenza in Vietnam, real GDP growth in Vietnam was 7.7 percent and the poverty rate continued to decline to 26 percent of the population. The decline in poverty among all regions and economic groups is mainly attributed to the even pattern of growth in all sectors, in particular the export sector, including agricultural commodities.

Despite the great strides in poverty reduction, Vietnam remains among the world's low-income countries and poverty remains deep in rural areas. This means improvements may require different policy instruments. The agricultural intensification that has thus far improved food security and reduced poverty may not have the same growth potential. According to an International Food Policy Research Institute (IFPRI) study, poverty is five times more severe in rural areas than urban areas and poverty is more concentrated in the remote hilly regions. The government is seeking to improve the situation. According to a World Bank report, the government plan includes targeted poverty reduction interventions to be achieved by developing a new social safety law and targeted social safety net programs.

Looking Ahead

According to all economic indicators, Vietnam is in a strong position to exceed the stated goal of the WFS by 2015. According to ERS estimates, the number of people consuming below the nutritionally required level in 2004 was less than 10 percent of the total population—down from 40 percent in 1992. However, if the growth achieved during the last decade is not sustainable, the situation could deteriorate. Any slowdown in agricultural performance could affect the purchasing power of the rural community, where most poor and food insecure live. During the last decade, most of the agricultural growth was the result of the adoption of new technologies, in particular the adoption of new crop varieties. Further growth from these options may be limited. According to the IFPRI study, growth in rice production is expected to decline in coming years because there is no potential for intensification and/or expansion of area. Rice is the dominant crop in Vietnam, planted on more than 80 percent of the cropland and accounting for 60 percent of the diet. Even assuming that the latest technologies are used, the long-term role of agriculture in eliminating food insecurity and poverty in the rural areas may be limited. The reason is the small average farm size of less than one hectare. Agriculture based on farms of this size cannot pull the rural population out of poverty. The trend of agriculture's declining share of GDP from 39 percent in 1990 to 22 percent in 2003 is expected to continue. This trend is consistent with the pattern of development in other countries, but if the share of population that depends on agriculture for income does not decline in the same proportion as the decline of the share of agriculture in GDP, income inequality is likely to increase. Another side effect is the increase in the pace of migration from rural to urban areas, requiring improvements in labor skills and faster employment creation.

So far, the changes in income inequality have been modest. However, the challenge of preventing inequality in growth will be predicated on creating jobs in rural communities, something that according to the World Bank report "...has been a major disappointment of the last decade."

On the positive side, Vietnam's commitment to improving social conditions—including food security—remains strong. The latest development plan contains a number of initiatives regarding potential economic and social problems. The rural development strategy includes intensification of the agricultural sector through an increase in the budget for agricultural research. Another important initiative is to diversify agricultural production, in particular shifting from rice production to high-value products with the goal of doubling the value of crops per hectare. To expand agricultural trade and reduce marketing costs, the government also plans to increase investment in market infrastructure, roads in particular. The Comprehensive Poverty and Growth Strategy and National Nutrition Strategy outline the goal of the government to reduce the rate of poverty to less than 5 percent of the population by 2010 and reduce the incidence of malnutrition in children under 5 to 20 percent.

Conclusions

These three countries have made tremendous strides toward improving the food security of their populations. While there are a handful of other countries that have also made marked improvements toward meeting the WFS goal, many countries, particularly those in Sub-Saharan Africa, continue to lose ground. Ghana, Peru, and Vietnam have been successful by implementing policy changes such as privatizing land, liberalizing input markets, creating flexible exchange rate systems, and removing price controls. Other countries that are determined to address food security problems will have to assess whether these kinds of policy changes could prove beneficial for their own countries given their own specific circumstances.

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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 2015. 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.

Food gaps are projected using two consumption criteria:

1) *Status quo target*, where the objective is to maintain average per capita consumption of the recent past. The most recent 3-year average (2002-2004) is used for the per capita consumption target to eliminate short-term fluctuations.

2) *Nutrition-based target*, 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.

The status quo measure embodies a "safety-net" criterion by providing food consumption stability at recently achieved levels. The nutrition-based target assists in comparisons of relative well-being. Comparing the two consumption measures either for countries or regions provides an indicator of the need depending on whether the objectives are to achieve consumption stability and/or to meet a nutritional standard. Large nutrition-based needs relative to status quo needs, for example, mean additional food must be provided if improved nutrition levels are the main objective. In cases where

nutrition-based requirements are below status quo consumption needs, food availability could decline without risking nutritional adequacy, on average. Both methods, however, fail to address inequalities of food distribution within a country.

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:

$$PR_{cnt} = AR_{cnt} * YL_{cnt} \tag{4}$$

$$YLcnt = f (LB_{cnt}, FR_{cnt}, K_{cnt}, T_{cnt}) \tag{5}$$

$$RPY_{cnt} = YL_{cnt} * DP_{cnt} \tag{6}$$

$$RNPY_{cnt} = NYL_{cnt} * NDP_{cnt} \tag{7}$$

$$AR_{cnt} = f (AR_{cnt-1}, RPY_{cnt-1}, RNPY_{cnt-1}, Z_{cnt}) \tag{8}$$

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:

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

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:

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

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):

$$C = a + b \ln Y \tag{11}$$

$$C = C_o / P \tag{12}$$

$$P = P_1 + \text{........} + P_i \tag{13}$$

$$Y = Y_o / P \tag{14}$$

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

[1]The method is similar to that used by Shlomo Reutlinger and Marcelo Selowsky in "Malnutrition and Poverty," World Bank, 1978.

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.

Historical data

Historical supply and use data for 1980-2004 for most variables are from a the USDA Production Supply and Distribution (PS&D) database (http://www.fas.usda.gov/psd/intro.asp). Data for grain production in 2005 for most countries are based on the PS&D database as of October 2005. Food aid data are from the UN's World Food Program (WFP), and financial data are from the International Monetary Fund and World Bank. Historical nonfood-use data, including seed, waste, processing use, and other uses, are estimated from the FAO Food Balance series. The base year data used for projections are the average for 2002-2004, except export earnings, which are 2001-2003.

Endogenous variables:

Production, area, yield, commercial import, domestic producer price, and food consumption.

Exogenous 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—USDA 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.

Food aid—1988-2004 data from WFP.

Gross Domestic Product—World Bank data.

Merchandise and service imports and exports—World Bank data.

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.

Appendix table 1
List of countries and their food gaps in 2005

	2005 food gaps				2005 food gaps		
	Status quo[1]	Nutrition[2]	Distribution[3]		Status quo[1]	Nutrition[2]	Distribution[3]
	1,000 tons				*1,000 tons*		
Angola	142	0	68	Algeria	0	0	0
Benin	259	0	0	Egypt	0	0	0
Burkina Faso	80	0	221	Morocco	0	0	0
Burundi	73	502	583	Tunisia	0	0	0
Cameroon	0	0	66	**North Africa**	**0**	**0**	**0**
Cape Verde	4	0	0				
Central African Repubic	0	88	231	Afghanistan	0	220	833
Chad	319	393	530	Bangladesh	202	0	231
Congo, Dem. Rep.	642	4,260	4,709	India	0	0	1,152
Côte d'Ivoire	0	0	141	Indonesia	0	0	0
Eritrea	87	429	456	Korea, Dem. Rep.	284	7	362
Ethiopia	0	3,261	3,664	Nepal	983	0	223
Gambia	27	0	21	Pakistan	0	0	220
Ghana	0	0	34	Philippines	0	0	136
Guinea	129	0	88	Sri Lanka	0	0	0
Guinea-Bissau	16	28	58	Vietnam	0	0	0
Kenya	0	265	940	**Asia**	**1,469**	**226**	**3,158**
Lesotho	0	152	192				
Liberia	0	0	64	Bolivia	0	0	128
Madagascar	0	0	412	Colombia	0	0	440
Malawi	491	117	453	Dominican Republic	0	0	26
Mali	0	0	161	Ecuador	0	0	179
Mauritania	54	0	7	El Salvador	0	0	73
Mozambique	0	0	96	Guatemala	0	0	289
Niger	443	37	564	Haiti	0	0	221
Nigeria	0	0	0	Honduras	0	281	415
Rwanda	149	0	26	Jamaica	0	0	0
Senegal	0	0	105	Nicaragua	0	0	134
Sierra Leone	24	199	451	Peru	0	0	226
Somalia	161	550	587	**Latin America and**			
Sudan	327	31	592	**the Caribbean**	**0**	**281**	**2,132**
Swaziland	0	0	14				
Tanzania	0	706	1,208	Armenia	0	0	0
Togo	159	227	281	Azerbaijan	0	0	0
Uganda	816	0	205	Georgia	0	0	0
Zambia	0	428	663	Kazakhstan	0	0	0
Zimbabwe	68	685	862	Kyrgyzstan	0	0	0
Sub-Saharan Africa	**4,471**	**12,362**	**18,753**	Tajikistan	34	108	169
				Turkmenistan	0	0	0
				Uzbekistan	0	0	46
				Commonwealth of			
				Independent States	**34**	**108**	**215**
				Total	**5,974**	**12,977**	**24,257**

[1]Status quo gap: amount of food needed to support 2002-2004 levels of per capita consumption.

[2]Nutrition gap: gap between available food and food needed to support a minimum per capita nutritional standard.

[3]Distribution gap: amount of food needed to raise consumption in each income quintile to the minimum nutritional requirement.

Source: USDA, Economic Research Service.

List of countries and their food gaps in 2015

	2015 food gaps				2015 food gaps		
	Status quo[1]	Nutrition[2]	Distribution[3]		Status quo[1]	Nutrition[2]	Distribution[3]
	1,000 tons				*1,000 tons*		
Angola	589	0	176	Algeria	0	0	0
Benin	536	0	1	Egypt	0	0	0
Burkina Faso	98	0	291	Morocco	0	0	0
Burundi	278	882	985	Tunisia	0	0	0
Cameroon	0	0	38	**North Africa**	**0**	**0**	**0**
Cape Verde	33	0	1				
Central African Repubic	114	225	354	Afghanistan	247	834	1,542
Chad	81	180	443	Bangladesh	0	0	0
Congo, Dem. Rep.	1,409	6,302	6,884	India	0	0	676
Côte d'Ivoire	71	0	219	Indonesia	0	0	0
Eritrea	232	694	725	Korea, Dem. Rep.	368	63	429
Ethiopia	0	2,219	2,811	Nepal	50	0	33
Gambia	72	0	42	Pakistan	0	0	559
Ghana	0	0	26	Philippines	0	0	58
Guinea	246	0	151	Sri Lanka	0	0	0
Guinea-Bissau	33	49	85	Vietnam	0	0	0
Kenya	29	1,140	1,776	**Asia**	**665**	**897**	**3,298**
Lesotho	0	20	85				
Liberia	198	139	210	Bolivia	0	0	51
Madagascar	270	218	736	Colombia	0	0	128
Malawi	140	0	295	Dominican Rep.	0	0	0
Mali	0	0	131	Ecuador	0	0	87
Mauritania	346	86	126	El Salvador	0	0	0
Mozambique	0	0	40	Guatemala	0	0	233
Niger	978	416	1,006	Haiti	191	173	407
Nigeria	2,146	0	118	Honduras	0	269	442
Rwanda	493	74	180	Jamaica	97	0	0
Senegal	0	0	162	Nicaragua	0	0	86
Sierra Leone	302	524	775	Peru	0	0	76
Somalia	229	750	800	**Latin America and**			
Sudan	0	0	141	**the Caribbean**	**287**	**442**	**1,510**
Swaziland	0	0	1				
Tanzania	0	290	1,042	Armenia	0	0	0
Togo	70	157	243	Azerbaijan	0	0	0
Uganda	2,206	0	734	Georgia	0	0	0
Zambia	0	842	1,088	Kazakhstan	0	0	0
Zimbabwe	0	85	398	Kyrgyzstan	0	0	0
Sub-Saharan Africa	**11,198**	**15,292**	**23,320**	Tajikistan	2	88	168
				Turkmenistan	0	0	0
				Uzbekistan	0	0	0
				Commonwealth of			
				Independent States	**2**	**88**	**168**
				Total	**12,153**	**16,719**	**28,295**

[1]Status quo gap: amount of food needed to support 2002-2004 levels of per capita consumption.

[2]Nutrition gap: gap between available food and food needed to support a minimum per capita nutritional standard.

[3]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 3
Country indicators

Region and country	Population 2005	Population growth rate	Grain production		Root production growth 1980-2004	Projected annual growth in supply 2005-2015
			Growth 1980-2004	Coefficient of variation 1980-2005		
	1,000	———————————————— *Percent* ————————————————				
North Africa:						
Algeria	32,854	1.5	0.3	45.8	-0.7	2.3
Egypt	74,033	1.9	4.6	6.1	1.6	1.7
Morocco	31,478	1.5	0.7	45.2	2.8	1.9
Tunisia	10,102	1.1	1.5	43.8	3.9	1.9
Central Africa:						
Cameroon	16,322	1.9	2.7	12.7	1.2	2.2
Central African Rep.	4,038	1.3	1.6	14.3	0.3	0.4
Congo, Dem. Rep.	57,549	2.8	2.8	11.0	-0.1	2.6
West Africa:						
Benin	8,439	3.2	4.9	16.2	4.7	2.3
Burkina Faso	13,228	3.2	4.6	13.3	-1.9	2.9
Cape Verde	507	2.4	6.7	59.2	-3.7	0.9
Chad	9,749	3.5	3.7	16.1	-0.1	3.6
Côte d'Ivoire	18,154	1.6	2.2	11.1	2.1	1.5
Gambia	1,517	2.9	3.4	20.8	0.8	1.7
Ghana	22,113	2.2	5.5	16.7	4.6	2.0
Guinea	9,402	2.2	3.5	5.5	5.3	2.0
Guinea-Bissau	1,586	3.0	2.5	21.7	2.7	2.8
Liberia	3,283	1.4	-4.5	32.8	1.3	0.8
Mali	13,518	2.8	4.1	12.4	2.8	3.5
Mauritania	3,069	3.0	6.8	38.5	0.3	0.1
Niger	13,957	3.4	3.4	15.1	-6.9	2.3
Nigeria	131,530	2.3	5.1	10.7	7.5	1.6
Senegal	11,658	2.4	1.1	17.4	4.6	2.1
Sierra Leone	5,525	4.1	-4.0	17.4	3.9	0.7
Togo	6,145	2.8	4.7	13.1	2.8	3.0
East Africa:						
Burundi	7,548	3.1	-2.9	16.5	1.6	2.7
Eritrea	4,401	4.4	-1.0	55.4	-0.1	1.4
Ethiopia	77,431	2.5	3.5	17.0	1.5	3.5
Kenya	34,256	2.2	0.3	14.0	1.8	2.1
Rwanda	9,038	2.4	-2.0	19.2	3.5	1.3
Somalia	8,228	3.3	-2.6	35.5	3.9	2.7
Sudan	36,233	1.9	3.1	31.0	-1.6	2.8
Tanzania	38,329	2.0	1.6	12.5	2.1	2.6
Uganda	28,816	3.5	1.7	9.1	2.0	2.7

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

Appendix table 3
Country indicators--Continued

Region and country	Population 2005	Population growth rate	Grain production Growth 1980-2004	Grain production Coefficient of variation 1980-2005	Root production growth 1980-2004	Projected annual growth in supply 2004-2015
	1,000			*Percent*		
Southern Africa:						
Angola	15,941	2.9	2.5	23.3	2.9	2.1
Lesotho	1,795	0.1	-0.9	32.4	7.6	2.9
Madagascar	18,606	2.8	1.2	5.6	0.9	2.3
Malawi	12,884	2.3	1.7	28.5	5.6	2.7
Mozambique	19,792	2.0	6.8	24.8	0.5	2.7
Swaziland	1,032	0.2	0.7	27.8	1.2	2.4
Zambia	11,668	1.7	-0.4	31.2	5.8	1.4
Zimbabwe	13,010	0.7	-1.9	34.4	4.4	2.2
Asia:						
Afghanistan	29,863	4.7	-1.6	24.9	-1.1	2.7
Bangladesh	141,822	1.9	2.7	7.1	2.2	2.4
India	1,103,371	1.6	2.3	5.8	1.4	1.7
Indonesia	222,781	1.3	1.7	3.8	-0.2	1.3
Korea, Dem. Rep.	27,137	1.1	-2.7	13.4	5.3	0.0
Nepal	27,133	2.1	3.0	6.3	3.8	2.7
Pakistan	157,935	2.1	2.5	5.1	4.3	2.0
Philippines	83,054	1.9	2.0	5.8	-0.4	2.1
Sri Lanka	20,743	0.9	1.0	8.3	-3.5	0.9
Vietnam	84,238	1.4	4.9	4.9	-1.8	3.4
Latin America and the Caribbean:						
Bolivia	9,182	2.0	2.7	10.2	-0.1	2.9
Colombia	45,600	1.6	-0.7	11.8	0.5	3.4
Dominican Republic	8,895	1.5	-0.3	11.3	0.7	8.8
Ecuador	13,228	1.5	2.6	19.5	1.3	2.7
El Salvador	6,881	1.8	1.3	10.9	5.2	7.0
Guatemala	12,599	2.4	0.1	9.2	0.6	2.9
Haiti	8,528	1.4	0.8	14.9	0.0	0.4
Honduras	7,205	2.3	0.8	17.3	3.5	2.4
Jamaica	2,651	0.5	-5.6	53.1	-1.3	-0.5
Nicaragua	5,487	2.0	3.1	18.1	4.0	2.6
Peru	27,968	1.5	4.1	17.2	1.6	3.6
Commonwealth of Independent States						
Armenia	3,016	-0.4	1.2	38.1	0.4	1.2
Azerbaijan	8,411	0.6	3.2	33.6	14.3	2.3
Georgia	4,474	-1.1	1.1	43.1	6.0	1.6
Kazakhstan	14,825	-0.3	-4.2	71.5	-3.9	1.1
Kyrgyzstan	5,264	1.2	0.7	40.7	9.9	1.9
Tajikistan	6,507	1.1	6.4	32.4	10.9	1.3
Turkmenistan	4,833	1.4	11.7	41.2	19.4	1.0
Uzbekistan	26,593	1.5	9.2	20.3	1.0	2.5

See note at end of table.

Country indicators--Continued

Region and country	Per capita GNI 2004	Per capita GDP growth 2003-04	GDP growth 2003	Export earnings growth 2003	Official development assistance as a share of GNI 2003	External debt: present value as a share of GNI 2003
	U.S. dollars	——————————————— *Percent* ———————————————				
North Africa:						
Algeria	2,230	3.4	6.8	8.6	0.4	38.0
Egypt	1,310	2.5	3.2	14.0	1.0	33.4
Morocco	1,520	1.9	5.2	0.6	1.3	47.7
Tunisia	2,630	4.5	5.6	0.3	1.4	69.8
Central Africa:						
Cameroon	800	2.8	4.7	3.8	8.7	90.6
Central African Rep.	310	-0.8	-7.3	--	4.9	130.3
Congo, Dem. Rep.	120	3.2	5.6	8.0*	99.2	205.9
West Africa:						
Benin	530	0.2	4.8	7.1	9.9	61.5
Burkina Faso	360	1.6	6.5	10.1	12.6	51.4
Cape Verde	1,170	2.9	5.0	6.7	21.3	71.1
Chad	260	27.4	11.3	63.6	11.9	72.3
Côte d'Ivoire	770	-4.0	-3.8	-0.9	2.3	109.6
Gambia	290	6.2	6.7	-14.3	15.4	162.4
Ghana	380	3.3	5.2	2.7	13.8	121.5
Guinea	460	0.5	1.2	2.3	7.0	102.1
Guinea-Bissau	160	1.3	0.6	8.0	71.8	368.5
Liberia	110	-0.2	-29.5	--	30.1	722.9
Mali	360	-0.3	6.0	-10.4	15.4	91.3
Mauritania	420	4.5	4.9	-9.5	21.2	206.5
Niger	230	-1.9	5.3	--	19.0	88.9
Nigeria	390	1.1	10.7	32.4	0.7	73.5
Senegal	670	3.8	6.5	0.5	8.1	79.4
Sierra Leone	200	5.4	6.6	20.0	36.8	199.6
Togo	380	0.8	2.7	6.6	2.9	111.7
East Africa:						
Burundi	90	3.5	-1.2	10.0	35.7	208.6
Eritrea	180	-0.2	3.0	-32.0	36.1	74.6
Ethiopia	110	11.2	-3.7	18.9	23.7	112.5
Kenya	460	0.4	1.8	9.9	3.8	52.9
Rwanda	220	3.5	3.2	3.0	18.2	84.3
Somalia	--	--	--	--	--	--
Sudan	530	3.5	6.0	19.3	4.0	114.0
Tanzania	330	4.3	7.1	18.3	15.7	70.5
Uganda	270	3.1	4.7	8.0	15.4	72.9

See note at end of table.

Country indicators--Continued

Region and country	Macroeconomic indicators					
	Per capita GNI 2004	Per capita GDP growth 2003-04	GDP growth 2003	Export earnings growth 2003	Official development assistance as a share of GNI 2003	External debt: present value as a share of GNI 2003
	U.S. dollars	———————————————— *Percent* ————————————————				
Southern Africa:						
Angola	1,030	7.7	4.5	4.9	5.0	96.9
Lesotho	740	2.1	3.3	30.5	7.3	64.9
Madagascar	300	2.6	9.8	58.6	11.1	102.1
Malawi	170	1.8	4.4	-3.2	27.5	173.4
Mozambique	250	5.9	7.1	16.2	26.4	126.2
Swaziland	1,660	0.8	2.2	39.9	1.8	27
Zambia	450	3.2	5.1	22.8	14.1	161.3
Zimbabwe	--	-6.7	--	--	--	70.5
Asia:						
Afghanistan	--	--	--	--	--	--
Bangladesh	440	10.6	5.3	6.9	2.5	34.1
India	620	5.4	8.6	7.0	0.2	19.9
Indonesia	1,140	3.7	4.1	4.0	1.0	77.4
Korea, Dem. Rep.	--	--	--	--	--	--
Nepal	260	1.6	3.1	--	8.0	55.4
Pakistan	600	3.9	5.1	28.4	1.4	46.9
Philippines	1,170	4.3	4.5	3.3	0.8	71.4
Sri Lanka	1,010	4.8	5.9	4.8	3.8	57.4
Vietnam	550	6.4	7.2	20.8	4.6	40.8
Latin America and the Caribbean:						
Bolivia	960	1.6	2.5	10.1	11.7	71.7
Colombia	2,000	2.3	3.9	5.0	1.0	40.9
Dominican Republic	2,080	0.6	-0.4	30.7	0.4	33.8
Ecuador	2,180	5.0	2.7	3.2	0.7	70.9
El Salvador	2,350	-0.2	1.8	3.8	1.3	46.3
Guatemala	2,130	0.1	2.1	5.2	1.1	21.2
Haiti	390	-5.5	0.4	35.6	6.0	39.1
Honduras	1,030	2.1	3.0	-2.5	5.8	83.5
Jamaica	2,900	1.2	2.3	15.0	0.0	70.8
Nicaragua	790	1.4	2.3	8.1	20.4	169.4
Peru	2,360	3.5	3.8	5.9	0.9	51.3
Commonwealth of Independent States:						
Armenia	1,120	10.3	13.9	28.2	8.6	39.0
Azerbaijan	950	3.7	11.2	-4.4	4.4	25.0
Georgia	1,040	9.6	11.1	4.8	5.6	49.2
Kazakhstan	2,260	8.8	9.2	5.9	1.0	86.1
Kyrgyzstan	400	6.1	6.7	2.5	11.5	117.7
Tajikistan	280	9.4	10.2	6.8	10.7	86.8
Turkmenistan	1,340	15.4	16.9	20.9	0.5	--
Uzbekistan	460	6.3	4.4	8.3	1.8	46.4

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

* = 2002 data.

Source: USDA, Economic Research Service, using data from FAOSTAT (population; (http://faostat.org) and
World Bank (macroeconomic indicators; World Development Indicators, 2005, and World Development Report 2005).