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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

Appreciation is extended to Neil Conklin, Director of the Market and Trade Economics Division, for his support of the food security work, and to Cheryl Christensen, for valuable comments on the articles. We would also like to thank the reviewers, especially Mary Bohman, Joy Harwood, Carol Goodloe, Jerry Rector, and Bill Hawkins, for their comments. Special thanks are extended to Lindsay Mann, Martha R. Evans, Wynnice Pointer-Napper, and Victor Phillips, Jr., for editorial and design assistance.

Summary

Fewer Hungry People by 2010; More Intense Poverty for Poorest

USDA's Economic Research Service (ERS) projects that average per capita food consumption for 67 low-income countries will increase in the next decade. ERS also projects that the number of people failing to meet their nutritional requirements will decline from 774 million in 2000 to 694 million in 2010, providing an improved outlook for global food security. But the gains are not uniform across countries and in many food insecurity will probably intensify. Sub-Saharan Africa, as the most vulnerable region, accounts for only 24 percent of the population of these 67 countries, but it is projected to account for 63 percent of these "hungry" people in 2010. HIV/AIDS is expected to reduce the region's agricultural productivity, and constraints in financial resources will limit commercial imports, thus leading to declining per capita consumption.

ERS evaluated the food security position of low-income countries by projecting the gaps between food consumption (domestic production, plus commercial imports, minus non-food use) and consumption targets through the next decade. The consumption targets are (1) maintaining per capita food consumption at 1997-99 levels (also referred to as "status quo") and (2) meeting minimum recommended nutritional requirements.

In 2000, the food gap to maintain per capita consumption at 1997-99 levels in 67 low-income developing countries is estimated at about 7 million tons. The gap to meet minimum nutritional requirements is estimated to be higher at 17 million tons. The food gaps with respect to both consumption targets are projected to widen during the next decade. The gap to maintain per capita consumption will increase 80 percent to 12.7 million tons in 2010, while the nutritional gap will expand 30 percent to more than 22 million tons. For the 67 countries as a whole, the "distribution gap" (the amount of food needed to raise consumption of each income group to the minimum nutritional requirement) is expected to widen by 21 percent and exceed 31 million tons in 2010. The growth of food gaps stands in contrast to the projected trend in the number of hungry people. In fact, the number of people failing to meet nutritional requirements is projected to decline in the next decade, implying that hunger in the food insecure and lower income groups will intensify.

ERS has identified Sub-Saharan Africa as the region most vulnerable to food insecurity. The high incidence of HIV/AIDS in Sub-Saharan Africa is expected to reduce agricultural productivity, and constraints in financial resources will limit commercial imports, thus leading to declining per capita consumption. Sub-Saharan Africa is the only region that shows increases in all indicators of food insecurity, such as food gaps and growth in the number of hungry people.

Depending upon the future availability of food aid, a portion or all of the projected food gaps can be eliminated. For example, in 1999 roughly 12 million tons of food aid was distributed globally. If the same amount were provided in 2000, it would fill the entire calculated gap to maintain per capita consumption (status quo) and about 66 percent of the nutritional gap. However, all of the available food aid is not going to low-income, food-deficit countries. In 1999, only 7.5 million tons of food aid, or 63 percent of the total, was given to the study countries, and that is about 40 percent of the estimated nutritional gap in 2000.

Global Food Security: Overview

Average per capita food consumption for the 67 low-income countries is projected to increase in the next decade. The number of people with nutritionally adequate food is also projected to rise, providing an improved outlook for global food security. But the gains are not uniform across countries and in many, food insecurity is projected to intensify. Countries with political instability in particular continue to face the threat of growing food insecurity. [Shahla Shapouri]

Food Security Improves Over Time

The lower food prices in recent years were welcome news for highly import-dependent countries, helping to improve food affordability and security. The low prices also did not reduce production incentives for those countries that have managed to improve their productivity and reduce their costs. Even among the lowest income developing countries, there are definite signs of rising living standards. At the forefront are some lower income Asian countries, e.g. Vietnam, that have shown steady increases in their food supplies and several indicators supporting the continuation of this trend. This achievement is very important because of the number of people who are at stake—more than 60 percent of the population of the countries covered in this report. The food situation in the lower income Latin American countries such as Bolivia and Guatemala is also improving, a credit to their improved economic and trade policies that have led to steady increases in their export earnings that finance imports. Similarly in the North African and New Independent States (NIS) countries, several of which are oil exporters, the oil price hike should provide a stronger basis on which to expand food imports.

Sub-Saharan Africa, however, is almost entirely dependent on domestic production, which in most countries is projected to grow at too slow a pace to allow increases in per capita consumption. The region's nutritional food gap is projected to increase 40 percent, exceeding 17 million tons in 2010.

Despite all the reasons for optimism in four of the five regions, the unequal distribution of food, both at the international and national levels, remains a major obstacle to improving food security among the poor. Even among the prosperous regions, some countries are lagging behind. Although some of these countries have inadequate resources, both physical and financial, the most severe food-insecure countries are the ones that have internal political instability. The situations in Haiti and Afghanistan are clear examples of dysfunctional economies and food insecurity.

The future food security position of the 67 developing countries included in this study is evaluated by projecting the gaps between food consumption (domestic production, plus commercial imports, minus nonfood use) and two different consumption targets through the next decade. Food aid, although a part of the historical food supply, is excluded in the projections presenting the food gaps that countries face when left to their own resources. The two consumption targets are (1) maintaining per capita consumption at the 1997-99 level (also referred to as status quo) and (2) meeting minimum recommended nutritional requirements (see box 1). The estimated nutritional gap only measures the gap in calorie consumption and does not consider other factors such as poor utilization of food due to inadequate consumption of micronutrients and lack of health and sanitary facilities. Because the national level estimates represent the average food gaps and mask the impact of unequal incomes on food security, we also estimate a "distribution gap." This gap is defined as the amount of food needed to raise food consumption for each income group to the level that meets nutritional requirements. This indicator captures the impacts of unequal purchasing power or food access.

What Is New in This Report...

This report is an updated version of the 1999 report, with all historical and projected data updated. The food production estimates for the year 2000 are based on USDA data as of September/October 2000. The financial and macroeconomic data are updated based on the latest World Bank data. The projected macroeconomic variables are either extrapolations based on calculated growth rates for 1980-98 or are World Bank projections/estimations.

In this report, we have included a scenario that examines the impact of slower growth in crop area on food security. In most food insecure countries, increases in food production are mainly due to the expansion of cropland. Our projections confirm that there will be a need for a substantial increase in food production over the next decade to meet nutritional requirements in the lower income countries, mostly in Sub-Saharan Africa. The existing conditions for food production and prospects for expansion vary greatly. However, there are ample studies suggesting that the increased food supply will have to come from the intensification of production. This applies to Asia and to a lesser extent to Latin America and Africa. In the latter regions, opportunities to expand the production area exist, but unrestrained expansion can lead to long-term damage to natural resources and the environment. The analysis of the scenario of slower growth in production area confirms and quantifies

what common sense suggests: without any increase in investment in production intensification, lower income countries tend to become more food insecure.

This report also includes two special articles. The first article is entitled "Factors Affecting Agricultural Productivity of Developing Countries" and concludes that agricultural productivity is important for food security both through its impact on food supplies and prices, and through its impact on the incomes and purchasing power of farmers. In this context, land quality is related to both food availability and food access. Land quality is, on average, lower in low-income food-deficit countries than it is in high-income countries. This has important implications for policymakers concerned with improving food security, both through protection and/or improvement of land quality itself and through recognition of the distinct roles played by more conventional agricultural inputs in areas that differ in land quality.

The second article is entitled "HIV/AIDS and the Sub-Saharan African Food Market." The article concludes that the HIV/AIDS epidemic will reduce labor quality and productivity and will have long-term implications on the performance of the agricultural sector of the highly affected countries. The projected long-term food outlook for these countries shows a steady increase in food gaps in part due to the impact of HIV/AIDS, and indicates that the situation will worsen if productivity declines further. This means that to minimize the impact of HIV/AIDS, policies should combine educational messages to prevent the spread of the disease and economic assistance and investment in areas such as introducing labor-saving technologies.

The Paradox: Growing Food Gaps And the Decline in the Number of Undernourished People

Food gaps based on status quo and nutritional targets and distribution gaps are projected to grow (tables 1 and 2). In contrast, a decline in the number of people failing to meet the nutritional target is estimated. This means that nutritional disparity among and within countries will intensify more than food deficits will spread. In other words, the hunger problem will get more severe in the vulnerable countries and/or among the lower income groups.

The status quo food gaps (or food needed to maintain per capita consumption at the 1997-99 base level) are estimated at 7 million tons for 2000, much lower than the projected 12.7 million tons for 1999 (table 1 and fig. 1). This drop can be attributed to the lower per capita consumption target. This is a moving average, which fell significantly due to last year's drought in North Africa. The food gaps to meet minimum nutritional requirements are estimated at 17 million tons, higher than last year's estimate of 15 million tons.

When the impact of unequal incomes is taken into account, as we do in the distribution gap the estimated results for the 67 countries show that food gaps increased significantly relative to the national average (table 2). In 2000, the distribution gap is estimated to be more than 25 million tons, 33 percent larger than the national average nutritional gap. Based on the estimated distribution gaps, we calculated the number of people (in each income quintile) whose consumption falls short of the minimum nutritional requirement in each country. For the

Table 1--Food availability and food gaps for 67 countries

Year	*Grain production*	*Root production* (grain equiv.)	*Commercial imports* (grain equiv.)	*Food aid receipts* (grains)		*Aggregate availability of all food*	*Population*
			---1,000 tons ---				Million
1991	369,198	53,828	30,309	11,123		571,862	2,188
1992	373,263	56,360	42,471	9,916		599,004	2,262
1993	380,772	58,799	43,808	7,975		610,979	2,310
1994	391,859	59,197	46,623	8,003		628,165	2,358
1995	396,966	60,938	54,089	6,212		657,794	2,406
1996	420,083	62,385	50,144	4,695		665,122	2,454
1997	407,457	62,122	59,025	5,337		669,734	2,503
1998	427,151	64,270	61,270	7,847		686,466	2,552
1999	433,093	67,553	61,358	5,068		715,439	2,600
Projections				**Food gap***			
				SQ	*NR*	(w/o food aid)	
2000	434,843	67,121	63,868	***7,026***	***17,054***	710,448	2,650
2005	481,858	73,292	68,397	***7,602***	***16,875***	784,538	2,896
2010	525,478	79,944	76,710	***12,709***	***22,072***	859,932	3,138

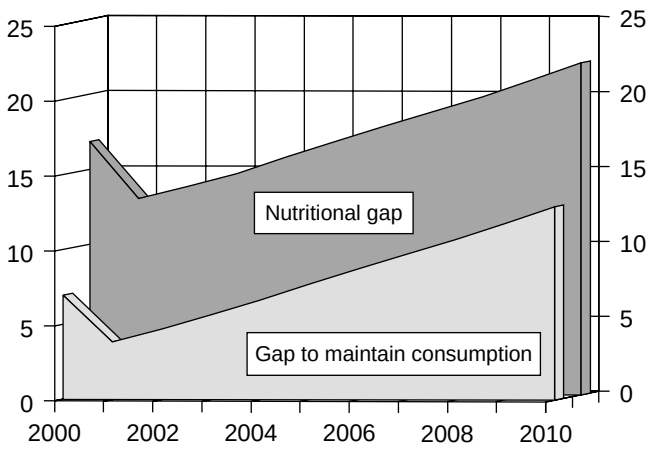
*SQ stands for status quo and describes the amount of grain equivalent needed to support 1997-99 levels of per capita consumption and NR stands for nutritional requirements and describes the amount needed to support minimum nutritional standards.

Table 2--Number of people with inadequate food and the size of food deficit

	Number of people with insufficient food		Distribution gap (due to inadequate access to food)	
	2000	2010	2000	2010
	--Million people--		--1,000 tons--	
Total	774	694	25,315	30,874
Asia	307	177	5,489	5,294
Sub-Saharan Africa	344	435	15,294	22,496
Latin America	62	47	1,897	1,813
North Africa	48	31	1,970	1,131
NIS	13	6	664	141

Source: Own calculations using Food Security Assessment model.

Figure 1
Food gaps in all 67 countries, 2000-2010



67 countries, the number of people failing to meet the nutritional target is projected to decline from 771 million in 2000 to 695 million by 2010.

Overall, the long-term food gaps for the 67 countries are lower than those reported in last year's assessment, principally due to the assumptions of higher economic growth rates for the Asian and Latin American countries. For the same reason, in the *1999 Food Security Assessment* report, we projected the number of people failing to meet the nutritional target to grow and for 2009 our projection was higher than the current projection.

Sub-Saharan Africa Remains the Most Vulnerable Region

Of the 37 countries in Sub-Saharan Africa, per capita consumption is projected to rise in only 7 countries. Even in those countries, the growth is not expected to be particularly strong. In 2010, consumption for 60 percent of the region's population is projected to fall short of nutritional requirements. In addition, the region is projected to account for nearly two-thirds of the hungry people in the 67 countries, but it accounts for only about one-fourth of the population (fig. 2). The region's nutritional gap is estimated to account for 65 percent of the nutritional gap for the 67 countries in total in 2000. This number is projected to jump to 76 percent in 2010. The region accounts for only 24 percent of the population of the 67 countries, thus indicating the severity of the region's food security situation.

In Sub-Saharan Africa, domestic food production accounts for about 80 percent of consumption. During the next decade, production growth is projected to fall short of historical rates and average 2.1 percent per year versus 2.4 percent during 1980-99. The reason for the expected lower production growth is twofold. First, nearly 90 percent of the region's historical grain production growth stemmed from area expansion. This trend is not expected to continue in the future, as much of the region's remaining land area is marginal for agricultural purposes. Second, the decline in population growth due to spread of HIV/AIDS is expected to reduce labor productivity. Labor remains the essential factor of production and lack of labor-saving technologies will lead to a decline in food production (see "Vulnerability to HIV/AIDS in Sub-Saharan Africa"). In the Food Security model, the marginal productivity of labor is assumed constant over the projection period. For the Sub-Saharan countries, this may be an overestimation because the decline in population growth is in part due to the spread of HIV/AIDS, which affects the most productive segment of the population.

The distribution gap, which incorporates the impact of skewed income distribution, is projected to rise from 15.3 million tons in 2000 to 22.5 million tons in 2010, 10 percent higher than the national average nutrition gap. The number of people in different income quintiles who fail to meet their nutritional requirement is projected to increase from 344 million to 435 million in 2010. Sub-Saharan Africa is the only region where food security, both in terms of the size of the gaps and the number of undernourished people is expected to rise.

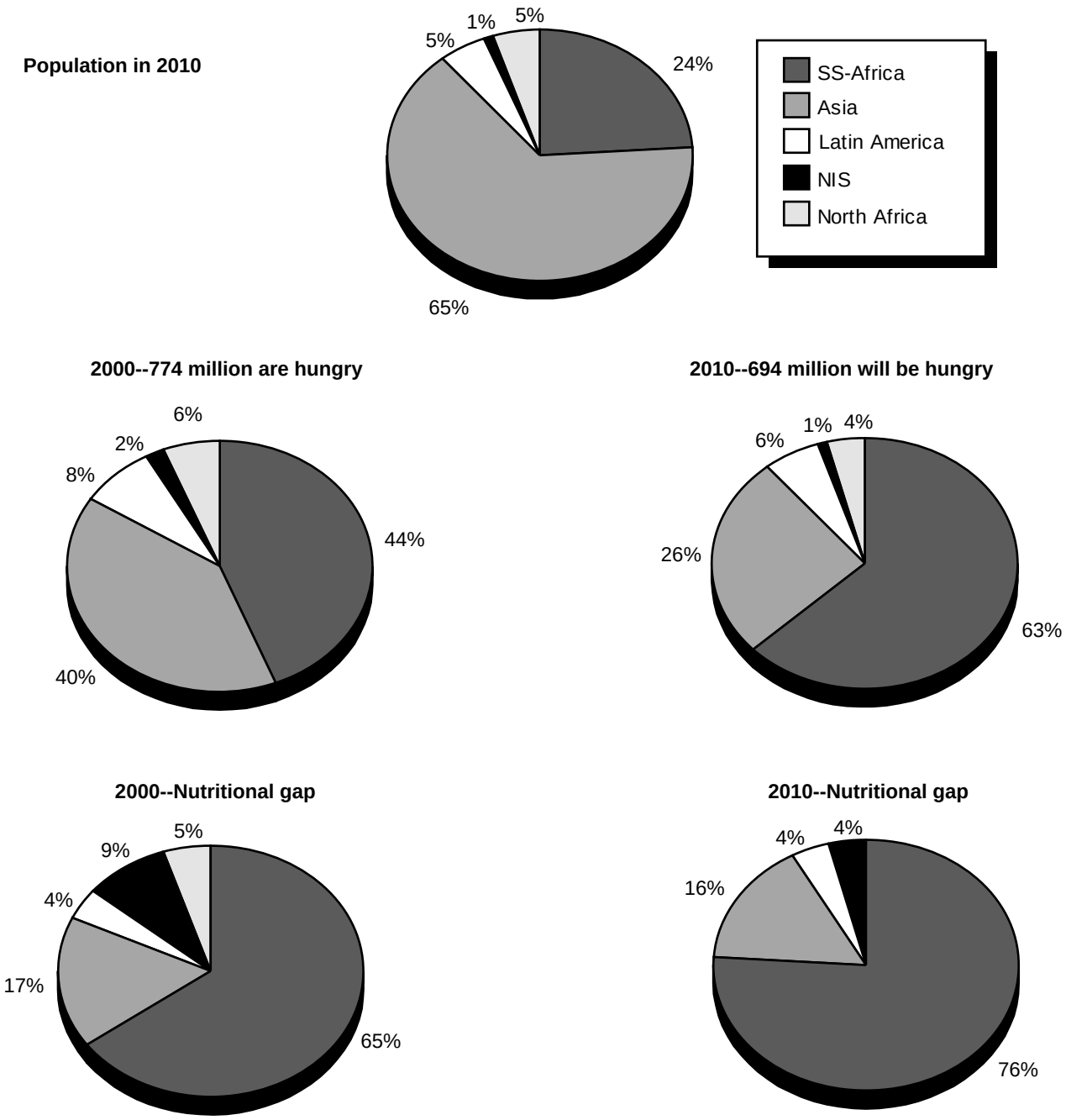
Food Availability will Increase in Most Low Income Asian and Latin American Countries

Per capita consumption in the 10 Asian countries covered in this report is projected to increase, on average, in the next decade. There are problem areas, however. Afghanistan and North Korea, and to a lesser extent, Bangladesh, account for most of the region's nutrition gaps during the projection period. The region's distribution gap is projected to decrease during the next decade, as is the number of people who cannot meet their nutritional requirement. The region has about 65 percent of the population of countries covered in the report, but is projected to account for only 26 percent of the people who cannot meet their nutritional requirement in 2010.

Per capita food consumption in most of the lower income Latin American and Caribbean countries (11 countries) is expected to improve. Even with a relatively slow increase in

Figure 2

While total number of hungry people is projected to decline, Sub-Saharan Africa's share is rising sharply



How Food Security Is Assessed

The commodity coverage in this report includes grains, root crops, and a group called "other." The three commodity groups in total, account for 100 percent of all calories consumed in the study countries. This report projects food consumption and access in 67 lower income developing countries: 37 in Sub-Saharan Africa, 4 in North Africa, 11 in Latin America and the Caribbean, 10 in Asia, and 5 in the NIS (see app. 1 for a detailed description of the methodology and app. 2 for a list of countries). The projections are based on 1997-99 data. The periods covered are 2000, 2005 (5 years out), and 2010 (10 years out). Projections of food gaps for the countries through 2010 are based on differences between consumption targets and estimates of food availability, which is domestic supply (production plus commercial imports) minus nonfood use. The estimated gaps are used to evaluate food security of the 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 1997-99 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 "Methodology" in app. 1). 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 food consumption of 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 following common terms are used in the reports: *domestic food supply*, which is the sum of domestic production and commercial 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.

food production, strong commercial import growth will raise food supplies sufficiently to keep up with population growth. Another positive sign is the projected decline in the number of people with inadequate food supplies. Despite this bright picture at the aggregate level, food insecurity is growing in a few countries and highly skewed purchasing power aggravates the problem. In 2000, the estimated distribution gap (that captures inequality in food access) is about six fold higher than of the national average nutritional gap. Nutritional gaps both at the national average and disaggregated levels (distribution gap) are projected to increase, indicating growth in intensity of hunger in countries such as Haiti.

North Africa and NIS Face Challenge of Financing Imports

Food imports make up about 42 percent of North Africa's consumption needs, and this level is projected to continue through 2010. Financing this level of imports in the next decade is the critical element to ensure food security. The region's two largest food importers, Egypt and Algeria, to varying degrees, depend on oil and gas revenues. With the real prices of oil and gas recovering, these countries should be able to cover their import needs.

Short-term production variability creates a challenge to food security in Algeria, Morocco, and Tunisia. Morocco is the extreme case because it has one of the highest levels of production variability in the world (app. 3). In Algeria, political difficulties are the main threat to food security. This year, because of the expected windfall in oil export revenues, imports are likely to increase to fill these gaps. The long-term food security of the country is threatened because of low investment that has led to slow growth in agricultural production and increased food-import dependency of the country; about 70 percent of grain consumption was imported during 1997-99. The ability to finance imports will be the critical factor to ensure food security.

We project positive growth for agricultural productivity and import capacity of the NIS countries, but political uncertainty remains a major issue. The drought in 2000 has led to food gaps in Armenia, Azerbaijan, Georgia, and Tajikistan. Although Georgia experienced the largest percentage production shock in 2000, the food gaps are expected to be relatively more severe in Armenia and Tajikistan. Tajikistan is the only country where food gaps are expected to continue over the next decade. Access to food by lower income groups in a few of these countries is a problem now, but should improve as the economies of these countries grow.

Food Aid Donations Are Increasing

Depending upon the future availability of food aid, a portion or all of the projected food gaps can be eliminated. For example, in 1999 roughly 11.9 million tons of food aid were distributed globally (fig. 3). If the same amount were provided in 2000, it would fill the entire calculated gap to maintain per capita consumption (status quo) and about 66 percent of the nutritional gap. However, all of the available food aid is not going to low-income, food-deficit countries. In 1999, only 7.5 million tons, or 63 percent of total food aid were given to the countries studied in this report, and the aid would cover about 40 percent of their estimated nutritional gap in 2000.

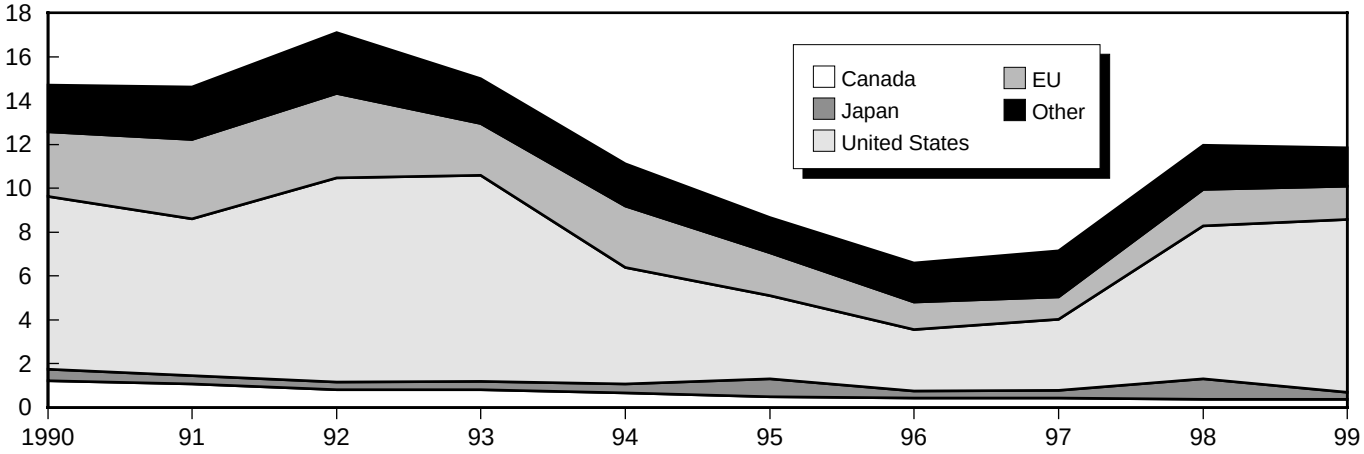
Food aid shipments for 1999 grew significantly from the 1996 level of 6.6 million tons. The main source of the hike in donations was the United States, while the European Union and Japan reduced their allocations. Although the amount of food aid donations was virtually unchanged from 1998 to 1999, allocations to the study countries declined by 20 percent. Allocations to Asian and Latin American countries declined, while those to Sub-Saharan countries remained roughly the same at 2.8 million tons.

Allocations of available food aid are not necessarily based on nutritional needs. Other factors such as political instability leading to the collapse of internal marketing systems and financial difficulties that disrupt commercial imports can play an important role in food aid allocations among countries. For example, in 1999, the bulk of the increase in U.S. food aid was allocated to Russia. In 1998, Indonesia was the third largest recipient of food aid after Bangladesh because of serious food deficits caused by the financial crisis and internal problems. The share of food aid going to Sub-Saharan Africa—the most food insecure region according to

Figure 3
Food aid: Donors and recipients

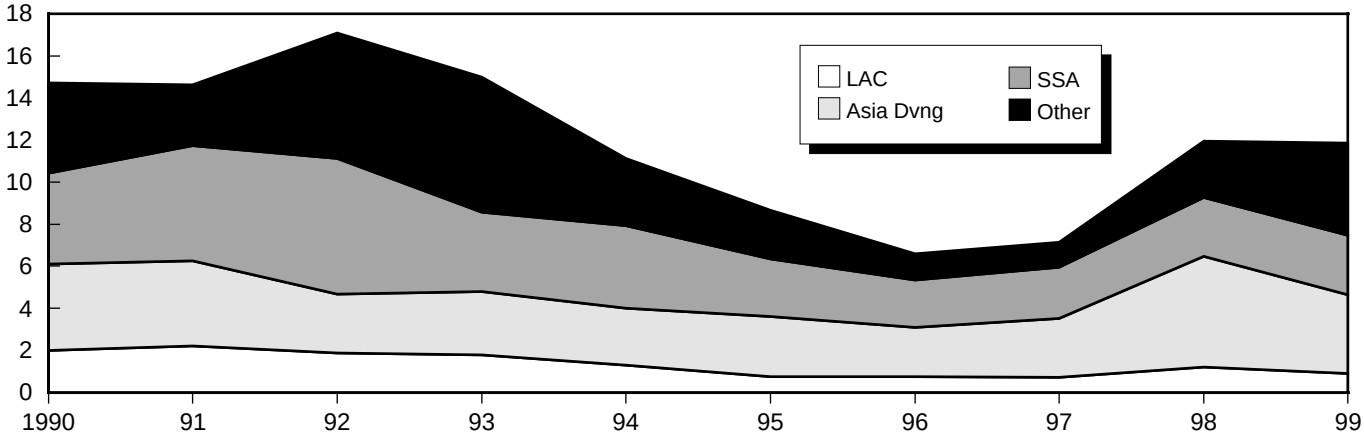
Food aid donors

Million tons



Food aid recipients

Million tons



our estimates—was only 24 percent in 1999. If this level of food aid is continued, it will cover only 23 percent of the estimated nutritional gap for the region in 2000.

Constraints in Expanding Agricultural Area

In many low-income countries, increases in agricultural output mainly have stemmed from area expansion. In Sub-Saharan Africa, area expansion accounted for more than 80 percent of grain output growth between 1980-99. This means that yield growth contributed to less than 20 percent of the growth. In Latin America, area expansion accounted for 68 percent of the growth in grain production. In Asia, the reverse was true—area expansion accounted for less than 5 percent of the growth in grain output.

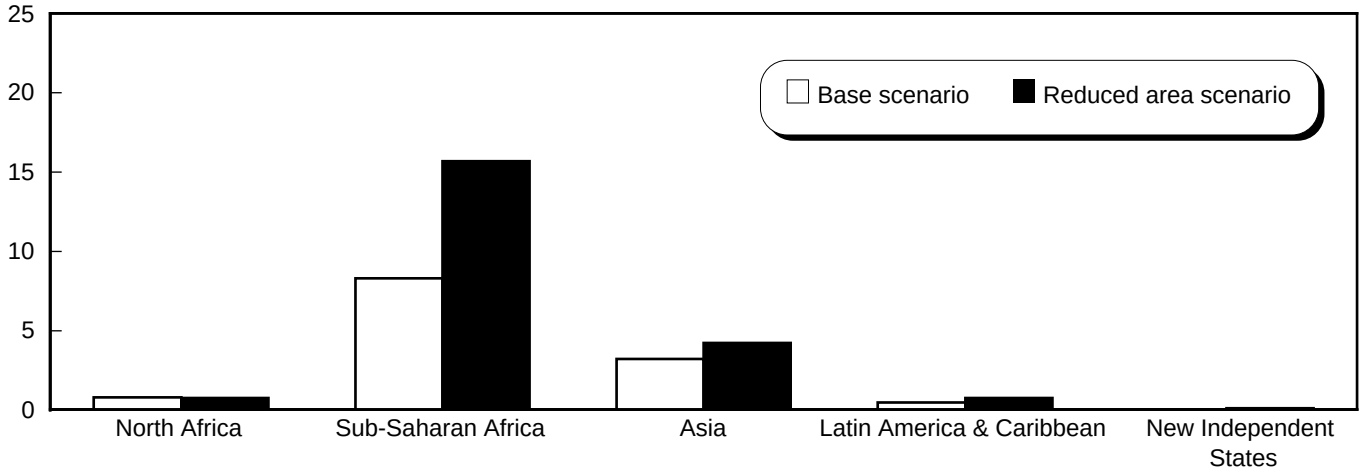
The long-term prospects for acreage expansion are not bright, because, in most countries, a large part of land that could be used for farming is unfit to cultivate without major investment. In Latin America and Sub-Saharan Africa, continued expansion of cropland means converting range and forestland to crop production, a process with high economic and environmental costs. According to FAO estimates, about half of the land that could be used to produce food in Sub-Saharan Africa has poor quality soil. Sub-Saharan Africa has a vast and diverse land area, but the region faces a number of resource constraints (such as lack of water) to sustainable agricultural growth.

Land quality as defined by soil quality, climate, and rainfall is a crucial factor determining agricultural productivity, as is discussed in more detail in the special article "Resource Quality, Agricultural Productivity, and Food Security in Developing Countries." Cross-country analysis confirms that low quality in cropland is significantly associated with low agricultural productivity. Loss of land available to agriculture—due to land degradation or expansion of urban areas—is a reality in many areas, especially in developing coun-

Figure 4
Food gaps by region

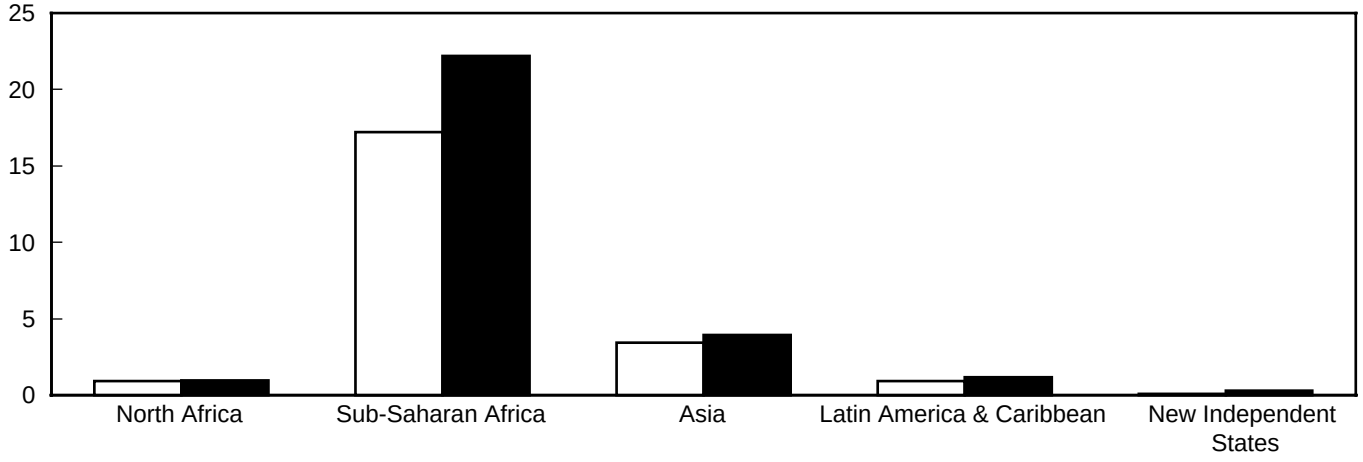
Status quo gap in 2010

Million tons



Nutritional gap in 2010

Million tons



tries. While new technology has been successful in providing data on the existing quality of land, limited data are available on changes of land quality over time. In the absence of precise projections, we analyze a scenario where area expansion is half the rate used in the base model for Sub-Saharan Africa, Latin America, NIS, and North Africa. In Asia, where annual area growth between 1980 and 1999 was less than 0.1 of a percent, we assumed area to remain constant during the entire projection period.

In Sub-Saharan Africa, production in the baseline scenario was projected to grow at a rate of 2.1 percent per year; under the reduced area growth scenario, this rate is projected to fall to 1.7 percent. As a result of the slower production growth, the region's nutritional gap in 2010 jumps by 34 percent to more than 22 million tons (fig. 4). In other regions, the cut in area is much less significant either because of high import capacity such as the case of North Africa or potential for yields to be the main contributor to production growth, i.e. Asia.

The results indicate that for food-insecure countries, in particular countries in Sub-Saharan Africa, the only option to sustain production growth is to increase yields. Yields highly depend on the use of improved inputs. Data show that Sub-Saharan Africa has the lowest labor productivity and that it is declining. Similarly, the region's fertilizer use is the lowest and on a declining trend. Even with an increase in fertilizer use, yields may not increase much. A cross-country estimate for developing countries showed that a 1-percent increase in fertilizer use results only in a 0.1- to 0.3-percent increase in yield. The principal factor limiting yield response to fertilizer use is the inadequate supply of water during the growing season. Irrigation can be a solution, but is too costly and in Sub-Saharan Africa only 4.2 percent of cropland is irrigated. Although water availability varies considerably across regions, it has been a serious problem in many countries. In addition, the agricultural sector consumes over half of the fresh water in most countries and could face increased competing demands from urban consumers and industrial uses in the future.

Overall, farm management practices, in particular improved efficiency in the use of water, can be the first step to improving food security in the vulnerable countries. To increase yields, high-yielding varieties appropriate for specific agroclimatic conditions are essential. The success, however, depends on the investment in supportive institutions for research and extension to diffuse the new varieties to farmers. For the resource-poor countries, the long-term strategy should aim at diversifying the sources of income of the farmers. In these countries, the agricultural sector alone cannot generate adequate incomes and food to support their growing populations. Policies to promote rural development not only would improve income distribution, they would allow the poor the means to buy the food they need and would also reduce pressure on land.

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North Africa

Algeria, Morocco, and Tunisia have experienced a severe drought this year. However, this translates into only modest food gaps for Algeria and Morocco. Only Algeria faces a longrun food deficit. Allowing for a land degradation scenario changes this projection only slightly, given the limited land availability for production in the region. [Michael Trueblood]

Algeria, Morocco, and Tunisia have experienced a serious drought in 2000 leading to production deviations that range from 48 percent to 64 percent below trend. In the case of Morocco, a country with one of the highest levels of production variability in the world, the shortfall is even more severe than last year's deficit, compounding a difficult situation.

These significant production shocks translate into relatively modest food gaps. All of these countries are middle income countries with relatively high per capita consumption levels compared to other countries in this report. Tunisia had the smallest shock and appears able to compensate for the shortfall with commercial imports. For Morocco, there is no food gap in 2000 based upon recent per capita consumption trends, but there is a nutrition-based food gap of 1 million tons. Morocco represents an extreme case in which the recent per capita consumption target can change dramatically each year. Because of last year's drought, the per capita consumption target—a 3-year moving average—dropped from 398 kg/cap to 241 kg/cap. Given this lower consumption target, assuming trend level of commercial imports, the target can be met despite the second year of drought. Using last year's consumption target (i.e. average consumption of the years 1996-98) would translate into a food gap of 4.1 million tons under the same assumptions.

Algeria shows a food gap of 361,000 tons to maintain recent per capita consumption levels and a food gap of 518,000 tons to meet nutritional requirements. However, these gaps will probably be fully met this year because of Algeria's expected windfall in oil and gas export revenues from high world prices, which will allow for higher imports. Analysis of the ratio of food import costs to export revenues suggests that even an above-average level of imports could be easily afforded compared with many previous years.

Analyzing the distribution of food consumption, the lower income groups in Algeria are the most vulnerable in the short and longrun: the four lowest income quintiles are projected not to meet minimum nutrition requirements, both in 2000 and 2010. For Morocco, the impact of the consecutive droughts in 1999 and 2000 is such that all income groups are projected to be unable to meet nutrition requirements in 2000. However, by 2010, this situation should be turned around with all income groups meeting these requirements. In Egypt and Tunisia, all income groups are estimated to have nutritionally adequate food supplies in both 2000 and 2010.

The four countries in North Africa examined in this report will continue to face limited land and water resources and become more reliant on food imports over time. The primary economic question is whether they will be able to afford these imports to sustain their current consumption levels (holding aside the issue of production volatility). However, another question is, would food gaps develop if area expansion were constrained?

For the first question, only Algeria is projected to show longrun food gaps (718,000 tons by 2010 to maintain current per capita consumption levels, which is about 7 percent of total food supplies). This is a somewhat tenuous projection in the case of Algeria, given its high dependency on oil and gas revenues, because of the great uncertainty of petroleum prices. If oil prices are sustained at recent levels, these food gaps could easily be eliminated. As for the second question, assuming that crop land grows half as rapidly, the gaps only increase for Algeria, and even then only slightly (up to 758,000 tons by 2010). This can be explained by the small impact that crop land growth has in the base case (less than 1 percent growth per year, which is reduced to 0.5 percent growth in the modified scenario). A similar explanation applies to the other North African countries in this report.

Table 3--Food availability and food gaps for North Africa

Year	Grain production	Root production	Commercial imports	Food aid receipts (grains)	Aggregate availability of all food
			---1,000 tons ---		
1991	26,890	1,162	13,254	1,345	39,211
1992	20,765	1,085	15,109	831	38,740
1993	19,082	1,053	16,854	418	39,804
1994	24,645	945	19,131	239	41,955
1995	19,881	1,353	19,739	221	46,839
1996	33,267	1,465	16,312	190	44,178
1997	22,439	1,192	20,565	94	46,340
1998	26,699	1,261	21,745	50	45,769
1999	24,449	1,211	21,895	63	49,071
Projections				**Food gap**	
				SQ NR	(w/o food aid)
2000	20,628	1,277	22,274	***361*** ***1,563***	43,701
2005	27,752	1,396	22,686	***180*** ***354***	50,858
2010	30,492	1,521	24,039	***718*** ***909***	55,071

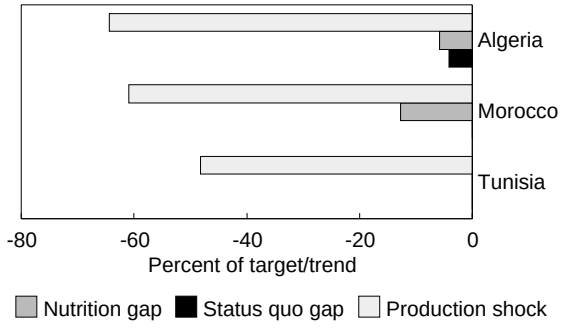
North Africa
138 million people in 2000

A second year of drought in North Africa has severely reduced production. Morocco could face the most severe nutritional food gaps. Algeria shows modest food gaps, but may avoid them due to imports financed by rising oil and gas prices.

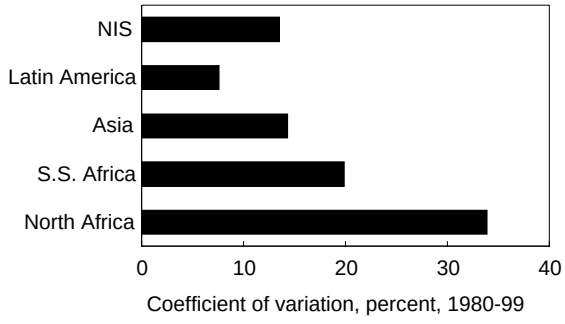
Food supplies for the lowest income groups in Algeria and Morocco may not be adequate in 2000, but should be sufficient in the long run.

Algeria is the only country in the region to face longrun food gaps, but this will depend on oil and gas price projections.

North Africa's production shocks have led to differently sized food gaps



North Africa's grain output variability is relatively high



North Africa: Land use

Region/ country	Share of cropland irrigated		Arable land 1995-97	Change (ha per capita) in arable land between 1979-81 and 1995-97	Annual rate of change in deforestation 1990-95
	1979-81	1995-97			
	Percent		Hectare per capita		Percent
North Africa	**52.2**	**52.7**	**0.18**	**-20**	**0.9** *
Algeria	3.4	6.9	.26	-30	1.2
Egypt	100.0	99.8	.05	-17	.0
Morocco	15.2	13.1	.33	-13	.3
Tunisia	4.9	7.6	.32	-37	.5

* Aggregate for Middle East and North Africa.
Source: World Development Report 2000/2001, World Bank.

Sub-Saharan Africa (SSA)

Of the 37 countries in the region, per capita consumption is projected to rise in only 7 countries. In 2010, consumption for 60 percent of the region's population is projected to fall short of nutritional requirements. In addition, the region is projected to account for nearly two-thirds of the hungry people in the 67 countries, while accounting for only 24 percent of the population. [Stacey Rosen]

Food security in Sub-Saharan Africa is almost entirely dependent on domestic production. Imports, as a share of the region's total food supplies, averaged around 10 percent in the late 1990s despite strong growth in commercial imports. The food aid share of imports peaked in the late 1980s at roughly 40 percent. In more recent years, that share has averaged less than 20 percent of imports.

Sub-Saharan Africa's agricultural productivity—as measured by output relative to agricultural land area—has accelerated over time. Between 1990-98, this productivity indicator rose 2.3 percent per year. This compares quite favorably to the success stories among the East and Southeast Asian countries where growth measured just under 2.5 percent during the same time period. However, Sub-Saharan Africa's population growth averaged 2.7 percent per year since 1990, meaning that productivity declined on a per capita basis. Moreover, the region's absolute level of productivity measured only about 65 percent of that of the Asian countries. This low level of productivity is directly attributable to low input use. Fertilizer use, the lowest rates in the world, actually declined between 1990 and 1998. Irrigated area as a share of total agricultural area stagnated during the 1990s and measured only about 3 percent in 1998. In Latin America, this share exceeded 11 percent and in Asia 20 percent.

Nearly 90 percent of the region's historical grain production growth stemmed from area expansion. This trend is not expected to continue in the future, as much of the region's remaining land area is marginal for agricultural purposes.

Production growth during the next decade is projected to fall short of historical rates and average 2.1 percent per year. To close the nutritional food gap, production would need to rise 2.9 percent per year. Given the region's limitations to expanding land area, achieving this growth rate would require investment in research and extension activities, improved infrastructure, and increased input use. Similar to the historical period, imports will not be a significant factor in the food security equation. Commercial imports are projected to account for less than 8 percent of food supplies in 2010 as slow export earnings growth is expected to constrain import capacity. Food aid allocations to the region may rise, but that has not been the case in recent years. Political and financial instability have been deciding factors in global food aid allocations. Sub-Saharan Africa, the most vulnerable region according to our analysis, received only a quarter of global food aid in 1999.

This slow production and import growth is expected to result in a continuation in the declining trend in per capita consumption. Of the 37 countries in the region, per capita consumption is projected to rise in only 7 countries—Ethiopia, Kenya, Sudan, Mozambique, Zimbabwe, Chad, and Togo. Even in these countries, the growth is not expected to be particularly strong. For example, Sudan is expected to experience the highest growth, but still only 1.4 percent per year. For Sudan, growth in grain output is not projected to match that of the historical period, but it will still outpace population growth by more than 1 percent per year. The same is true for Ethiopia and Mozambique. Slow population growth projections, due to the HIV/AIDS epidemic, is the primary factor behind the positive per capita consumption growth as production growth is projected to be quite slow—even falling short of the regional average. For Kenya, Chad, and Togo, the growth is negligible.

The region's food gap to maintain consumption is projected to rise about 65 percent during the next 10 years to 8.3 million tons in 2010. The nutritional food gap is projected to increase 40 percent, nearing 17 million tons in 2010. In other words, the region would need more than two times the amount of food to achieve nutritionally adequate diets as compared with simply maintaining the recent standard. The region's nutritional gap is estimated to account for 65 percent of the nutritional gap for the 67 countries in total in 2000. This number is projected to jump to 76 percent in 2010. The region accounts for only 24 percent of the population of the 67 countries, thus indicating the severity of the region's food security situation.

The situation appears even more desperate when examining projected consumption by income group. The distribution gap—the amount of food needed to raise consumption in each income group to the nutritional target—is projected to increase 40 percent during the next decade, reaching almost 23 million tons in 2010. At the same time, the number of people in the region consuming inadequate diets is projected to rise 25 percent during the next decade. The fact that this gap is projected to rise at a faster rate than the number of

Table 4--Food availability and food gaps for Sub-Saharan Africa

Year	Grain production	Root production	Commercial imports	Food aid receipts (grains)	Aggregate availability of all food
			---1,000 tons ---		
1991	59,185	35,394	5,262	5,140	113,750
1992	57,345	36,993	6,858	5,514	124,658
1993	61,108	39,479	7,717	3,236	125,908
1994	64,401	39,768	7,864	3,295	130,818
1995	64,872	41,029	7,179	2,269	137,916
1996	69,804	41,542	7,526	1,846	137,016
1997	63,597	40,945	9,860	2,140	136,878
1998	69,295	44,772	11,940	2,598	148,628
1999	68,792	45,763	10,466	1,700	148,117
Projections				**Food gap**	
				SQ NR	(w/o food aid)
2000	69,734	45,600	11,152	***3,287*** ***10,999***	147,217
2005	81,354	49,996	11,344	***4,687*** ***12,812***	165,527
2010	90,756	54,753	12,055	***8,295*** ***16,574***	182,620

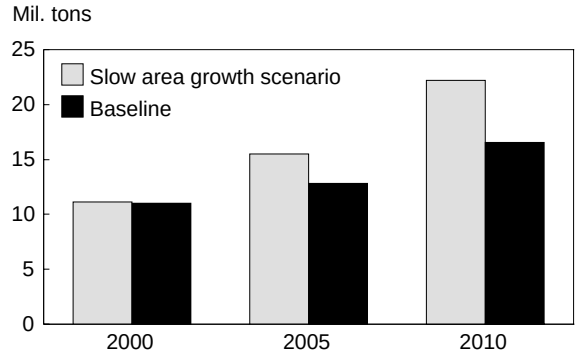
Sub-Saharan Africa
589 million people in 2000.

Only 7 of the 37 countries are projected to have rising per capita consumption trends through the next decade.

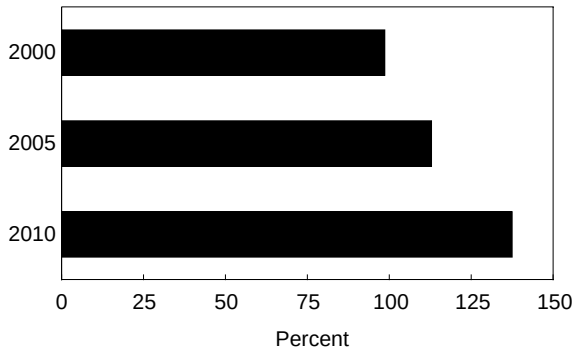
While Sub-Saharan Africa will have only 24 percent of the population of the study countries in 2010, it is projected to account for 76 percent of the total nutrition gap.

Sixty percent of the region's population is projected to consume at levels below the minimum nutritional requirement in 2010.

Nutritional food gap in Sub-Saharan Africa



Nutritional gap as share of imports



Sub-Saharan Africa: Land use

Region/ country	Share of cropland irrigated		Arable land 1995-97	Change (ha per capita) in arable land between 1979-81 and 1995-97	Annual rate of change in deforestation 1990-95
	1979-81	1995-97			
	Percent		Hectare per capita		Percent
SSA					
Kenya	0.9	1.5	0.14	-39	0.3
Rwanda	.4	.3	.12	-20	.2
Angola	2.2	2.1	.27	-34	1.0
Madagascar	21.5	35.0	.19	-32	.8
Mozambique	2.1	3.4	.18	-25	.7
Congo, Dem. Rep.	.1	.1	.15	-40	--

Source: World Development Report 2000/2001, World Bank.

hungry people is an indicator that the food security problems in this region will not only spread, they will intensify. In 2010, consumption for 60 percent of the region's population is projected to fall short of nutritional requirements. In addition, the region is projected to account for nearly two-thirds of the hungry people in the 67 countries, while accounting for only 24 percent of the total population (see fig. 2 in the Overview).

Given the region's land constraints, we ran a scenario of reduced area growth. In the base scenario, agricultural area was projected to rise 1.2 percent per year. For the scenario, this growth was cut in half. As a result of these changes, the nutritional gap is projected at more than 22 million tons—30 percent above that under the base scenario (see fig. 4 in the Overview). Given the precarious food security position of the region, the implications of lower domestic production growth rates are particularly acute for the lower income groups. The number of people with inadequate diets jumps 15 percent relative to the base scenario to 435 million as consumption in only the highest income group is projected to exceed the minimum nutritional requirement.

While policy reform in the region has had some positive effects (i.e., market-determined prices, private sector involvement in food marketing), there is considerable room for improvement. Investment is needed to improve rural infrastructure to facilitate the transport of agricultural inputs and products. Policies are needed to promote the continued participation of the private sector in distributing inputs and marketing output. The HIV/AIDS crisis, which has already reduced the supply and productivity of labor in many countries, must be addressed through education efforts. Countries in this region need to participate in international trade negotiations to improve their trade and market access.

The discussion of debt forgiveness within the international community is welcome news for these countries and should open opportunities for increased investment. Gross domestic investment in the region declined from 23 percent of GDP in 1980 to 18 percent in 1997. The new U.S. initiative—The African Growth and Opportunity Act—was signed into law on May 18, 2000. It provides preferential access to U.S. markets for eligible products from designated countries within the region as well as improved access to U.S. credit and technical expertise.

Asia

The region's food security situation is projected to improve during the next decade as the share of population consuming nutritionally inadequate diets falls from an estimated 17 percent in 2000 to 9 percent in 2010. Most of the region's improvements can be attributed to India. [Stacey Rosen]

The Asia region in this report includes Afghanistan, Bangladesh, India, Indonesia, Nepal, the Democratic People's Republic of Korea (North Korea), Pakistan, the Philippines, Sri Lanka, and Vietnam. Fewer people in the region are expected to be hungry in 2010 than in 2000. The aggregate food security situation for the region is projected to improve during the next decade, as a larger number of people will consume nutritionally adequate diets. The region's achievements in agricultural growth during the last two decades were largely a result of rapid growth in input use and productivity. Investment in public research and extension, expansion of irrigated area, and improvements in rural infrastructure and human capital contributed greatly to the productivity growth. Concerns are growing, however, as population growth is placing pressure on natural resources. Already, nearly 80 percent of the region's potentially arable land is cultivated. In addition, there is increasing competition for water from household and industrial uses that will invariably raise costs.

Grain output in the region rose roughly 2.5 percent per year during the historical period (1980-99) due to strong yield growth. This growth was supported by steady increases in irrigated land area and fertilizer use. In 1998, 36 percent of the region's cultivated land was irrigated—twice the world average. Fertilizer use jumped more than 5 percent per year and averaged 130 kilograms per hectare, roughly 10 percent above the world average. The strong production growth, coupled with rapid commercial import growth, resulted in an increase in per capita consumption and will continue to sustain it through the next decade.

Improvements in food security are also reflected in food consumption by income group. In 2000, consumption in all income groups, with the exception of the lowest 20 percent, is estimated to exceed the minimum nutritional requirement. In 2000, 17 percent of the region's population are estimated to be hungry. By 2010, we project that this share will fall to 9 percent, or 177 million people.

Most of the region's improvements can be attributed to India whose population of more than 1 billion is by far the largest in the region and therefore influences the performance of the region on the whole. Agricultural output per hectare, a measure of land productivity, grew at an annual rate of 3.3 percent—twice the U.S. and world average rates. This growth was supported by high rates of input use. Roughly 35 percent of cultivated land is irrigated, twice the world average. The country is estimated to have no status quo or nutritional food gaps in 2000. Per capita consumption is projected to continue its upward trend during the next decade, ensuring that by 2010, consumption in all income groups, on average, will exceed the nutritional requirement. However, within the lowest income group, there will be people who cannot afford to purchase enough food for an adequate diet.

Indonesia is beginning to recover from the international financial crisis that hit in 1997 and continued through early 1999. The country's real GDP declined nearly 14 percent in 1998 and a further 4 percent in 1999. The currency depreciation resulted in an inflation rate of 70 percent which, in turn, led to a decline in consumption. For example, wheat consumption declined 50 percent from the 1996 peak to 1998. Food aid shipments of 1 million tons in 1998 and 500,000 tons in 1999 were crucial in preventing famine. The situation began to stabilize in 1999 and real GDP growth for 2000 is estimated at around 2 percent. The projections indicate that the country's nutritional food requirements were being met as of 1999 and that the food security situation is expected to improve through the next decade.

Political uncertainty makes projections for North Korea and Afghanistan difficult. North Korea has been characterized by a stagnating economy that has reduced both commercial import capacity and the supply of agricultural inputs. Per capita consumption fell 25 percent during the 1990s. North Korea is estimated to account for a third of Asia's nutritional food gap in 2000. While the situation is projected to improve, it is still desperate. By 2010, consumption in only the top income group is expected to exceed the minimum target, meaning that roughly 80 percent of the population will have inadequate diets.

Afghanistan is estimated to account for the other two-thirds of the region's nutritional gap in 2000. Production, although rebounding from the lowest points of the early 1990s, has not recovered to the levels achieved in the 1980s. Per capita consumption in 1999 was roughly half of the mid-1980s level; it is projected to fall more than 1 percent per year through 2010. Consumption will fall short of nutritional requirements in all income groups; in even the highest

income group consumption is projected at only 80 percent of the nutritional target in 2010.

Considering the land constraints facing the region—primarily attributable to population pressures—we ran a scenario for Asia assuming zero area growth. In the base scenario, total area was projected to rise 0.3 percent per year. Under the reduced area scenario, consumption for 23 percent of the population—or 459 million people—will fall short of the nutritional requirement in 2010. In the base scenario, only 9 percent of the population was projected to consume an inadequate diet. The region's per capita consumption growth is cut by more than half—from 0.5 percent per year to 0.2 percent. While this lower area growth adversely affected all countries in the region, the implications varied. For example, the food security position of Indonesia, Sri Lanka, and Vietnam was so strong, that even with lower production growth, nutritional requirements will continue to be met across all income groups. Conversely, in India and Pakistan, the drop in output results in inadequate diets for the lowest income group. In Afghanistan and North Korea, even consumption in the top income group is projected to fall below the nutritional target. Therefore, what seems to be a very small change in one variable can have severe implications for consumption, particularly for the poorest segments of the population, in many countries in the region.

Table 5--Food availability and food gaps for Asia

Year	Grain production	Root production	Commercial imports	Food aid receipts (grains)	Aggregate availability of all food
			---1,000 tons ---		
1991	269,734	14,804	7,485	2,811	391,293
1992	280,809	15,669	11,461	1,769	399,324
1993	286,011	15,298	11,296	1,792	409,558
1994	289,925	15,431	10,971	1,942	418,601
1995	299,303	15,295	17,824	2,106	435,076
1996	303,206	16,016	15,899	1,722	445,101
1997	307,064	16,621	16,947	2,054	446,522
1998	316,929	14,916	15,220	4,193	450,664
1999	324,982	16,768	16,991	2,534	475,894
Projections				**Food gap**	
				SQ NR	(w/o food aid)
2000	330,470	16,616	17,403	***2,627*** ***2,925***	479,938
2005	356,138	17,944	19,463	***2,445*** ***2,783***	519,832
2010	386,322	19,362	22,699	***3,218*** ***3,454***	566,771

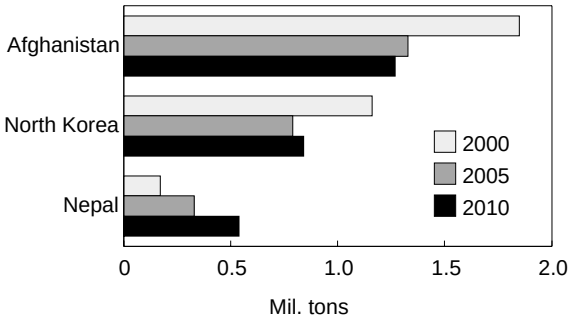
Asia
1,678 million people in 2000

By 2010, Asia's population—65 percent of the total of the 67 study countries—is projected to account for 17 percent of the nutritional food deficit.

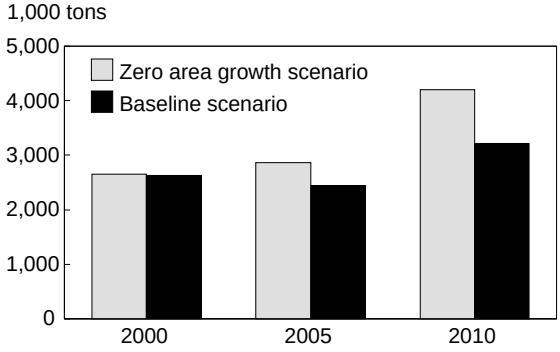
The share of the region's population consuming nutritionally inadequate diets is projected to fall from an estimated 17 percent in 2000 to 9 percent in 2010.

Serious land constraints face the region. In a zero area growth scenario, the region's per capita consumption growth was cut in half—from 0.5 percent per year to 0.2 percent.

Status quo gaps in selected Asian countries



Status quo food gap in Asia



Asia: Land use

Region/ country	Share of cropland irrigated 1979-81	Share of cropland irrigated 1995-97	Arable land 1995-97	Change (ha per capita) in arable land between 1979-81 and 1995-97	Annual rate of change in deforestation 1990-95
	Percent		Hectare per capita		Percent
Asia					
Bangladesh	17.1	43.4	0.06	-40	0.8
India	22.8	32.4	.17	-29	.0
Indonesia	16.2	15.5	.09	-25	1.0
N. Korea	59.6	60.6	.04	-20	.2
Pakistan	72.7	80.8	.17	-29	2.9
Philippines	14.0	16.3	.07	-22	3.5

Source: World Development Report 2000/2001, World Bank.

Latin America and the Caribbean (LAC)

Food security in the region is projected to improve as commercial imports are expected to fill most food gaps thanks to an optimistic economic outlook for most countries. Haiti and Nicaragua, the poorest countries in the region, will continue to depend on food aid. [Birgit Meade]

Food security in most of the 11 countries in this region[1] is improving as increases in food production combined with food imports will grow at a faster rate than population. Regional per capita consumption is projected to increase roughly 1 percent per year over the next 10 years. Despite this positive trend there remain four countries with insufficient food supplies to meet consumption requirements.

Compared to the 1999 projections, this year's results show considerably lower food gaps by the end of this decade, thanks to a more optimistic economic outlook. The region is expected to import almost half of its grain consumption. High import dependency for staple foods means that the financial situation of the countries will be a crucial factor in maintaining food security.

The nutritional food gap is projected to reach 900,000 tons by 2010. This projection is 36 percent lower than last year's projection for 2009 which illustrates growing optimism for the region based on agricultural and economic performance in recent years.

At the country level, food insecurity continues to be of concern in Bolivia, Haiti, Honduras, and Nicaragua. Bolivia and Honduras are projected to improve over time. Bolivia is expected to eliminate its food gaps by 2005 if projected production increases can indeed be realized. Honduras is still recovering from Hurricane Mitch, but is projected to raise per capita consumption above the base level during the next 10 years. Despite this positive trend, hunger will still remain a problem in Honduras where the nutritional gap is projected at 6 percent of total food availability in 2010.

Haiti and Nicaragua, the two poorest countries in the Western Hemisphere, have not been able to achieve adequate production to eliminate food gaps, which amount to one-third of grain and root crop requirements. Commercial imports are not expected to be able to compensate for the production shortfalls because of insufficient foreign exchange. Both countries are projected to rely on food aid receipts over the next decade.

While Haiti's political deadlock offers little hope for dramatic economic improvements, Nicaragua has enjoyed steady economic growth and fast increasing export earnings of 11 percent annually for the last few years. However, the country will need foreign investment to further expand its export sectors. In December, Nicaragua will find out if it is included in the Highly Indebted Poor Countries Initiative. Criteria include good economic performance, improved governance and more openness. If Nicaragua qualifies for relief on its debt of $6.3 billion it will be in a much better position to improve infrastructure and attract international investors.

Highly skewed income distribution remains the root cause of food insecurity in the region. The size of the distribution gap in 2000 is about 2.6 times the average nutrition gap. The good news is, however, that an increase in food availability and economic prosperity is expected to improve the food situation of the poor in the longrun. By 2010, the number of hungry people is projected to decline by 30 percent to 44 million and 2010 project the distribution gap projected to decline slightly, by 4 percent. More than 80 percent of the population of Haiti and Nicaragua is projected to fail to meet their nutritional requirements by 2010. On the other hand, Colombia, the Dominican Republic, Jamaica, and Peru are expected to limit food deficits to less than 20 percent of their populations.

The overall progress towards food security in the last two decades was mainly due to improvements in the performance of the export sector. Production growth of the staple food crops has been slow and most of the growth was due to area expansion. This pattern of growth is not sustainable over the next decade.While Latin America has the world's largest reserves of cultivable land—the agricultural potential of the region is estimated at 576 million hectares—more than half of this land has been adversely affected by land degradation, mostly soil erosion, but also loss of nutrients.

In order to examine the impact of resource constraints, in particular land degradation, a scenario of slower area expansion was analyzed for all regions. Area growth in Latin America and the Caribbean was assumed to be half the baseline rate. In this scenario, the average nutritional food gap increased by 30 percent and the status quo gap increased by more than 50 percent relative to the baseline scenario. In addition, the number of people vulnerable to food insecurity would be higher. This means, again, that in the absence of investment in improved technologies that raise land productivity, food security in the poorer countries will be critically dependent upon area expansion.

[1] The countries studied here are four Central American countries: El Salvador, Guatemala, Honduras, and Nicaragua; three Caribbean countries: the Dominican Republic, Haiti, and Jamaica; and four South American countries: Bolivia, Colombia, Ecuador, and Peru.

Table 6--Food availability and food gaps for Latin America and the Caribbean (LAC)

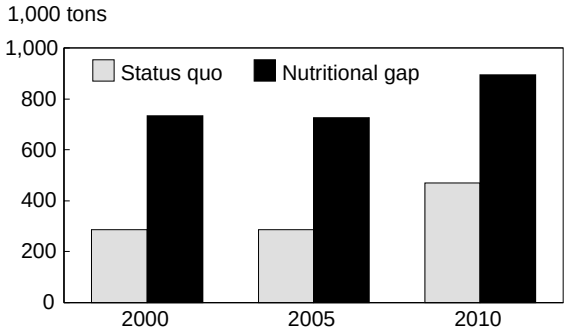
Year	Grain production	Root production	Commercial imports	Food aid receipts (grains)	Aggregate availability of all food
			---1,000 tons ---		
1991	9,575	2,468	4,308	1,828	27,608
1992	10,539	2,376	6,159	1,324	29,284
1993	11,036	2,723	6,052	1,371	29,153
1994	9,960	2,802	7,814	1,002	30,524
1995	10,088	2,970	8,619	520	31,861
1996	9,911	3,040	9,308	556	32,579
1997	9,736	3,028	10,145	476	32,572
1998	10,081	2,946	10,726	847	34,251
1999	10,625	3,369	10,611	493	35,148
Projections				**Food gap**	
				SQ NR	(w/o food aid)
2000	10,713	3,225	11,417	***287*** ***735***	35,569
2005	11,465	3,508	13,260	***286*** ***726***	39,964
2010	12,382	3,810	16,173	***470*** ***894***	46,470

Latin America and the Caribbean
137 million people in 2000

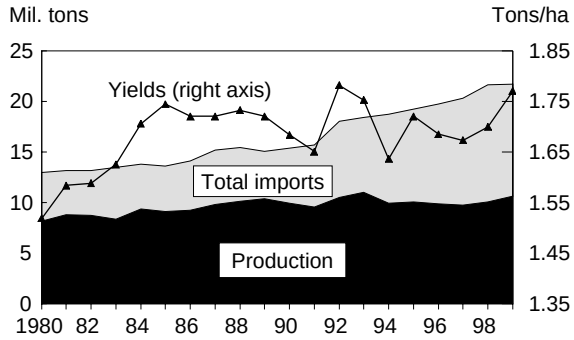
Food security in the region is projected to improve over the next 10 years. Despite recent economic difficulties in South America long term projections indicate rising per capita consumption for most countries.

Haiti and Nicaragua, however, the poorest countries in the region, do not share this optimistic outlook. Their situation is expected to worsen unless drastic political and infrastructural improvements can be achieved.

Food gaps in Latin America and the Caribbean



LAC's grain supply



Latin America and the Caribbean: Land use

Region/ country	Share of cropland irrigated		Arable land 1995-97	Change (ha per capita) in arable land between 1979-81 and 1995-97	Annual rate of change in deforestation 1990-95
	1979-81	1995-97			
	Percent		Hectare per capita		Percent
LAC	**11.6**	**13.5**	**0.28**	**-13**	**0.6**
Bolivia	6.6	4.1	.23	-34	1.2
Guatemala	5.0	6.6	.13	-32	2.0
Haiti	7.9	9.9	.08	-20	3.4
Honduras	4.1	3.6	.29	-34	2.3
Nicaragua	6.0	3.2	.54	-39	2.5

Source: World Development Report 2000/2001, World Bank.

New Independent States (NIS)

Droughts in Georgia and Tajikistan in 2000 led to shortrun food gaps in these countries. Only Tajikistan will continue to display food gaps over the next decade. Access to food by lower income groups is a problem now in a few of these countries, but it should improve as the economies of these countries grow. Political stability and investment will be key. [Michael Trueblood]

Severe droughts in Georgia and Tajikistan in 2000 have affected output and are estimated to lead to food gaps in these countries. Based upon recent per capita consumption levels, the food gap in Georgia is estimated to be 68,000 tons (7 percent of total supplies) and 208,000 tons in Tajikistan (15 percent of total food supplies). Using a nutrition standard, the food gaps are estimated to be 242,000 tons and 253,000 tons, respectively (21 percent and 17 percent of total supplies). Of the five NIS countries examined in this report, only Tajikistan is projected to have longrun food gaps (the nutrition-based food gap is projected at 70,000 tons by 2010, 4 percent of supplies).

Over the last 10-15 years, one common pattern among these five countries is that area sown has increased, especially after independence, offsetting declining yields. In many transition economies, yields declined after subsidies on inputs like fertilizer and plant protection agents were removed and their application levels declined. Future projections assume that the growth in land sown will slow (from 3-4 percent per year to 1-2 percent per year) and that yields will resume moderately positive growth rates ranging from 0.6 percent to 1.0 percent per year. The assumption about yield growth may be too optimistic, which may possibly understate future food gaps. Of course, any resumption of hostilities would dramatically affect these projections.

With the exception of Kyrgyzstan, these NIS countries depend on imports for a sizeable share of their total food supplies (ranging from about 30 percent to 60 percent). The share of imports in total food supplies is expected to increase. To finance these imports, these five countries will need to show steady growth in real export earnings. These countries' trade is highly open compared with many regions around the world. However, these five countries continue to depend on Russia and other former Soviet republics for trade (ranging from 40 percent to 80 percent of exports in 1999). After the Russian ruble devaluation in 1998, several of these countries devalued their own currencies to stay competitive, forcing a short-term contraction in imports and economic growth. Preliminary data suggest that the devaluation stimulated domestic output in Russia and the other NIS countries, which in the medium term may indirectly improve these countries' economies.

The World Bank has projected that overall real GDP growth in the transition economies will average about 5 percent per year in the coming decade. Azerbaijan in particular is projected to grow quite rapidly. Over the past year, there have been a few key developments regarding the oil and gas sector in this region. A new oil pipeline went online connecting Baku, Azerbaijan, to Suspa, Georgia, on the Black Sea. A pipeline agreement was signed by Azerbaijan, Georgia, and Turkey that will allow oil to be delivered from Baku to the Mediterranean port of Ceyhan, Turkey, within 3 years. However, the economic viability of this deal remains questionable and may be determined by external oil and gas developments in several neighboring countries.

Except for Tajikistan, recent national average per capita consumption levels in these NIS countries have been above nutrition requirements. In Azerbaijan and Kyrgyzstan, all income groups are estimated to have adequate food supplies in the short and longrun to meet the minimum nutritional requirements. Although Georgia's recent national average per capita consumption level exceeds nutrition requirements, the 2000 drought has led to projections in which food supplies are nutritionally inadequate for each quintile group. However, this problem is expected to be resolved within a few years as production recovers. In Armenia, the two lowest income quintiles in 2000 are estimated to have inadequate food supplies to sustain minimum nutrition levels. However, by 2010, all income groups in Armenia are projected to have nutritionally adequate food supplies.

In Tajikistan, the recent national average per capita consumption levels are below nutrition requirements by about 5 percentage points. In 2000, every quintile group is projected to fall below nutrition requirements. This situation should improve slightly by 2010 with the top income quintile reaching the nutritional requirement.

We considered a scenario that hypothetically examined the effect of land degradation, assuming that the growth in land area is cut in half. Under this scenario, only Tajikistan would display food gaps. To maintain recent per capita food consumption levels, the gap would increase from 58,000 tons in 2010 in the base case to 67,000 tons; nutrition-based food gaps would increase from 70,000 tons to 118,000 tons. These relatively small changes in the food gaps reflect the already low growth rates assumed for future land area sown.

Table 7--Food availability and food gaps for New Independent States (NIS)

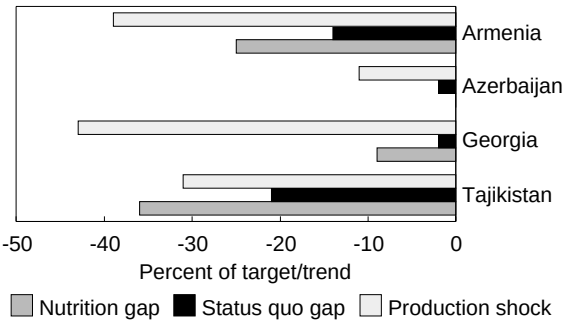
Year	Grain production	Root production	Commercial imports	Food aid receipts (grains)	Aggregate availability of all food
			---1,000 tons ---		
1991	3,814	---	---	---	---
1992	3,805	---	2,885	---	---
1993	3,535	246	1,889	1,159	6,556
1994	2,928	250	843	1,526	6,267
1995	2,822	291	728	1,097	6,101
1996	3,895	322	1,100	381	6,248
1997	4,621	337	1,507	573	7,422
1998	4,147	375	1,639	158	7,154
1999	4,245	442	1,395	277	7,210
Projections				**Food gap**	
				SQ / NR	(w/o food aid)
2000	3,298	404	1,623	***426*** / ***832***	6,216
2005	5,107	449	1,645	***0*** / ***243***	8,227
2010	5,482	498	1,746	***0*** / ***285***	8,862

NIS
27 million people in 2000

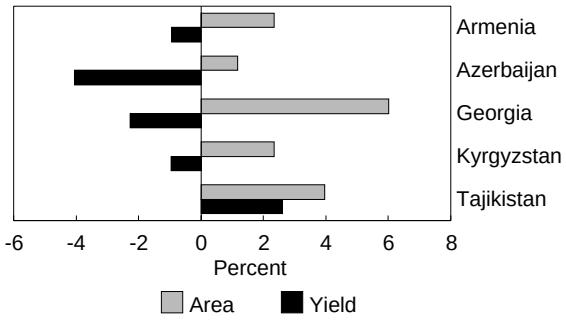
This year's drought has affected output in several countries. Shortrun food gaps may occur in four countries. The most severe gaps will be in Armenia and Tajikistan, which already faced food consumption levels that were low in absolute terms. Tajikistan is the only country in the region to face longrun food gaps.

Almost all income groups may have inadequate access to food in Armenia and Georgia in 2000, but this situation should improve with time. In Tajikistan, access will remain a problem.

NIS production shocks in 2000 translate into differently sized food gaps



NIS countries have increased area sown but yields declined in the 1990s



New Independent States: Land use

Region/ country	Share of cropland irrigated 1975-97	Arable land 1995-97	Annual rate of change in deforestation 1990-95
	Percent	Hectare per capita	Percent
NIS	**67.0**	**0.18**	**0.1***
Armenia	51.5	.13	-2.7
Azerbaijan	74.9	.21	.0
Georgia	43.3	.14	.0
Kyrgyzstan	77.3	.29	.0
Tajikistan	79.7	.13	.0

* Aggregate for Europe and Central Asia.
Source: World Development Report 2000/2001, World Bank.

Resource Quality, Agricultural Productivity, and Food Security in Developing Countries

Keith Wiebe and Abebayehu Tegene[1]

Abstract: Raising agricultural productivity improves food security both through increased incomes for farmers and through increased food supplies for consumers. Productivity depends in turn on a variety of factors, including the quantities of fertilizer, water, and other inputs used in agricultural production. Recent advances in data and analysis show how productivity also depends critically on the quality of inputs used, including the quality of natural resources such as land. Within Sub-Saharan Africa, the productivity of agricultural land is found to be 28 percent higher in countries with favorable soils and climate than it is in countries with poor land quality, everything else being equal, and in Asia the difference is 34 percent. Productivity is especially responsive to increases in the use of fertilizer and irrigation in countries with poor land, while productivity in countries with good land is more responsive to improvements in labor quality and transportation infrastructure. Reductions in the incidence of armed conflict are important in both sets of countries.

Keywords: land quality, agricultural productivity, food security.

Resource Quality and Agricultural Productivity

Sustained growth in agricultural productivity is critical to improving food security for two reasons. First, growth in agricultural productivity translates into increased food supplies and lower food prices for consumers. Second, growth in agricultural productivity means higher incomes and thus improved ability to purchase food and other basic necessities, for many food-insecure people who earn their livelihoods through agricultural production.

Agricultural productivity depends in turn on a variety of factors. Recent studies (e.g. Craig, Pardey, and Roseboom, 1997, and Frisvold and Ingram, 1995) indicate that most differences in agricultural productivity, whether across households or countries or over time, can be attributed to differences in the quantity of conventional inputs used in agricultural production, such as land, labor, fertilizer, and machinery. But agricultural productivity also depends critically on the quality of inputs used, including the quality of natural resources such as land. As simple as this statement seems, the influence of resource quality on agricultural productivity has received insufficient attention in the past because appropriate data have been scarce. However, recent advances in data and analytical methods (see box, "Data and Methods") allow improved understanding of the ways in which agricultural productivity and food security are affected by differences in the quality of resources. Distinguishing the relative impacts of input quantity and quality is important in determining appropriate policy measures to improve agricultural productivity and food security.

Soils and Climate

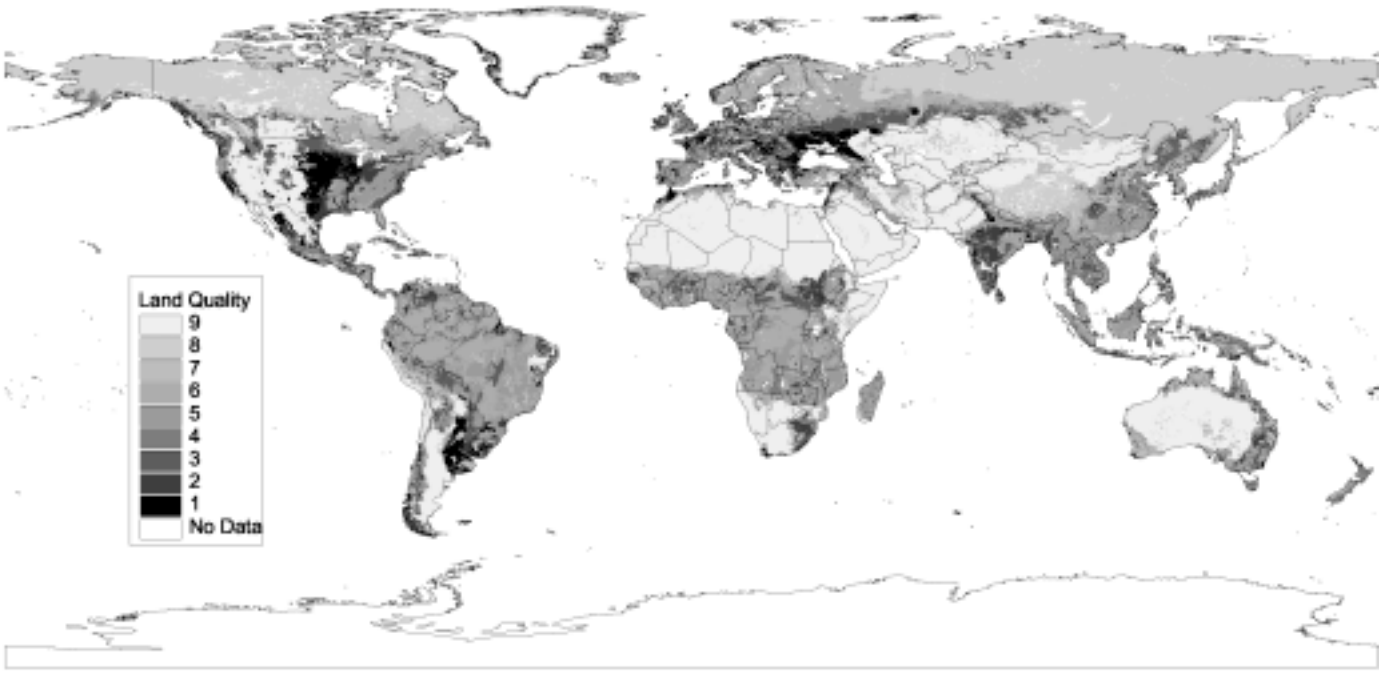
Land—embodying soils, climate, and other characteristics—is one of the most basic resources used in agricultural production. Figure A-1 illustrates global differences in land quality, based on assessments by USDA's Natural Resources Conservation Service of the suitability of soils and climate for agricultural production. Extensive areas of high-quality land are evident in North America and Europe. Land is of lower quality, on average, in Latin America, Asia, and Sub-Saharan Africa, and is poorest of all in North Africa, the Middle East, and Central Asia.

Figure A-2 illustrates global differences in average annual rainfall. Rainfall may be more equitably distributed on a global scale than is high-quality land, but substantial variations remain within regions and countries. Latin America receives abundant rainfall, on average, with the exception of northern Mexico, northeastern Brazil, and the western coast of South America. Western and central Africa receive more rain than northern, eastern, and southern parts of the continent, while southeast Asia and adjoining areas receive more rain than northern and western portions of India and China.

[1] Agricultural economists with the Resource Economics Division, Economic Research Service, USDA.

Figure A-1

Global land quality

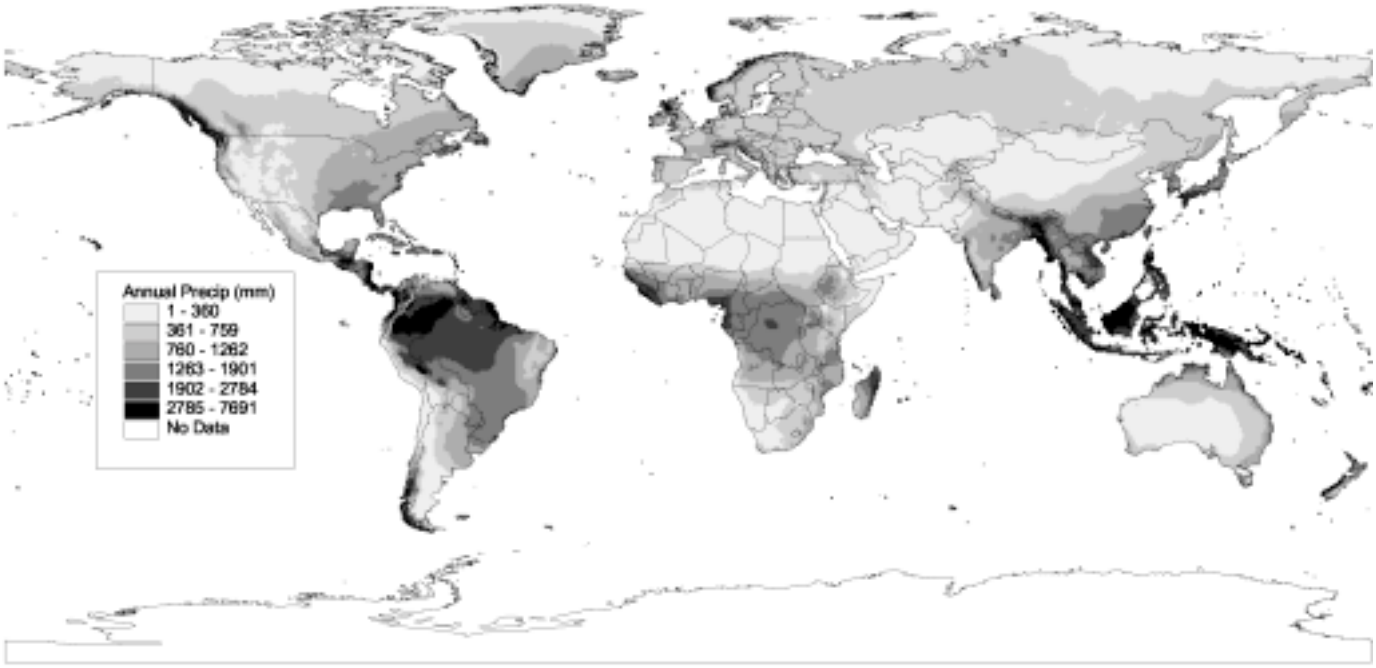


Note: Land quality class 1 represents the land most suitable for agricultural production, i.e. having the fewest inherent soil and climate constraints.

Source: NRCS/USDA.

Figure A-2

Global mean precipitation, 1961-96



Source: Climatic Research Unit, University of East Anglia.

Poor soils and climate do not make agricultural production impossible, but they do mean that costs of production are likely to be higher and/or that yields and net returns are likely to be lower than they would be under more favorable conditions. (In other words, agricultural productivity is likely to be lower.) Figure A-3 illustrates where crop production actually dominates the landscape, based in part on land quality and rainfall patterns, along with other physical and economic characteristics. Large concentrations occur in North America, Europe, India, China, Brazil, and Argentina; cropland is more sparsely distributed in Africa and the Middle East.

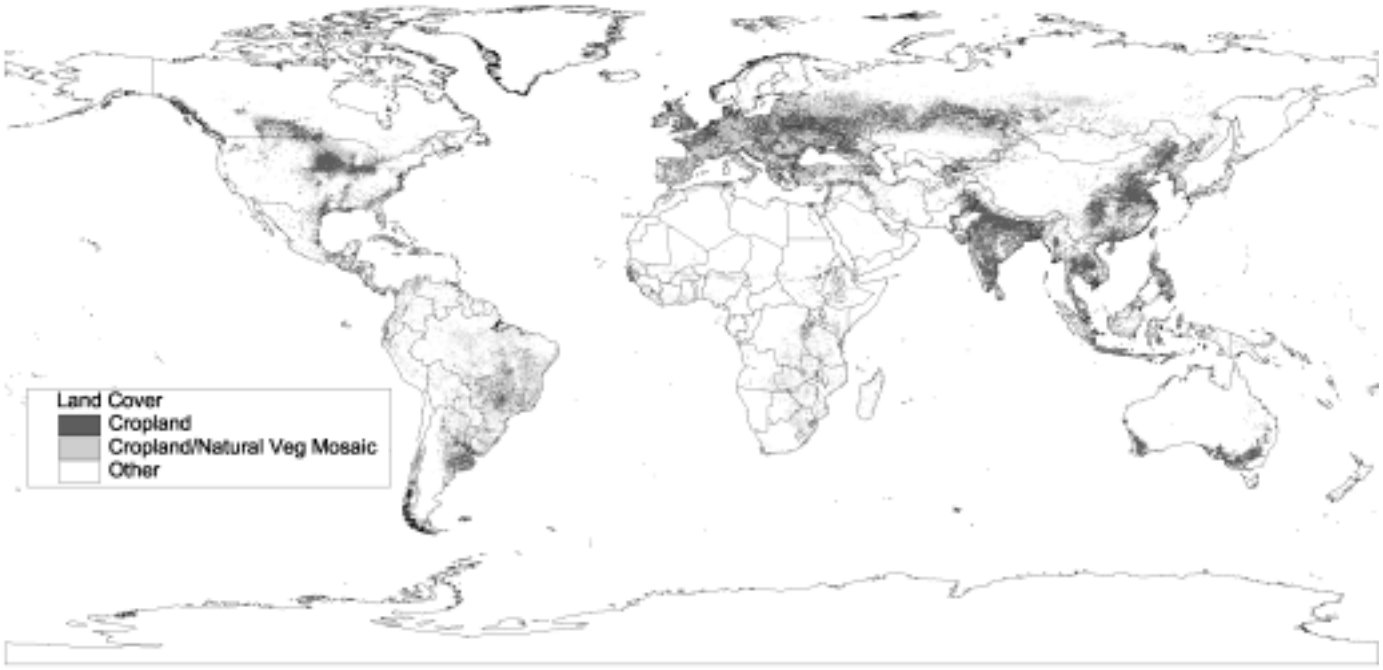
Combining this information on soils, climate, and land cover allows us to compare the quality of cropland by country and region. While the quality of all land is, on average, lowest in the Middle East and North Africa, the quality of cropland is lowest in Sub-Saharan Africa. In 12 of 38 Sub-Saharan African countries studied, less than 1 percent of cropland is classified in the top three land-quality classes, and the median share of cropland that is classified in the top three land-quality classes in Sub-Saharan African countries is about 6 percent (fig.A- 4). This compares with a median of 16 percent in Asia (where 7 of 17 countries studied have more than a quarter of their land in the top three classes), 19 percent in the Middle East and North Africa (where 3 of 8 countries studied have more than a quarter of their land in the top three classes, and 27 percent in Latin America (where 12 of 19 countries studied have more than a quarter of their land in the top three classes). By contrast, the median share of high-quality cropland was 29 percent in the high-income countries, as defined by the World Bank (where 13 of 22 countries studied have more than a quarter of their land in the top three classes) and over 50 percent in Eastern Europe (where all six countries studied have more than a quarter of their cropland in the top three classes).

Not surprisingly, econometric analysis of 110 countries during 1961-97 (see box, “Data and Methods”) reveals that after taking into account other factors such as input levels, differences in the quality of cropland soils and climate are significantly related to differences in agricultural productivity. Within Sub-Saharan Africa, the productivity of agricultural land is 28 percent higher, on average, in countries with high land quality than it is in countries with poor land quality. The productivity difference attributable to high land quality is 34 percent in Asia, and 22 percent in the high-income countries. (In Latin America, where most countries lie above the global median in terms of land quality, only the best soils and climate are significantly associated with increased agricultural productivity.)

These findings confirm our expectations and provide for the first time an empirical estimate of the significance that differences in the inherent physical quality of soils and climate have on agricultural productivity. Perhaps more important, however, are the insights they provide into the impact on agricultural productivity of more conventional inputs, such as quantities of land, labor, fertilizer, and machinery.

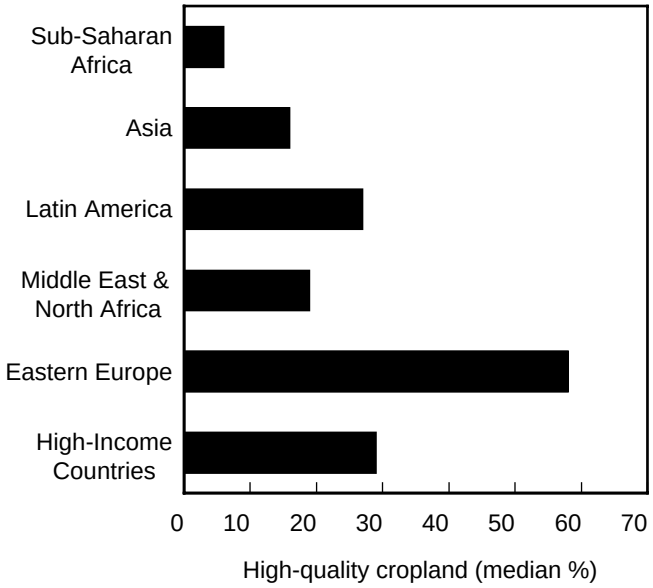
Figure A-3

Global distribution of cropland



Source: USGS/UNL/JRC Global Land Cover Characterization.

Figure A-4
Cropland quality



Conventional Inputs and Other Factors

To capture these impacts, we included in our econometric analysis country-level measures of conventional agricultural inputs like agricultural land, labor, tractors, livestock, and fertilizer. We also included factors such as annual rainfall on cropland, the percentage of each country's agricultural land that is classified as arable land or permanent cropland, the percentage of arable land or permanent cropland land that is not irrigated, life expectancy and illiteracy rates (as measures of labor quality), an indicator of the occurrence of armed conflict (as a measure of institutional stability), and road density and cumulative agricultural research and development expenditures (as measures of infrastructure). (Data on agricultural research and development expenditures were available only for 1961 through 1985, but they revealed a significant and positive association with agricultural productivity during that time.)

Within each region, countries were classified according to the share of their cropland that is highly suitable for agricultural production (see box, "Data and Methods"). Countries where this share exceeds the median value for their region were identified as having good soils and climate; those with less than the median were identified as having poor soils and climate. Each group of countries was then analyzed separately to compare the impacts of individual factors on agricultural productivity by region and land-quality class.

In Sub-Saharan African countries with good soils and climate, agricultural land productivity rises significantly with increases in quantities of labor, livestock, tractors, fertilizer, and annual rainfall. Productivity also improves with irrigation, labor quality (in the form of longer life expectancy and higher literacy rates), and transportation infrastucture and falls significantly with the occurrence of armed conflict. In Sub-Saharan African countries with poor soils and climate, productivity responds even more strongly to fertilizer application, irrigation, and political instability, but it is not sensitive to improvements in tractors, labor quality, or infrastructure. Overall, the results suggest a land quality-related hierarchy of constraints limiting agricultural productivity in Sub-Saharan Africa. In countries poorly endowed with soils and climate, basic inputs such as fertilizer, water (in the form of irrigation), and institutional stability are more important than they are in countries that are relatively well endowed. The evidence suggests that only when these constraints have been overcome do factors such as labor quality, road density, and mechanization become significantly associated with improvements in agricultural productivity—as they are in countries with better soils and climate.

Similar patterns characterize other developing regions. In Latin America, increases in labor, fertilizer, and irrigation are associated with increased productivity of agricultural land in countries with poor soils and adverse climate but not in countries with good soils and beneficial climate. Improvements in literacy and transportation infrastructure are associated with increased productivity in countries with good soils and climate but not in those that are poorly endowed. In Asia, additional land, labor, and roads increase agricultural productivity in counties with good soils and climate but not in those that are poorly endowed, where productivity is relatively more sensitive to increased irrigation. (Specifically, productivity is positively related to an increase in irrigated area, but some authors (e.g. Rosegrant 1997) have noted that degradation of irrigated areas through waterlogging and salinization is also a significant and growing problem.) In the Middle East and North Africa, agricultural productivity is sensitive to levels of labor, tractors, and literacy in well-endowed countries but not in countries with poor soils and climate, where (as in Asia) productivity is relatively more sensitive to increased irrigation.

Analysis of inherent land quality thus improves our understanding of the impacts on agricultural productivity of factors over which policy makers exercise at least some influence. The policy implications of these findings will be discussed further below. Analysis of differences in land quality across countries and regions also provides an initial indication of the potential impact on agricultural productivity of changes in land quality (i.e. land degradation) over time. Data on land degradation rates and impacts remain even more scarce than data on land quality, but most studies to date have found that global average productivity losses due to processes such as soil erosion, nutrient depletion, and salinization are small (on the order of 0.1 - 0.2 percent per year) in relation to historic gains in productivity (on the order of 2 percent per year) due to improvements in technology and input use (den Biggelaar et al. forthcoming, Crosson 1997; Byerlee, Heisey, and Pingali 1999; Pinstrup-Andersen, Pandya-Lorch, and Rosegrant 1999). Nevertheless, in some areas with poor or fragile soils and inappropriate agricultural management practices, productivity losses could be significantly higher

Data and Methods

We examined the impact of resource quality on the productivity of agricultural land, using for the first time recent global data on soils, climate, and land cover. We began with data developed by Eswaran et al. (1997), who combined FAO's Digital Soil Map of the World and associated soil characteristics (e.g. slope, depth, and salinity) with spatially referenced longrun average temperature and precipitation data to establish nine land quality classes in terms of their suitability for agricultural production (fig. 1). Wiebe et al. (2000) then overlaid these land quality classes with political boundaries and global land-cover data generated from satellite imagery with a resolution of 1 kilometer United States Geological Survey/University of Nebraska-Lincoln/Joint Research Centre of the European Commission (USGS/UNL/JRC, 1999). They focused on cropland identified according to the International Geosphere-Biosphere Programme land cover classification scheme (fig. 2). The result is a dummy variable based on the share of each country's cropland that is found in the three best quality classes. Countries where this share exceeds the median value for their region are identified as having good soils and climate; those with less than the median are identified as having poor soils and climate.

This static measure, based on cross-country differences in inherent soil and climate characteristics, supplements existing time-variant quality indicators such as the percentage of agricultural land that is cropped (or irrigated) and long-term average or annual rainfall. To better capture this last effect, we also developed a high-resolution measure of annual rainfall by aggregating and overlaying monthly precipitation data on a 0.5-degree grid (fig. 3; Climatic Research Unit 1998) with national boundaries and cropland as described above. The result is a country-specific, time-variant measure of rainfall on cropland.

The dependent variable in our analysis is the productivity of agricultural land, measured as the value of total agricultural production (the sum of price-weighted quantities of all agricultural commodities, expressed in international dollars, after deductions for feed and seed) per hectare of agricultural land (the sum of arable land, permanent cropland, and permanent pasture). Other variables include country-level indicators of agricultural labor, tractors, livestock, and fertilizer, as well as measures of the quality of labor, the institutional environment, and infrastructure. The data are combined in an econometric analysis of 110 countries during 1961-97. Additional detail is provided in Wiebe et al. (2000).

(Scherr 1999, Lal 1998). That such conditions are found in parts of Sub-Saharan Africa, where productivity levels are already low and the need for growth is correspondingly high is cause for concern.

Implications for Food Security and Policy

As noted earlier, agricultural productivity is important for food security both through its impact on food supplies and prices and through its impact on the incomes and purchasing power of those whose livelihoods depend on agricultural production. Through its effect on agricultural productivity, land quality is thus related directly to both food availability and food access. Land quality is, on average, lower in low-income, food-deficit countries than it is in high-income countries, and agricultural productivity is more sensitive to differences in land quality. These relationships have important implications for policymakers concerned with improving food security, both through protection and/or improvement of land quality itself and through recognition of the distinct roles played by more conventional agricultural inputs in areas that differ in land quality.

In Sub-Saharan African countries with relatively poor soils and adverse climate, for example, the policy-sensitive variable most strongly associated with agricultural productivity is irrigation, followed by armed conflict and fertilizer use. Among the policy measures most important for increased agricultural productivity in those countries are thus investments in the efficient delivery and use of water and fertilizer, combined with efforts to improve institutional stability through the cessation of armed conflict. In Sub-Saharan African countries with good soils and climate, these factors remain important, but agricultural productivity becomes relatively more sensitive to improvements in labor quality and infrastructure. Policymakers in those countries may need to focus additional resources on investment in education, health, extension services, and transportation.

Similar conclusions apply in other regions as well. In Latin American countries with relatively poor soils and climate, agricultural productivity and thus food security are likely to respond most strongly to policy measures to improve efficiency in the use of fertilizer and water and to reduce the occurrence of armed conflict. In Latin American countries with better land, productivity responds much more strongly to improvements in labor quality, infrastructure, and mechanization, suggesting the need for investments in education, transportation, and capital. Improvements in irrigation, education, and conflict reduction are important in Asian countries with poor land, while improved transportation remains important in Asian countries with good land. Increased application of fertilizer is not associated with improved agricultural productivity in Asia, regardless of land quality, reflecting the relatively high levels of use already observed there. In the Middle East and North Africa, not surprisingly, improvements in irrigation offer the greatest potential gains in agricultural productivity.

Results and implications are generally consistent with the expectation that the greatest improvements in agricultural productivity will be realized by relaxing the constraints that bind most tightly and those constraints will vary from region to region according to differences in resource endowments and other factors. Neither is it surprising that the quality of soils and climate should play a key role in defining these differences. Yet only recently, with improvements in spatial data and methods, has characterizing these differences with increased precision at the multi-country scale become possible. Analysis to date supports the conclusion that policymakers in low-income, food-deficit countries face a hierarchy of priorities that depends critically on the quality of soils and climate but that is broadly consistent across regions. Continued research will be needed to further refine our understanding of the relationships of resource quality, agricultural productivity, and food security.

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Vulnerability to HIV/AIDS in Sub-Saharan Africa

Shahla Shapouri and Stacey Rosen[1]

Abstract: Labor is the vital component of agricultural production in Sub-Saharan Africa. If size and structure are changed productivity of the labor force will directly affect food production and consumption in the region. Sub-Saharan Africa, with 11 percent of global population, has an estimated 73 percent of global HIV/AIDS—related infections. Little is known about the net affect of HIV/AIDS on the agricultural economy, but vulnerability to food insecurity will certainly increase in the severely affected countries. The estimated health and productivity costs of the epidemic will have long-term implications on the economic growth of the countries.

Keywords: Sub-Saharan-Africa, AIDS, HIV, population growth, food production, food consumption, labor productivity.

Introduction

The projections of food gaps reveal the intensity of the current as well as the future food security problems in Sub-Saharan Africa. By 2010, this region is projected to account for 65 percent of the total (all 67 countries covered in this report) gap to maintain consumption and 75 percent of the gap to meet nutritional needs even though the region's population constitutes only 25 percent of the 67-country total. The region's nutrition gap, as a share of consumption (total available food supplies), is projected to exceed 10 percent by 2010. Added to the food problem is the prevalence of HIV/AIDS in the region. The future impact of the HIV/AIDS disease on food systems is of major concern because of the already low and declining per capita food consumption and the low level of agricultural productivity in the region. Also, coping with and combating the disease in rural areas where poverty is at its highest and education is at its lowest level is the biggest challenge facing both individual countries and the international community. This article reviews the historical role of population (and the labor force) in food markets in Sub-Saharan Africa and the expected impact of HIV/AIDS on the structure of the population. It also examines the likely implications of the disease on food security in highly infected countries. The final section reviews the coping mechanism and response capacity.

Background: Changes in Population Growth and Structure

Sub-Saharan Africa's population growth during the 1980s was the highest in the world—about 3 percent per year. Since then, it has declined to 2.7 percent and is projected to decline further during this decade. The high population growth in Sub-Saharan Africa resulted from sharp mortality declines in the 1950s due to improved health services. Rapid population growth occurred in industrial countries between 1890 and 1920 and was supported by strong income growth and improvements in education and health. Their experience also shows that high population growth, when accompanied by appropriate and adequate investments in agricultural technology and supportive government policies, can have a positive impact on agricultural development. In Sub-Saharan Africa, however, fertility rates have remained high, incomes have stagnated, and low education levels have persisted. Although the high population growth put additional pressure on the demand side of the food market, it has remained the key source of productivity on the production side. In most Sub-Saharan countries, modernization of the agricultural sector has not yet occurred. Limited uses of new technology and poor market infrastructures are the two characteristics that have precluded an increase in agricultural productivity (see "Resource Quality, Agricultural Productivity, and Food Security in Developing Countries" p. 24.)

Now, after a long period of dealing with the burden of growing populations, the region is facing a sharp decline in population growth rates. The problem, however, is that the decline is not a natural progression of development, but a result of the rapid spread of HIV/AIDS. The disease has major implications for the economies and agricultural sectors of Africa.

The two severely affected regions are Southern and Eastern Africa. In Southern Africa, seven countries—Botswana, Lesotho, Namibia, South Africa, Swaziland, Zambia, and Zimbabwe—are reported to have adult HIV prevalence of

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more than 20 percent. In most East African countries, HIV prevalence is more than 10 percent. In these countries, life expectancy is projected to decline to 30-40 years instead of 60-70 years (an estimate used prior to the spread of HIV/AIDS). According to a UN report, about 55 percent of all HIV infections in Sub-Saharan Africa are among women. Peak HIV prevalence among women is at age 25, that is 10 to15 years earlier than for men, changing the structure of the population. Thus, the most productive age cohort, 15-45, is dying the fastest from HIV/AIDS. This age cohort is nearly 50 percent of the population in highly HIV/AIDS affected countries. HIV prevalence among the relatively educated as well as high-income urban population is as high or higher than among low-income and rural groups. In Rwanda, Congo, and Zambia, the level of HIV infection in the highest socioeconomic strata is two to four times higher than among those in the lowest category.

HIV/AIDS and Food Security

In the countries mostly affect by HIV/AIDS, slow growth in agricultural productivity and overall economic growth that limited purchasing power resulted in growing food insecurity over the last two decades. Even in countries such as Uganda where food supplies are projected to be nutritionally adequate, food insecurity remains a major concern because of the low and wide disparity in purchasing power. Table B-1 shows the projected nutritional vulnerability in selected countries that are highly affected by HIV/AIDS. These projections include the decline in population growth and productivity of labor, as well as can be estimated. Most of the available studies have focused on the medical costs, and there is limited information on long-term economic costs of HIV/AIDS and the variation of the effects on different groups within countries. By the same token, any quantification of the net effect of HIV/AIDS on the food system is preliminary. However, the food system will be certainly subjected to shocks that could amplify the food insecurity of many countries.

Shocks to Agricultural Productivity and Output from HIV/AIDS

The size of the supply shock depends on the extent to which HIV/AIDS reduces the productivity of the agricultural labor in rural areas. The agricultural sector plays a crucial role in the economy of African countries in terms of both sources of food and exports to finance food imports. A review of the statistics of selected countries in table B-2 shows that with the exception of Kenya, the agricultural sector provides 80 percent of grain consumption in these countries. Grains contribute as much as 80 percent of per capita calorie consumption in these countries. The share of the agricultural sector in GDP for the same set of countries is in the range of 11 percent in Zambia to 47 percent in Tanzania.

With labor as the prime component of agricultural production, the implication of the HIV/AIDS epidemic on food security of the countries could be staggering. In projecting crop production for these countries, we use an elasticity of 0.3, meaning that with a 1-percent decline in labor availability, production will decline by 0.3 percent. However, we did not account for a change in the quality of labor. In the Food Security model, the marginal productivity of labor is assumed to remain constant over the projection period. For the Sub-Saharan countries, this may be an overestimation because the decline in population growth is in part due to the spread of HIV/AIDS, which affects the most productive segment of the population. A decline in healthiness of rural populations is expected to reduce labor productivity in rural areas. The World Health Organization estimates that local losses in agricultural productivity from HIV/AIDS at the household or village level range from 10 to 50 percent in about 10 Sub-Saharan African countries.

The high rate of infection among women will, in particular, have enormous implications on nutrition and poverty. Many farms are headed by women and on other farms women provide a large portion of total labor. For example, a study of two towns in Tanzania found that women provide 48 percent of agricultural labor including land preparation, planting, weeding, and harvesting while men did most of the marketing. Economic consequences will be compounded by the fact that women are barred from owning land in many countries. If a husband dies, the wife's lack of collateral limits her ability to obtain credit to keep the farm in operation or to purchase labor-saving technology. Also, an increase in the number of orphans places a burden on healthy women in the community

Table B-1--Grain market performance profile for selected countries

Region/ country	Annual production growth		Ratio of nutritional gap in grain equivalent in year 2010 to:	
	1980-99	1989-99	Production	Imports
	Percent			
East Africa:				
Kenya	0.44	-1.04	12.12	25.21
Tanzania	2.03	0.00	33.57	353.67
Uganda	2.18	1.29	.00	.00
Southern Africa:				
Malawi	1.83	4.14	18.11	213.54
Zambia	-1.22	-3.63	69.91	356.20
Zimbabwe	-1.06	-.10	2.41	21.75

Source: Economic Research Service, USDA.

Table B-2--Agricultural indicators for selected countries

Region/ country	Grain import share in consumption 1997-99	Agricultural share in GDP 1997	Agricultural share in exports 1997
		Percent	
East Africa:			
Kenya	32.2	24.4	56.2
Tanzania	9.0	47.4	63.3
Uganda	5.2	41.4	76.0
Southern Africa:			
Malawi	12.9	44.6	76.8
Zambia	19.6	11.1	4.6
Zimbabwe	10.6	13.9	46.2

Sources: Economic Research Service, USDA and World Bank data.

who must care for the sick and dying, while simultaneously increasing their child care responsibilities. This dilemma compounds the effect of HIV/AIDS on agriculture because healthy women will have less time for farming activities.

Another factor that can worsen the situation is the likely change in cropping patterns. For example, farmers are expected to move away from labor-intensive export crops to more subsistence crops that use less labor. Among food crops, a switch from corn to cassava would conserve considerable labor. However, cassava is less nutritious than corn. Nutritional intake is already below minimum standards in several countries, including those highly affected by HIV/AIDS. In 14 of the 17 countries in East and Southern Africa, per capita daily caloric intake is below the level required to attain a minimum nutritional standard (the calories required to sustain life with minimum activity). The nutritional vulnerability of the countries is projected to grow by 30 percent in the next decade. A domino effect follows: food supply deficits and decreased healthiness impair agricultural productivity through reduced food availability, which further reduces agricultural productivity and may hasten the onset of HIV/AIDS in weakened HIV-positive people.

Effects of HIV/AIDS on Food Market Demand

One of the effects of HIV/AIDS is declining living standards and, consequently, a reduction in food demand through lower population and income growth. The bleakest economic outlook is for GDP growth to decline from its already meager pace (table B-3). In Kenya, for example, GDP will probably be 14.5 percent lower than projections that do not account for the effects of HIV/AIDS. In Tanzania, the annual direct medical costs and losses in labor productivity are projected to be 2 percent to 4 percent of GDP. These costs are very troublesome because public and private incomes in these countries have stagnated or declined in the last 20 years and any increase in public and private outlays on health care must come at the expense of investment in economic development. More immediately, many health care needs are likely to be unmet due to prohibitive costs. To put this in perspective, the average public health expenditure for the region was 1.7 percent of GDP during 1990-97 and the region's per capita GNP in 1997 was $308; thus, annual health care spending was $5 per capita. Even in a country such as Zimbabwe that is on the high end of the region's income, the per capita expenditure was not much more than $10 per person. According to available reports, the life-extending drugs costs $11,000 a year in the United States. Even at a discounted rate, their costs far outstrip health expenditures in these countries.

The implication of HIV/AIDS on the demand for food is clear. As incomes decline due to the spread of HIV, demand for food will decline, but as expected, the impact is more damaging to the lower income countries than the higher incomes. Low-income countries spend more than half of their income on food. In Africa, this share is in the range of 40 percent to 70 percent. The average income-calorie elasticity for Sub-Saharan Africa is estimated at 0.14 percent (using cross-country data). Thus, a 10-percent decline in income over the projected period will reduce calorie consumption by 1.4 percent. While this kind of decline would not affect the nutritional well being of high income countries such as the United States where per capita calorie availability is about 3,700 per day, it can have serious implication for the countries that live on the margin of the minimum calorie requirement. In Sub-Saharan Africa the average per capita calorie availability was about 2,200 per day in 1998, the lowest of all developing regions of the world. Added to the low level of calorie consumption is the quality of food consumed in the region. Cereals and starchy roots and pulses, low-cost foods, comprise 70 percent of the region's calorie consumption, while higher cost foods such as meat and dairy products that are good sources of vitamins and minerals are consumed at the lowest rates in the world.

The decline in income will have varying implications for the entire population. Skewed income distribution in these countries exacerbates the problems for the poor. In most countries, the poorest 20 percent of the population holds only 4 percent to 8 percent of total national income, while the richest 20 percent holds nearly 50 percent. This disparity in purchasing power could worsen with the spread of HIV/AIDS. The food security estimates for the year 2000 indicate that food consumption by 60 percent of Sub-Saharan Africans falls short of meeting their nutritional requirements. More alarming, however, is the depth of the problem. Food consumption of the lowest income group is estimated to be 20 percent less than the nutritional requirement in year 2000. If the income distribution worsens, the implication will be serious. In African countries, most of the poor live in rural areas. In rural areas, most farmers are subsistence producers and have limited assets to bear the reduction or loss in their productivity. For the rural landless laborer, HIV/AIDS means a severe cut in purchasing power. Also, there is no formal safety-net program to provide support for the sick and unemployed in these countries. Therefore, the family network must provide the support.

Table B-3--Social indicators in selected countries

Region/ country	Adult HIV infection rate in Dec. 1999	Per capita GNP 1998	Population below poverty line	Public expenditure on health, share of GDP 1990-97	Life expectancy at birth 1997
	Percent	US Dollars	Percent		Years
East Africa:					
Kenya	14.0	330	42.0	1.9	51
Tanzania	12.0	210	51.1	1.1	49
Uganda	8.0	320	55.0	1.9	42
Southern Africa:					
Malawi	16.0	200	54.0	2.3	43
Zambia	20.0	330	68.0	2.9	43
Zimbabwe	25.1	610	25.5	1.7	51

Source: World Development Report, World Bank, 1999.

Overall, any reduction in agricultural output and/or demand for food below the current low levels will have serious consequences for food security of the severely affected countries. Even without taking into account the side effects of HIV/AIDS, a continuation of present trends in food consumption is projected to lead to deteriorating food security in these countries. Investment and a concerted policy response by the affected governments must occur if these losses are to be minimized.

Coping Mechanism and Response Capacity

To identify coping options in dealing with the impact of HIV/AIDS on food security, one should examine forces that shape the food markets of these countries. One important characteristic of the market is that the agriculture sector is the main source of both food production and exports to finance food imports. Agricultural sectors in Sub-Saharan Africa have performed poorly and are generally characterized by (1) low productivity that is now compounded by the spread of HIV/AIDS, (2) a lack of resources and affordable technology to increase productivity, and (3) a low literacy rate that limits access to know-how and technology as well as access to knowledge for essential behavioral change. These factors reinforce each other, and altering the situation requires attacking all three problems simultaneously.

To reduce the economic costs of HIV/AIDS, African countries must design an economic strategy in which health policy is a major component. Public policy should aim at providing information wherein health is a precondition of economic wellbeing. Currently, there are success stories in the region. Uganda has launched major preventive efforts during the last decade and has managed to reduce the rate of infection. Now, the growing awareness by officials at the international level has led to an increase in financial aid to improve and expand the preventive measures to reduce the rate of infection. This should ease costs and support national programs.

Educational messages to prevent the spread of disease, if combined with economic assistance to cope with the situation, are the most efficient ways of using new resources. For example, in response to the reduction in food supplies, nutritional education, particularly the mother's education, is important to provide information on food processing and nutritional conservation. To promote self-reliance and more sustainable responses in highly affected HIV areas, governments should encourage communities to diversify their economic activities. Many communities in Africa have started income-generating activities such as raising poultry or gardening to improve their financial situation and to help families affected by HIV/AIDS. In Malawi and Uganda, village banks give small loans to households to start their own enterprise such as market trading and honey production. In Uganda, 75 percent of households who received loans recently reported that they were caring for orphans (U.S. Agency of International Development (USAID)-Impact on HIV, June 2000).

In sum, the projected long-term food outlook for these countries shows a steady increase in food gaps, both to maintain per capita consumption and to meet nutritional requirements. Sub-Saharan Africa historically has shown the smallest improvement in average daily per capita calorie consumption. The HIV/AIDS crisis, which has already reduced the supply of labor in many countries, is projected to deepen the food insecurity problems of the region. Our projections, however, do not capture the full economic implications of HIV/AIDS, such as the decline in labor quality, medical/care costs, and costs associated with change in population structure. The challenge is new and has no simple remedy. As for the agriculture sector, strategies should aim at promoting domestic production. Unless urgent steps are taken to reverse the technological stagnation in the agricultural sector, HIV/AIDS will further deteriorate the food security problem of the region. The process, however, will be long and require consistent policies and credible institutional bodies. Given current economic and resource constraints, governments will have to

make difficult choices about HIV/AIDS care, prevention, and revitalization of their economies.

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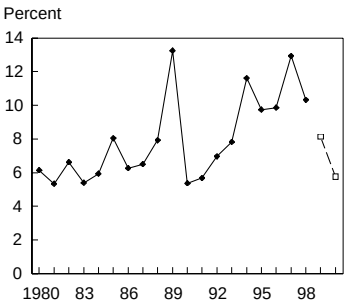
Statistical table 1--Algeria (North Africa)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grains)	Aggregate availability of all food
			---1,000 tons ---		
1991	3,730	275	4,190	19	8,309
1992	3,348	295	4,689	15	8,600
1993	1,563	272	5,483	18	8,339
1994	959	183	6,939	24	9,434
1995	2,137	306	5,724	13	11,541
1996	4,883	294	3,653	36	8,871
1997	883	242	5,778	13	9,199
1998	3,023	281	5,861	27	9,692
1999	2,172	254	5,745	0	9,653
Projections				**Food gap**	
				SQ NR	(w/o food aid)
2000	772	280	6,025	***361*** ***518***	8,467
2005	2,043	309	6,079	***180*** ***354***	9,629
2010	2,208	339	6,340	***718*** ***909***	10,027

Algeria's 2000 drought led to a severe production shock and food gaps, but the windfall from petroleum revenues might over-come this shortfall. Algeria will become more dependent on food imports. Longrun food gaps are projected, but could be eliminated if petroleum prices continue at recent levels.

Algeria's share of grain imports to total imports



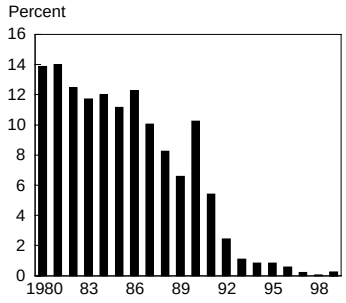
Data are estimated for 1999 and 2000.

Statistical table 2--Egypt (North Africa)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grains)	Aggregate availability of all food
			---1,000 tons ---		
1991	12,016	508	6,456	1,026	17,701
1992	12,329	460	6,573	482	17,529
1993	13,205	466	6,764	230	18,301
1994	13,510	398	8,895	180	20,265
1995	14,578	721	7,701	190	20,989
1996	15,485	731	8,507	145	21,306
1997	16,304	522	10,037	59	23,396
1998	15,289	572	10,558	13	22,987
1999	16,676	542	10,072	63	24,922
Projections				**Food gap**	
				SQ NR	(w/o food aid)
2000	16,820	560	10,666	***0*** ***0***	24,914
2005	17,551	599	10,996	***0*** ***0***	25,512
2010	18,615	640	11,798	***0*** ***0***	27,110

Egypt does not show any food gaps in the short or longrun. Annual grain output continues to grow steadily and impressively, but yield growth appears to be slowing down. Almost all income groups appear to consume well above nutrition requirements, but this might erode slightly over time.

The share of food aid in total grain supplies has declined in Egypt

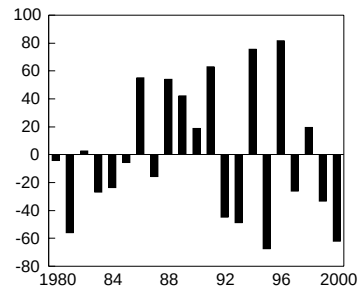


Statistical table 3--Morocco (North Africa)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grains)	Aggregate availability of all food
			---1,000 tons ---		
1991	8,636	325	1,768	203	9,593
1992	2,933	276	2,923	234	8,869
1993	2,753	265	3,593	124	9,898
1994	9,530	312	1,711	13	9,245
1995	1,800	267	3,620	0	9,922
1996	10,037	373	2,912	4	10,479
1997	4,101	357	2,780	10	10,049
1998	6,733	335	3,358	10	9,157
1999	3,785	341	4,515	0	10,633
Projections				**Food gap**	
				SQ / NR	(w/o food aid)
2000	2,185	361	3,669	***0*** / ***1,045***	7,138
2005	6,401	405	3,639	***0*** / ***0***	11,553
2010	7,755	453	3,779	***0*** / ***0***	13,406

Morocco has experienced two consecutive major droughts. Last year, the country was able to absorb the production shock, but not this year. For most income groups, average consumption levels may fall below nutrition requirements in the short run, but recover in the long run.

Morocco experiences another large deviation from production trend

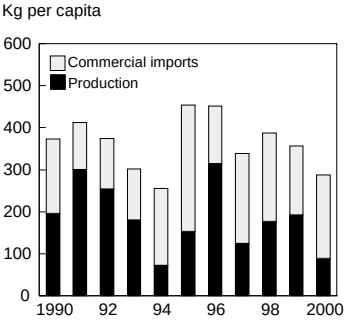


Statistical table 4--Tunisia (North Africa)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grains)	Aggregate availability of all food
			---1,000 tons ---		
1991	2,508	55	839	96	3,608
1992	2,155	54	925	100	3,743
1993	1,561	49	1,014	46	3,267
1994	646	52	1,585	22	3,011
1995	1,366	58	2,694	18	4,387
1996	2,862	67	1,239	4	3,522
1997	1,151	72	1,971	12	3,695
1998	1,654	73	1,969	0	3,933
1999	1,816	74	1,562	0	3,862
Projections				**Food gap**	
				SQ / NR	(w/o food aid)
2000	851	76	1,914	***0*** / ***0***	3,182
2005	1,757	83	1,972	***0*** / ***0***	4,164
2010	1,914	90	2,122	***0*** / ***0***	4,527

Tunisia's production in 2000 is almost 50 percent below trend due to the drought. However, the country should be able to compensate for the shortfall with commercial imports. Consumption levels should be above nutrition requirements for all income groups in both the short run and long run.

Tunisia's imports should offset low production

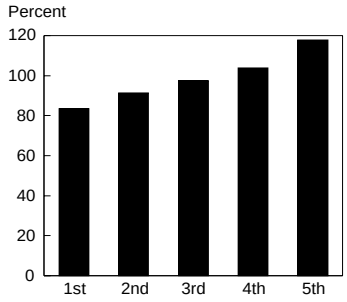


Statistical table 5--Cameroon (Central Africa)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grains)	Aggregate availability of all food
			---1,000 tons ---		
1991	950	747	253	13	2,979
1992	868	755	434	1	3,129
1993	878	784	307	2	3,097
1994	892	778	417	2	3,235
1995	1,140	749	314	4	3,366
1996	1,240	892	122	0	3,449
1997	1,065	927	360	5	3,588
1998	1,155	833	432	11	3,671
1999	1,215	835	288	3	3,643
Projections				**Food gap**	
				SQ NR	(w/o food aid)
2000	1,215	906	395	***0*** ***0***	3,833
2005	1,280	987	457	***162*** ***0***	4,177
2010	1,402	1,075	546	***237*** ***0***	4,642

Production is projected to grow at an annual rate of 1.8 percent through 2010, marking a slight slowdown from the historical trend. A 2.6-percent growth rate would be required to maintain per capita consumption at base levels and eliminate the status quo gap.

Consumption by income quintile in 2010
Share of nutritional requirements

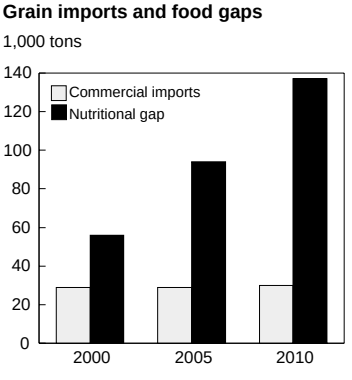


Statistical table 6--Central African Republic (Central Africa)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grains)	Aggregate availability of all food
			---1,000 tons ---		
1991	129	270	22	3	691
1992	93	281	25	5	673
1993	93	279	25	6	682
1994	85	271	43	1	710
1995	105	281	28	0	722
1996	110	298	14	0	747
1997	120	315	29	3	794
1998	120	333	23	10	821
1999	120	318	29	1	813
Projections				**Food gap**	
				SQ NR	(w/o food aid)
2000	120	328	29	***23*** ***56***	819
2005	127	347	29	***58*** ***94***	863
2010	134	366	30	***98*** ***137***	912

The nutritional situation is projected to deteriorate during the next decade. Annual production growth of just over 1 percent will be insufficient to fill nutritional requirements, and imports will continue to play a minimal role in contributing to domestic food supplies.

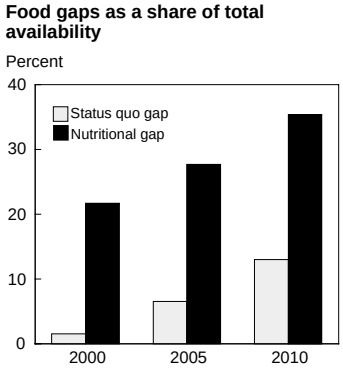
Grain imports and food gaps



Statistical table 7--Congo, Democratic Republic (Central Africa)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grains)	Aggregate availability of all food
			---1,000 tons ---		
1991	1,229	6,826	164	129	9,130
1992	1,408	6,968	238	27	9,550
1993	1,567	6,668	246	31	9,929
1994	1,545	6,744	218	91	9,929
1995	1,452	6,841	336	33	10,070
1996	1,465	5,998	260	24	9,418
1997	1,305	6,029	511	10	9,491
1998	1,585	6,044	464	13	9,862
1999	1,445	5,841	240	10	9,408
Projections				**Food gap**	
				SQ / NR	(w/o food aid)
2000	1,470	6,176	405	***156*** / ***2,141***	9,872
2005	1,770	6,769	377	***718*** / ***3,021***	10,915
2010	1,964	7,409	367	***1,551*** / ***4,218***	11,920

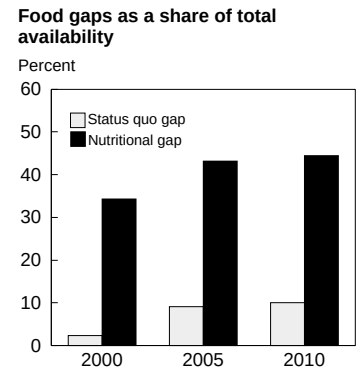
Per capita consumption is projected to decline more than 1.1 percent per year through 2010. Population growth is projected to average roughly 2.8 percent annually. Consumption in each income group will fall short of that needed to fulfill minimum nutritional requirements.



Statistical table 8--Burundi (East Africa)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grains)	Aggregate availability of all food
			---1,000 tons ---		
1991	385	389	33	1	1,328
1992	258	399	18	6	1,214
1993	249	389	0	59	1,189
1994	185	339	62	49	1,108
1995	225	356	45	5	1,140
1996	220	366	13	1	1,132
1997	225	389	16	0	1,152
1998	215	355	26	0	1,143
1999	220	397	69	1	1,252
Projections				**Food gap**	
				SQ / NR	(w/o food aid)
2000	220	389	39	***28*** / ***412***	1,200
2005	227	422	38	***116*** / ***553***	1,280
2010	269	456	39	***142*** / ***629***	1,417

Even though projected production growth far outstrips the historical trend, food supplies will not be sufficient to meet nutritional requirements through the next decade. Consumption in even the highest income group is projected at only 82 percent of the nutritional target in 2010.

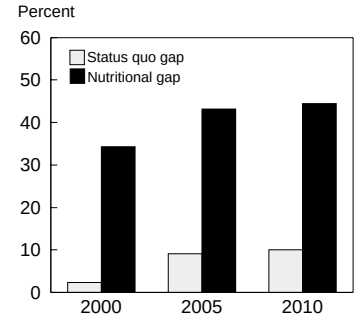


Statistical table 9--Eritrea (East Africa)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grains)	Aggregate availability of all food
			---1,000 tons ---		
1991	72	--	0	253	72
1992	198	--	0	39	198
1993	73	26	0	246	291
1994	298	26	102	153	677
1995	153	25	26	65	366
1996	84	25	232	9	447
1997	99	26	254	63	553
1998	458	27	218	103	908
1999	270	26	237	53	699
Projections				**Food gap**	
				SQ / NR	(w/o food aid)
2000	280	28	243	***89*** / ***236***	659
2005	290	30	243	***174*** / ***340***	673
2010	316	33	253	***237*** / ***424***	717

Production growth would need to double from the projected rate of 1.8 percent per year to eliminate the nutrition gap by 2010. Per capita consumption is projected to decline 1.4 percent annually.

Food gaps as a share of total availability

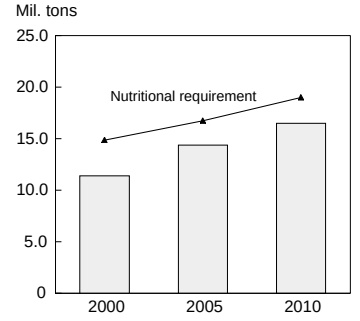


Statistical table 10--Ethiopia (East Africa)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grains)	Aggregate availability of all food
			---1,000 tons ---		
1991	4,876	0	0	1,046	4,876
1992	5,342	0	0	543	5,342
1993	5,276	1,354	0	652	8,656
1994	5,702	1,431	236	787	9,637
1995	6,922	1,510	122	525	10,793
1996	9,116	1,551	116	297	12,875
1997	6,901	1,587	5	655	10,854
1998	7,867	1,592	22	696	12,053
1999	7,805	1,615	17	823	12,261
Projections				**Food gap**	
				SQ / NR	(w/o food aid)
2000	7,745	1,672	14	***793*** / ***3,479***	11,380
2005	10,182	1,850	14	***0*** / ***2,365***	14,374
2010	11,745	2,046	15	***0*** / ***2,525***	16,461

Despite a projected slowing of the production growth rate relative to the historical period, per capita consumption will rise nearly 1 percent per year through 2010. However, food supplies will fall short of meeting nutritional requirements.

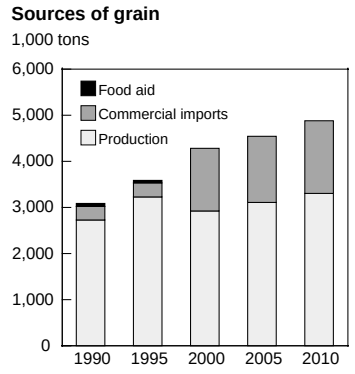
All food availability versus requirement



Statistical table 11--Kenya (East Africa)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grains)	Aggregate availability of all food
			---1,000 tons ---		
1991	3,033	480	136	186	5,910
1992	3,085	500	360	288	6,047
1993	2,220	525	313	236	4,907
1994	3,554	520	1,004	111	6,878
1995	3,227	571	298	42	6,320
1996	2,778	606	365	59	5,456
1997	2,930	644	1,470	112	7,520
1998	3,030	651	855	80	6,852
1999	2,715	642	1,542	49	7,343
Projections				**Food gap**	
				SQ / NR	(w/o food aid)
2000	2,915	664	1,363	***0*** / ***191***	7,289
2005	3,102	727	1,442	***0*** / ***357***	7,759
2010	3,297	795	1,584	***0*** / ***399***	8,355

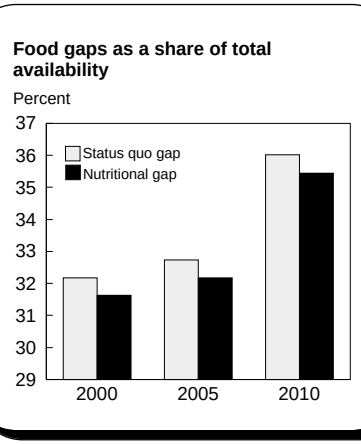
Production growth is projected to be quite slow through the next decade—1.3 percent per year. However, a continued slowdown in the population growth rate, principally due to the impact of AIDS, will preclude a deterioration in per capita consumption through 2010.



Statistical table 12--Rwanda (East Africa)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grains)	Aggregate availability of all food
			---1,000 tons ---		
1991	254	749	19	11	1,597
1992	267	695	0	90	1,631
1993	188	583	46	90	1,463
1994	149	346	0	282	1,131
1995	154	347	0	258	1,159
1996	174	450	0	349	1,328
1997	214	490	0	177	1,434
1998	214	474	57	153	1,537
1999	194	565	133	77	1,704
Projections				**Food gap**	
				SQ / NR	(w/o food aid)
2000	214	499	20	***443*** / ***436***	1,378
2005	255	551	19	***499*** / ***491***	1,525
2010	271	609	19	***595*** / ***585***	1,651

Although production returns to prewar levels before the end of the projection period, growth is slow and commercial imports are negligible. As a result, food supplies will fall well short of those required to maintain base per capita consumption levels and to meet minimum nutritional requirements.



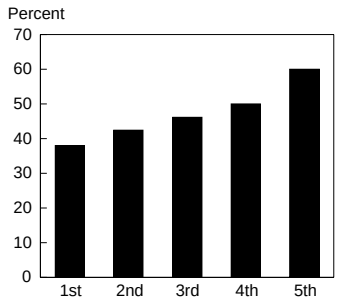
Statistical table 13--Somalia (East Africa)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grains)	Aggregate availability of all food
			---1,000 tons ---		
1991	257	16	77	132	1,093
1992	202	14	38	312	1,181
1993	162	14	125	75	1,126
1994	228	13	115	13	1,186
1995	293	16	80	13	1,268
1996	313	18	93	3	1,341
1997	320	19	83	22	1,394
1998	254	21	88	34	1,402
1999	204	23	68	55	1,414
Projections				**Food gap**	
				SQ NR	(w/o food aid)
2000	229	21	81	***159*** ***939***	1,367
2005	298	23	78	***327*** ***1,261***	1,501
2010	321	25	79	***548*** ***1,640***	1,587

Production growth is projected at 1.8 percent per year through 2010. This growth rate would need to nearly triple in order to eliminate the nutritional food gap. Consumption in even the highest income group is projected at only 60 percent of nutritional requirements in 2010.

Consumption by income quintile in 2010

Share of nutritional requirements

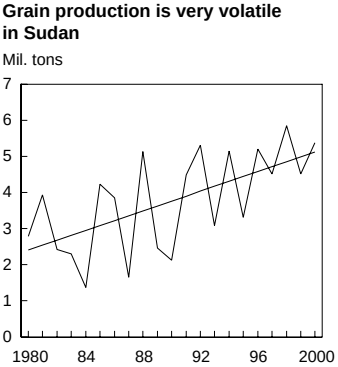


Statistical table 14--Sudan (East Africa)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grains)	Aggregate availability of all food
			---1,000 tons ---		
1991	4,488	49	489	711	7,396
1992	5,307	49	333	286	7,794
1993	3,087	47	93	293	6,071
1994	5,152	50	677	138	8,145
1995	3,307	51	325	58	6,595
1996	5,207	52	282	120	8,418
1997	4,507	52	555	99	8,540
1998	5,842	53	400	294	9,139
1999	4,507	54	623	71	8,621
Projections				**Food gap**	
				SQ NR	(w/o food aid)
2000	5,382	53	536	***0*** ***0***	9,057
2005	6,244	56	526	***0*** ***0***	10,347
2010	6,976	59	540	***0*** ***0***	11,482

Prospects for the 2000 coarse grain crop are good due to high producer prices and export opportunities to Eritrea and Ethiopia. The government has also delivered inputs such as seeds, fertilizer, fuel, and pesticides to facilitate agricultural activities.

Grain production is very volatile in Sudan



Statistical table 15--Tanzania (East Africa)

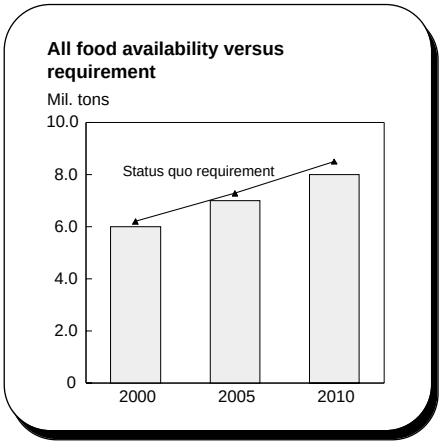
Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grains)	Aggregate availability of all food
			---1,000 tons ---		
1991	3,540	1,736	111	18	6,648
1992	3,390	1,648	154	36	6,476
1993	3,700	1,593	150	47	6,520
1994	3,305	1,671	223	114	6,443
1995	4,355	1,451	184	35	6,822
1996	4,180	1,450	148	20	6,799
1997	3,355	1,436	217	96	6,481
1998	3,905	1,477	340	42	6,917
1999	3,585	1,728	361	22	7,134
Projections				**Food gap**	
				SQ / NR	(w/o food aid)
2000	3,685	1,560	319	***0*** / ***838***	6,948
2005	4,281	1,684	328	***0*** / ***930***	7,812
2010	4,730	1,817	354	***55*** / ***1,252***	8,559

Although production growth rates are projected to exceed those of the historical period, they will not keep pace with the annual population growth rate of 2.3 percent. As a result, the nutritional situation is expected to deteriorate through 2010.

Statistical table 16--Uganda (East Africa)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grains)	Aggregate availability of all food
			---1,000 tons ---		
1991	1,460	1,834	0	30	5,120
1992	1,666	1,765	0	40	5,304
1993	1,794	1,886	36	46	5,539
1994	1,900	1,593	0	63	5,553
1995	2,020	1,688	0	44	5,843
1996	1,750	1,431	0	49	5,484
1997	1,550	1,582	43	82	5,475
1998	1,680	2,007	80	53	5,958
1999	1,670	2,217	0	0	6,225
Projections				**Food gap**	
				SQ / NR	(w/o food aid)
2000	1,670	1,975	19	***274*** / ***0***	5,995
2005	2,088	2,194	21	***416*** / ***0***	6,944
2010	2,354	2,436	23	***830*** / ***0***	7,758

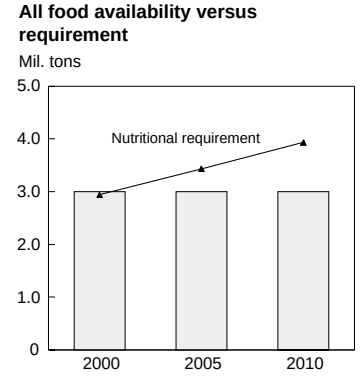
While the projected production growth rate of 2.5 percent per year is adequate to provide enough food to meet nutritional requirements, it falls more than 1 percentage point short of that needed to maintain base per capita consumption levels.



Statistical table 17--Angola (Southern Africa)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grains)	Aggregate availability of all food
			---1,000 tons ---		
1991	346	633	164	142	2,074
1992	452	714	207	116	2,057
1993	317	707	107	222	1,944
1994	261	887	176	229	2,254
1995	302	948	192	218	2,545
1996	473	932	315	190	2,654
1997	513	871	232	132	2,413
1998	443	1,175	259	146	2,887
1999	603	1,143	368	138	2,907
Projections				**Food gap**	
				SQ NR	(w/o food aid)
2000	513	1,113	298	***231*** ***440***	2,698
2005	609	1,195	308	***502*** ***746***	2,915
2010	661	1,282	331	***785*** ***1,065***	3,135

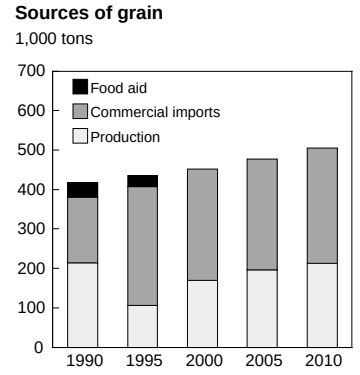
Corn production for 2000 was adversely affected by several factors: the late start of the rainy season which was followed by excessive rainfall, scarcity of inputs, poor seed quality, and displacement of population due to civil strife.



Statistical table 18--Lesotho (Southern Africa)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grains)	Aggregate availability of all food
			---1,000 tons ---		
1991	148	14	197	37	348
1992	75	16	175	45	448
1993	151	17	189	32	541
1994	243	20	174	15	312
1995	106	20	301	47	689
1996	261	20	304	15	512
1997	210	22	306	13	448
1998	135	23	313	6	585
1999	175	25	202	3	453
Projections				**Food gap**	
				SQ NR	(w/o food aid)
2000	170	24	282	***25*** ***34***	506
2005	197	25	281	***57*** ***66***	528
2010	213	27	292	***87*** ***97***	556

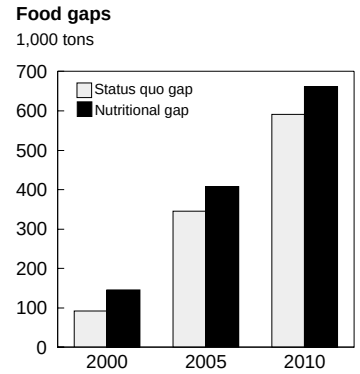
Production growth is projected at 1.75 percent per year through 2010. This is about half the rate necessary to eliminate the status quo and nutritional food gaps.



Statistical table 19--Madagascar (Southern Africa)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grains)	Aggregate availability of all food
			---1,000 tons ---		
1991	1,553	932	28	54	2,842
1992	1,715	916	73	59	3,057
1993	1,812	953	77	34	3,138
1994	1,670	972	123	20	3,057
1995	1,780	956	127	24	3,205
1996	1,830	962	48	43	3,238
1997	1,830	986	103	13	3,319
1998	1,700	981	126	25	3,274
1999	1,875	996	145	6	3,505
Projections				**Food gap**	
				SQ / NR	(w/o food aid)
2000	1,875	1,019	128	***92*** / ***146***	3,459
2005	2,013	1,105	127	***346*** / ***407***	3,716
2010	2,181	1,197	131	***591*** / ***661***	4,018

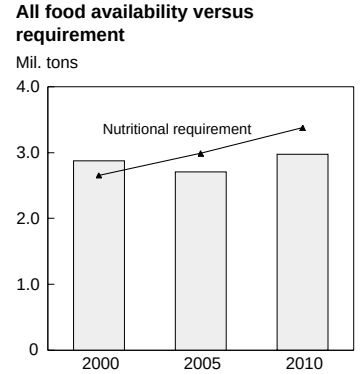
Per capita consumption is projected to drop more than 1 percent per year as food production remains just above the historical trend of 1.5 percent. Production would need to grow nearly 3 percent per year to preclude this decline.



Statistical table 20--Malawi (Southern Africa)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grains)	Aggregate availability of all food
			---1,000 tons ---		
1991	1,629	116	0	285	1,358
1992	670	105	0	605	3,057
1993	2,016	128	498	62	1,586
1994	1,093	118	220	284	2,902
1995	1,628	124	182	117	2,493
1996	1,833	125	85	51	1,839
1997	1,270	127	67	27	2,570
1998	1,795	128	121	84	3,062
1999	2,445	128	58	63	2,315
Projections				**Food gap**	
				SQ / NR	(w/o food aid)
2000	2,245	130	176	***0*** / ***0***	2,876
2005	2,048	142	180	***0*** / ***281***	2,706
2010	2,264	156	192	***14*** / ***401***	2,977

Good rains and agricultural inputs supplied at no cost or at highly subsidized rates have resulted in two consecutive above average harvests. As a result, it is estimated that food supplies will be adequate and there will be no food gaps, on the aggregate level, in 2000.

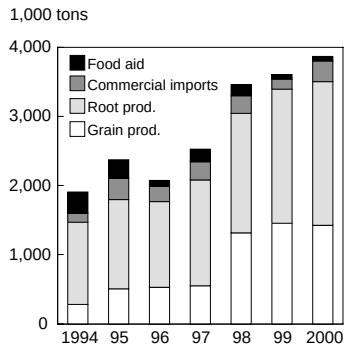


Statistical table 21--Mozambique (Southern Africa)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grains)		Aggregate availability of all food
			---1,000 tons ---			
1991	544	1,355	0	664		2,860
1992	278	1,193	130	929		3,348
1993	715	1,292	309	351		3,232
1994	756	1,238	217	305		3,558
1995	1,080	1,528	263	266		4,019
1996	1,313	1,727	257	91		3,915
1997	1,453	1,941	145	183		4,290
1998	1,573	2,049	362	159		4,626
1999	1,673	2,054	369	64		4,378
Projections				**Food gap**		
				SQ	NR	(w/o food aid)
2000	1,423	2,082	297	***132***	***558***	4,281
2005	2,013	2,232	295	***0***	***231***	5,046
2010	2,327	2,391	307	***0***	***95***	5,589

Severe flooding in February and March resulted in a small decline in foodcrop plantings, on the aggregate level. However, successive years of good harvests have raised onfarm stocks and boosted food supplies.

Sources of grain and tubers



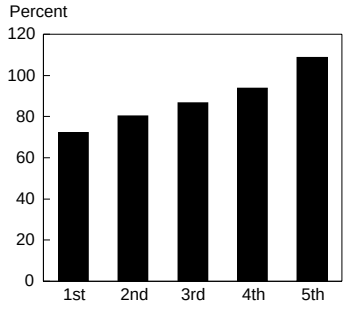
Statistical table 22--Swaziland (Southern Africa)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grains)		Aggregate availability of all food
			---1,000 tons ---			
1991	158	2	91	5		217
1992	59	2	59	40		260
1993	78	2	80	10		275
1994	104	2	102	1		267
1995	81	2	62	12		297
1996	140	2	64	0		250
1997	105	2	78	0		257
1998	105	2	64	10		243
1999	105	2	76	0		251
Projections				**Food gap**		
				SQ	NR	(w/o food aid)
2000	105	2	76	***10***	***0***	263
2005	115	2	82	***28***	***7***	285
2010	121	2	92	***45***	***21***	310

Growth in grain production and imports will be sufficient to provide enough food to meet nearly all of the nutritional requirements through the next decade. However, consumption in only the top income groups will exceed the minimum nutritional target in 2010.

Consumption by income quintile in 2010

Share of nutritional requirements

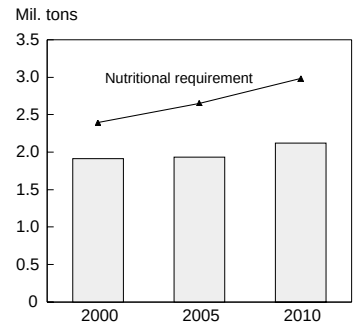


Statistical table 23--Zambia (Southern Africa)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grains)	Aggregate availability of all food
			---1,000 tons ---		
1991	1,309	234	0	342	1,316
1992	597	227	188	535	2,947
1993	1,759	252	342	11	1,593
1994	1,195	243	55	12	1,576
1995	929	239	80	73	2,378
1996	1,563	251	138	8	1,420
1997	1,157	280	101	8	1,493
1998	702	322	338	39	2,033
1999	1,015	335	222	5	1,945
Projections				**Food gap**	
				SQ NR	(w/o food aid)
2000	1,142	321	228	***0*** ***479***	1,914
2005	1,109	351	230	***15*** ***719***	1,932
2010	1,233	383	243	***70*** ***862***	2,120

Production would need to grow nearly 1 percentage point faster than the projected growth rate to achieve the growth necessary to close the nutritional food gap. Consumption in all income groups is projected to fall short of the minimum nutritional requirement in 2010.

All food availability versus requirement

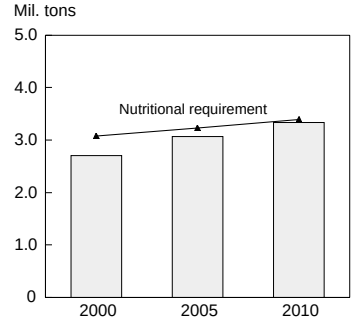


Statistical table 24--Zimbabwe (Southern Africa)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grains)	Aggregate availability of all food
			---1,000 tons ---		
1991	2,139	47	0	87	992
1992	675	52	583	896	4,189
1993	2,249	57	586	16	2,956
1994	2,622	58	86	5	1,210
1995	1,225	64	118	3	3,801
1996	2,900	65	457	1	2,757
1997	2,417	68	216	0	2,137
1998	1,870	69	214	82	2,489
1999	1,945	72	201	0	2,976
Projections				**Food gap**	
				SQ NR	(w/o food aid)
2000	2,175	73	216	***0*** ***373***	2,707
2005	2,412	82	243	***0*** ***168***	3,064
2010	2,576	91	287	***0*** ***62***	3,333

Per capita consumption is projected to grow more than 1 percent per year through the next decade. Production is projected to rise nearly 2 percent per year while population growth will continue its slowdown, equaling just 1 percent in 2010.

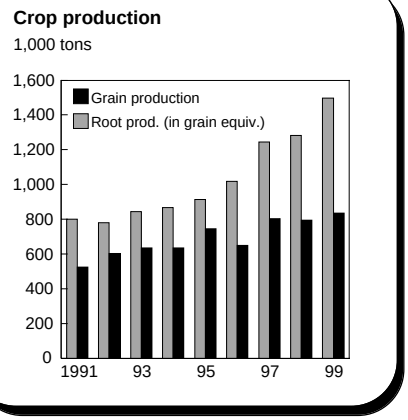
All food availability versus requirement



Statistical table 25--Benin (West Africa)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grains)	Aggregate availability of all food
			---1,000 tons ---		
1991	524	802	138	7	1,469
1992	602	782	161	19	1,560
1993	635	843	106	26	1,619
1994	635	868	85	15	1,611
1995	746	914	94	9	1,765
1996	651	1,018	81	12	1,701
1997	805	1,244	86	31	1,966
1998	795	1,284	111	11	1,900
1999	835	1,497	106	9	2,164
Projections				**Food gap**	
				SQ NR	(w/o food aid)
2000	800	1,414	107	***105*** ***0***	2,060
2005	953	1,570	114	***150*** ***0***	2,320
2010	1,065	1,741	127	***227*** ***0***	2,581

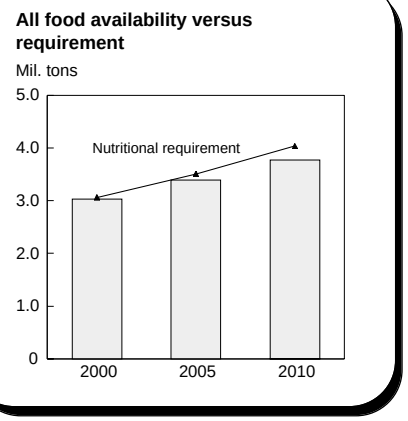
Production growth averaged nearly 5 percent per year between 1980-98. Although this is projected to slow to just over 2 percent by 2010, food supplies will be adequate to meet minimum nutritional requirements.



Statistical table 26--Burkina Faso (West Africa)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grains)	Aggregate availability of all food
			---1,000 tons ---		
1991	2,220	21	108	101	2,668
1992	2,438	31	122	31	2,868
1993	2,515	22	114	27	2,997
1994	2,453	19	104	19	2,879
1995	2,265	22	101	26	2,727
1996	2,425	21	104	31	2,895
1997	1,965	18	141	27	2,440
1998	2,640	20	134	75	3,116
1999	2,590	20	145	10	3,133
Projections				**Food gap**	
				SQ NR	(w/o food aid)
2000	2,590	19	142	***0*** ***28***	3,031
2005	2,922	20	137	***0*** ***117***	3,391
2010	3,270	21	137	***129*** ***264***	3,773

The projected production growth rate of 2.4 percent per year through the next decade marks a significant slowdown relative to the historical period. However, food gaps in the long term will remain small.

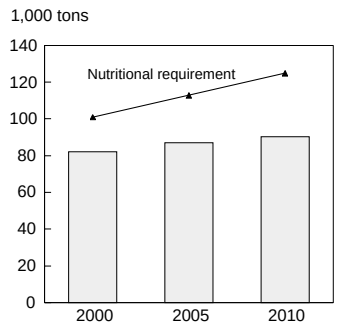


Statistical table 27--Cape Verde (West Africa)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grains)	Aggregate availability of all food
			---1,000 tons ---		
1991	4	3	0	76	128
1992	10	2	86	45	158
1993	12	4	13	58	142
1994	9	3	20	64	145
1995	10	2	29	50	152
1996	10	2	12	58	136
1997	10	2	22	50	135
1998	10	2	25	61	151
1999	10	2	2	72	140
Projections				**Food gap**	
				SQ NR	(w/o food aid)
2000	10	2	17	***66*** ***19***	82
2005	14	2	16	***79*** ***26***	87
2010	15	2	18	***94*** ***35***	90

Cape Verde depends more upon imports than domestic production to fulfill food requirements. Commercial import growth is projected to be slow—less than 1 percent per year—and food gaps will grow as a result.

All food availability versus requirement

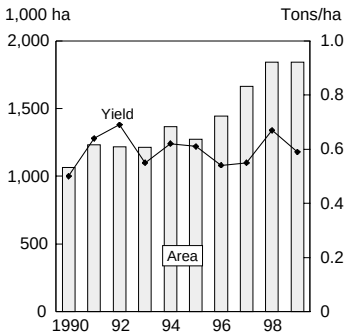


Statistical table 28--Chad (West Africa)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grains)	Aggregate availability of all food
			---1,000 tons ---		
1991	794	212	0	67	1,382
1992	836	183	51	0	1,410
1993	671	176	58	17	1,283
1994	846	186	33	15	1,397
1995	779	215	26	8	1,470
1996	786	215	13	32	1,490
1997	916	220	29	28	1,690
1998	1,236	220	32	15	1,991
1999	1,096	220	56	11	1,896
Projections				**Food gap**	
				SQ NR	(w/o food aid)
2000	1,216	225	40	***0*** ***0***	1,986
2005	1,358	248	39	***0*** ***19***	2,225
2010	1,569	273	40	***0*** ***4***	2,545

Grain production grew more than 4 percent per year during the last two decades due principally to acreage expansion. While growth is projected to slow to 3 percent per year through 2010, it will be adequate to maintain base per capita consumption levels.

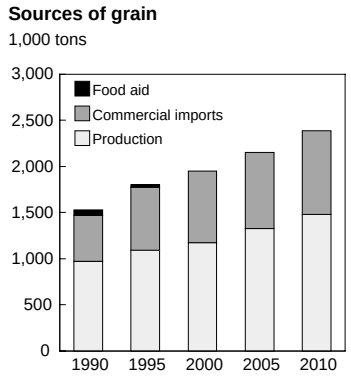
Grain production and yields



Statistical table 29--Côte d'Ivoire (West Africa)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grains)	Aggregate availability of all food
			---1,000 tons ---		
1991	1,031	1,579	574	36	3,739
1992	962	1,619	561	41	3,757
1993	1,009	1,629	600	45	3,773
1994	1,042	1,669	444	56	3,709
1995	1,092	1,689	680	30	3,997
1996	1,160	1,744	522	45	3,958
1997	1,130	1,786	738	26	4,159
1998	1,078	1,759	821	35	4,349
1999	1,140	1,752	657	3	4,228
Projections				**Food gap**	
				SQ / NR	(w/o food aid)
2000	1,170	1,817	777	***0*** / ***0***	4,409
2005	1,326	1,996	822	***0*** / ***0***	4,843
2010	1,481	2,190	904	***0*** / ***0***	5,347

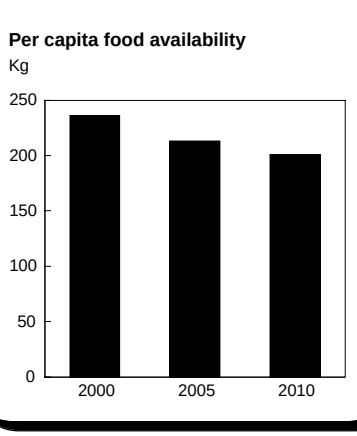
Production growth of more than 2 percent per year, coupled with import growth of nearly 2 percent, is adequate to provide enough food to meet nutritional requirements through 2010. Consumption in each income group is projected to exceed the minimum nutritional target.



Statistical table 30--Gambia (West Africa)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grains)	Aggregate availability of all food
			---1,000 tons ---		
1991	108	2	80	10	284
1992	87	2	78	6	261
1993	93	2	67	11	265
1994	101	2	86	2	275
1995	101	2	118	3	327
1996	101	2	123	6	338
1997	83	2	107	5	303
1998	94	2	117	6	321
1999	94	2	90	5	300
Projections				**Food gap**	
				SQ / NR	(w/o food aid)
2000	94	2	105	***18*** / ***1***	309
2005	109	2	98	***55*** / ***35***	315
2010	126	2	95	***82*** / ***60***	332

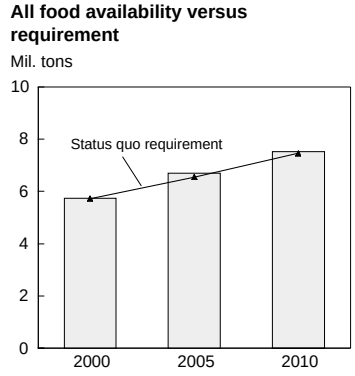
Per capita food availability is projected to fall 1.6 percent per year through the next decade. Consumption in all income groups is projected to fall short of the minimum nutritional requirements in 2010.



Statistical table 31--Ghana (West Africa)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grains)	Aggregate availability of all food
			---1,000 tons ---		
1991	1,375	2,585	203	215	4,140
1992	1,198	2,469	326	75	4,203
1993	1,582	2,665	253	126	4,651
1994	1,532	2,382	403	101	4,758
1995	1,737	2,717	219	43	4,962
1996	1,673	2,960	261	63	5,075
1997	1,578	2,954	354	69	5,209
1998	1,665	3,100	448	27	5,427
1999	1,685	3,461	446	39	5,946
Projections				**Food gap**	
				SQ NR	(w/o food aid)
2000	1,635	3,393	438	***0*** ***0***	5,736
2005	2,123	3,769	465	***0*** ***0***	6,689
2010	2,460	4,179	520	***0*** ***0***	7,528

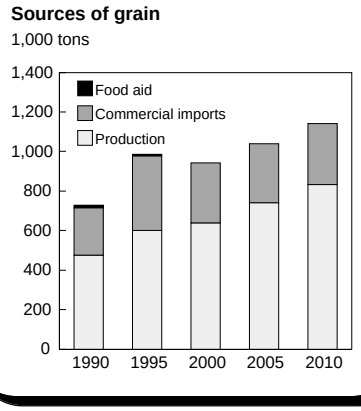
While the projected production growth rate will be less than half of that of the historical period, it will be sufficient to preclude food gaps through the next decade. Consumption in all but the lowest income group will exceed nutritional requirements in 2010.



Statistical table 32--Guinea (West Africa)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grains)	Aggregate availability of all food
			---1,000 tons ---		
1991	581	232	237	30	1,521
1992	505	255	285	30	1,576
1993	553	277	243	46	1,658
1994	574	284	331	29	1,731
1995	600	298	377	8	1,830
1996	610	319	283	6	1,786
1997	630	346	294	6	1,791
1998	630	372	236	26	1,777
1999	640	372	350	0	1,885
Projections				**Food gap**	
				SQ NR	(w/o food aid)
2000	640	371	302	***0*** ***0***	1,839
2005	740	404	300	***66*** ***0***	2,006
2010	832	439	309	***139*** ***0***	2,190

Projected production growth of 2 percent per year will be sufficient to supply enough food to meet nutritional requirements through 2010. However, food supplies will not maintain base per capita consumption levels.

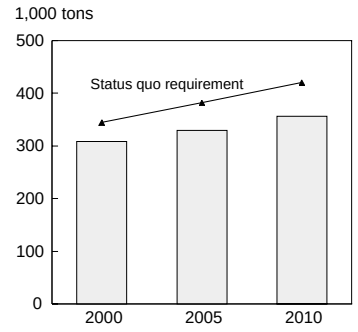


Statistical table 33--Guinea-Bissau (West Africa)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grains)	Aggregate availability of all food
			---1,000 tons ---		
1991	172	22	42	21	303
1992	125	24	72	9	277
1993	134	24	61	9	271
1994	154	24	64	2	294
1995	152	25	60	2	291
1996	150	26	66	6	305
1997	145	26	71	3	303
1998	125	26	48	21	282
1999	145	26	99	0	335
Projections				**Food gap**	
				SQ / NR	(w/o food aid)
2000	145	27	75	***10*** / ***0***	308
2005	162	28	74	***24*** / ***0***	329
2010	180	30	77	***32*** / ***0***	356

Food supplies are projected to be adequate to meet nutritional requirements at the aggregate level during the next decade. However, skewed distribution of income will limit food access for roughly 40 percent of the population where consumption will fall short of nutritional requirements in 2010.

All food availability versus requirement

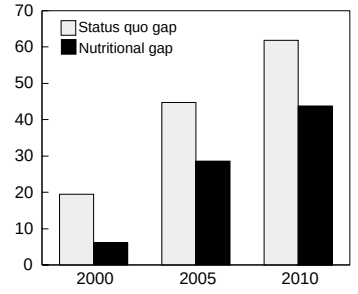


Statistical table 34--Liberia (West Africa)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grains)	Aggregate availability of all food
			---1,000 tons ---		
1991	120	135	38	136	560
1992	61	141	0	149	486
1993	39	127	34	146	495
1994	30	131	0	183	478
1995	35	99	86	132	535
1996	60	116	122	88	574
1997	100	146	134	45	617
1998	125	158	123	102	726
1999	160	158	148	53	748
Projections				**Food gap**	
				SQ / NR	(w/o food aid)
2000	160	157	140	***133*** / ***41***	679
2005	135	168	138	***300*** / ***191***	671
2010	144	180	141	***437*** / ***309***	706

Despite the fact that the country's security situation has stabilized and the agricultural recovery has begun, food gaps are projected to grow. In 2010, consumption in all income groups will fall short of nutritional requirements.

Food gaps as a share of total availability

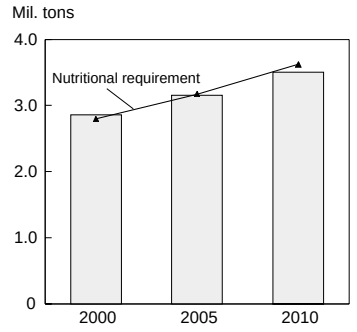


Statistical table 35--Mali (West Africa)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grains)	Aggregate availability of all food
			---1,000 tons ---		
1991	2,245	8	185	51	2,949
1992	1,714	6	63	35	2,276
1993	1,965	9	57	29	2,459
1994	2,234	7	23	16	2,804
1995	2,050	8	86	8	2,645
1996	2,075	9	46	29	2,623
1997	2,000	10	81	31	2,481
1998	2,275	12	94	12	2,815
1999	2,325	12	98	3	2,902
Projections				**Food gap**	
				SQ NR	(w/o food aid)
2000	2,325	12	95	***0*** ***0***	2,856
2005	2,573	14	100	***0*** ***14***	3,157
2010	2,853	15	111	***81*** ***119***	3,502

Grain output grew nearly 5 percent per year between 1980 and 1999, supported mainly by a large jump in area planted. Although this growth is projected to slow during the next decade as area expansion slows, it will be nearly adequate to meet nutritional requirements through 2010.

All food availability versus requirement

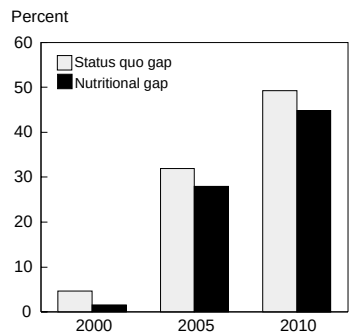


Statistical table 36--Mauritania (West Africa)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grains)	Aggregate availability of all food
			---1,000 tons ---		
1991	96	2	275	50	673
1992	103	1	164	45	571
1993	158	1	189	63	677
1994	204	1	174	22	673
1995	210	1	174	28	723
1996	195	1	245	24	768
1997	108	1	265	27	720
1998	158	1	736	24	821
1999	193	1	249	13	372
Projections				**Food gap**	
				SQ NR	(w/o food aid)
2000	193	1	421	***30*** ***10***	640
2005	191	2	408	***185*** ***162***	580
2010	210	2	414	***286*** ***260***	581

Growth in food production will fall well short of that needed to meet status quo or nutritional food requirements through the next decade. Per capita consumption is projected to decline more than 3 percent per year through 2010.

Food gaps as a share of total availability



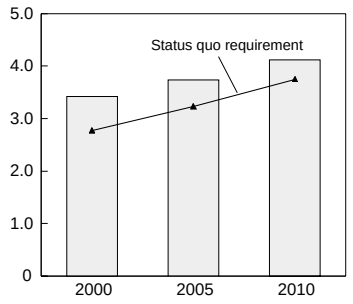
Statistical table 37--Niger (West Africa)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grains)	Aggregate availability of all food
			---1,000 tons ---		
1991	2,290	86	88	45	2,682
1992	2,227	92	95	28	2,623
1993	2,119	93	89	33	2,517
1994	2,190	99	67	39	2,626
1995	2,153	100	48	19	2,602
1996	2,296	100	14	46	2,825
1997	2,195	97	21	45	2,902
1998	2,940	103	34	59	3,640
1999	2,645	116	50	0	3,356
Projections				**Food gap**	
				SQ NR	(w/o food aid)
2000	2,845	108	36	***0*** ***0***	3,425
2005	3,087	120	38	***209*** ***0***	3,736
2010	3,398	133	41	***451*** ***77***	4,121

Food production is projected to grow just over 2 percent per year through 2010. This growth would need to accelerate by more than 1 percentage point to maintain base per capita consumption levels.

All food availability versus requirement

Mil. tons



Statistical table 38--Nigeria (West Africa)

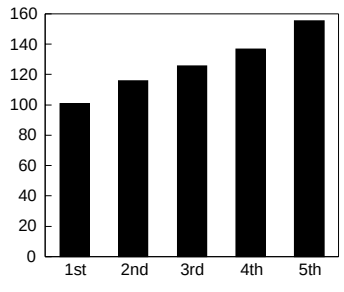
Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grains)	Aggregate availability of all food
			---1,000 tons ---		
1991	17,531	12,885	751	1	28,617
1992	18,248	14,717	979	0	30,889
1993	19,278	15,637	1,572	0	34,128
1994	19,897	16,348	922	0	33,884
1995	20,810	16,636	995	0	35,638
1996	18,885	17,230	1,216	0	34,428
1997	18,700	15,678	1,755	1	33,539
1998	19,390	18,482	2,937	0	37,098
1999	19,645	18,528	1,600	0	36,542
Projections				**Food gap**	
				SQ NR	(w/o food aid)
2000	19,345	18,386	2,139	***344*** ***0***	36,394
2005	23,073	20,182	2,095	***0*** ***0***	41,540
2010	25,673	22,119	2,138	***0*** ***0***	45,744

Per capita consumption is projected to hold fairly steady at base levels, and there will be no long term food gaps. Consumption across all income groups is projected to exceed nutritional requirements in 2010.

Consumption by income quintile in 2010

Share of nutritional requirements

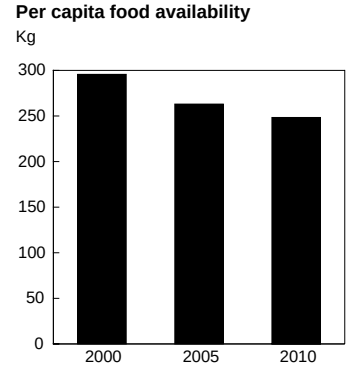
Percent



Statistical table 39--Senegal (West Africa)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grains)	Aggregate availability of all food
			---1,000 tons ---		
1991	900	14	555	65	2,201
1992	817	20	528	71	2,198
1993	1,029	19	563	38	2,466
1994	886	31	569	18	2,288
1995	1,005	23	697	9	2,562
1996	917	16	777	6	2,557
1997	706	20	607	10	2,326
1998	686	25	859	15	2,712
1999	928	17	748	18	2,855
Projections				**Food gap**	
				SQ NR	(w/o food aid)
2000	898	22	762	***0*** ***0***	2,801
2005	866	23	770	***79*** ***0***	2,826
2010	941	23	808	***265*** ***108***	3,018

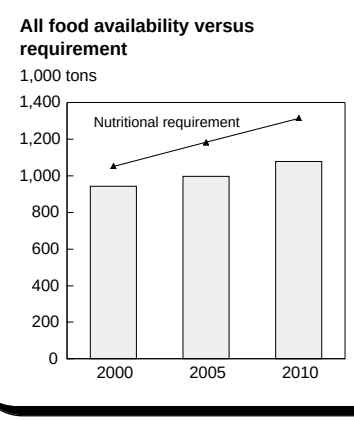
Production and import growth will be outstripped by population growth that is projected at 2.5 percent per year through the next decade. As a result, per capita consumption will fall 1.5 percent per year, and consumption in only the top income group will exceed minimum nutritional requirements in 2010.



Statistical table 40--Sierra Leone (West Africa)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grains)	Aggregate availability of all food
			---1,000 tons ---		
1991	268	50	115	66	783
1992	315	48	114	29	732
1993	321	44	116	29	773
1994	270	104	240	30	800
1995	193	95	236	48	867
1996	260	118	239	58	935
1997	275	129	261	32	831
1998	235	119	246	70	849
1999	255	93	310	20	852
Projections				**Food gap**	
				SQ NR	(w/o food aid)
2000	255	120	291	***63*** ***142***	941
2005	262	129	312	***124*** ***212***	996
2010	273	138	349	***166*** ***264***	1,079

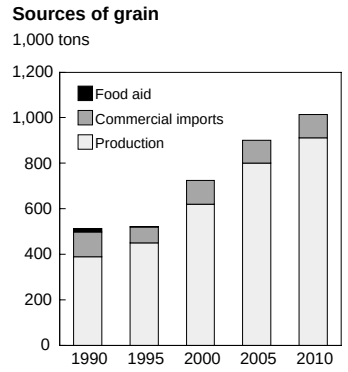
Civil disturbances continued through the summer, adversely affecting planting that takes place in May and June. Distribution of inputs and relief supplies were also interrupted. Consumption across all income groups is projected to fall short of the nutritional requirement in 2010.



Statistical table 41--Togo (West Africa)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grains)	Aggregate availability of all food
			---1,000 tons ---		
1991	427	327	89	14	806
1992	492	302	156	4	912
1993	611	351	55	11	999
1994	405	289	48	8	700
1995	450	416	69	4	933
1996	600	423	88	5	1,141
1997	705	470	104	6	1,262
1998	565	469	138	4	1,194
1999	620	469	67	4	1,219
Projections				**Food gap**	
				SQ NR	(w/o food aid)
2000	620	488	104	***61*** ***0***	1,222
2005	801	546	100	***0*** ***0***	1,454
2010	912	610	101	***22*** ***0***	1,628

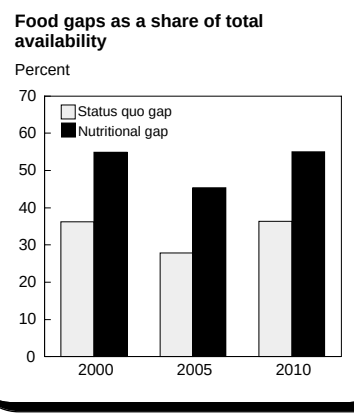
The nutritional food gap, on the aggregate level, is projected to be zero in the long term. Skewed income distribution, however, will preclude roughly 40 percent of the population from consuming a nutritionally adequate diet in 2010.



Statistical table 42--Afghanistan (Asia)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grains)	Aggregate availability of all food
			---1,000 tons ---		
1991	2,830	86	82	56	3,625
1992	2,830	86	45	108	3,676
1993	2,930	88	144	71	3,773
1994	3,210	88	0	151	3,949
1995	3,320	90	76	124	4,313
1996	3,420	90	12	174	4,311
1997	3,510	90	158	85	4,428
1998	3,620	90	163	73	3,743
1999	3,630	90	120	117	3,863
Projections				**Food gap**	
				SQ NR	(w/o food aid)
2000	2,675	93	151	***1,273*** ***1,928***	3,515
2005	3,889	100	147	***1,331*** ***2,166***	4,772
2010	4,150	108	149	***1,847*** ***2,795***	5,086

Per capita consumption in 1999 was roughly half of the mid-1980s level. It is projected to fall more than 1 percent per year through 2010. In even the highest income group, consumption is projected at only 80 percent of nutritional requirements.

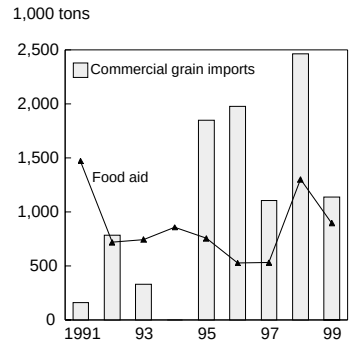


Statistical table 43--Bangladesh (Asia)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grains)	Aggregate availability of all food
			---1,000 tons ---		
1991	19,301	422	162	1,469	23,636
1992	19,452	454	784	719	24,171
1993	19,264	446	332	745	23,648
1994	18,011	457	0	858	21,836
1995	18,979	467	1,849	755	25,179
1996	20,299	472	1,976	527	26,622
1997	20,365	469	1,106	531	25,815
1998	21,706	478	2,463	1,301	26,990
1999	23,480	515	1,137	895	30,044
Projections				**Food gap**	
				SQ NR	(w/o food aid)
2000	23,350	501	1,710	***0*** ***0***	28,942
2005	24,490	540	1,972	***0*** ***0***	30,682
2010	26,434	582	2,408	***0*** ***0***	33,450

Production growth is projected at only about 1.6 percent per year. However, population growth is projected to slow from a current rate of more than 1.7 percent to 1.5 percent by 2010. As a result, food supplies will be sufficient to preclude food gaps throughout the next decade.

Imports in Bangladesh

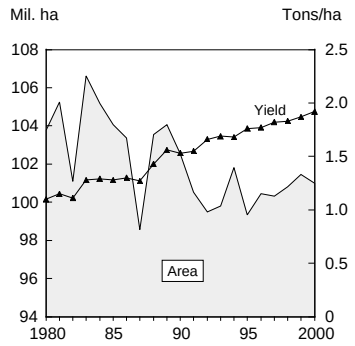


Statistical table 44--India (Asia)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grains)	Aggregate availability of all food
			---1,000 tons ---		
1991	155,744	5,248	0	277	229,112
1992	165,337	5,597	1,352	261	234,785
1993	168,530	5,239	67	336	239,764
1994	170,844	5,906	0	271	247,063
1995	174,870	5,845	0	268	249,759
1996	177,758	6,102	393	275	258,468
1997	182,842	7,493	2,075	264	263,507
1998	184,020	5,955	1,902	323	263,796
1999	189,430	7,118	1,842	246	272,394
Projections				**Food gap**	
				SQ NR	(w/o food aid)
2000	194,300	7,112	2,113	***0*** ***0***	281,692
2005	208,776	7,788	2,402	***0*** ***0***	304,313
2010	226,431	8,520	2,894	***0*** ***0***	330,988

Sustained growth in grain production, relatively strong growth in commercial import capacity, and a slowdown in population growth will ensure nutritionally adequate food supplies for each income group in 2010.

Grain area and yields

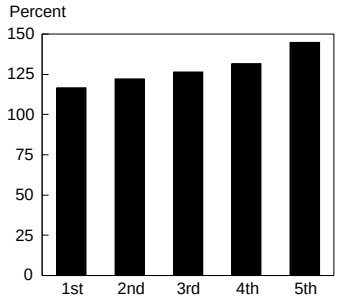


Statistical table 45--Indonesia (Asia)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grains)	Aggregate availability of all food
			---1,000 tons ---		
1991	36,750	5,713	2,787	59	52,685
1992	36,968	5,977	3,314	41	55,535
1993	35,715	6,218	3,084	52	54,193
1994	38,433	5,695	5,363	15	56,097
1995	39,215	5,755	8,664	12	62,596
1996	38,034	6,204	6,998	0	62,015
1997	36,818	5,496	5,294	9	56,702
1998	38,600	5,450	1,877	973	55,678
1999	38,300	5,670	5,744	487	62,713
Projections				**Food gap**	
				SQ / NR	(w/o food aid)
2000	38,300	5,694	4,497	***0*** / ***0***	59,794
2005	42,589	6,068	5,171	***0*** / ***0***	66,323
2010	46,020	6,461	6,007	***0*** / ***0***	72,239

Food production growth is projected to slow relative to historical levels. However, population growth is projected to slow as well. Per capita consumption will rise and consumption in even the lowest income group will equal 117 percent of nutritional requirements in 2010.

Consumption by income quintile in 2010
Share of nutritional requirements

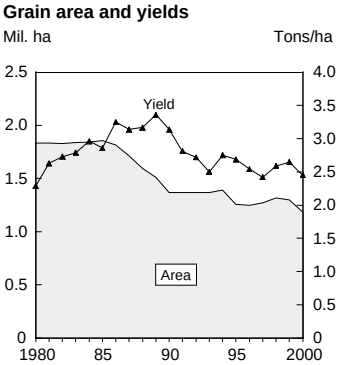


Statistical table 46--Korea, Dem. People's Rep. (Asia)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grains)	Aggregate availability of all food
			---1,000 tons ---		
1991	3,855	315	1,578	0	6,779
1992	3,723	350	1,130	0	6,114
1993	3,423	163	1,570	0	5,805
1994	3,825	232	495	75	5,463
1995	3,375	176	219	736	5,447
1996	3,175	207	470	508	5,269
1997	3,075	182	500	833	5,571
1998	3,400	128	0	1,036	5,547
1999	3,450	457	692	339	5,983
Projections				**Food gap**	
				SQ / NR	(w/o food aid)
2000	2,900	265	401	***1,155*** / ***997***	4,611
2005	3,573	282	394	***786*** / ***617***	5,353
2010	3,762	300	405	***835*** / ***658***	5,610

Per capita consumption fell 25 percent during the 1990s. Production is projected to grow at roughly the same rate as population through the next decade. Consumption in only the top income group will exceed nutritional requirements in 2010.

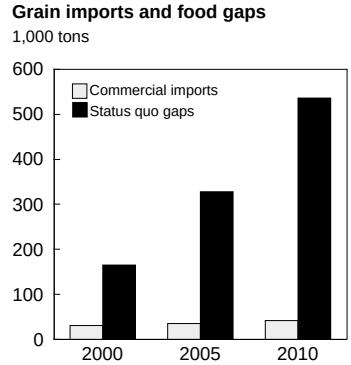
Grain area and yields



Statistical table 47--Nepal (Asia)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grains)	Aggregate availability of all food
			---1,000 tons ---		
1991	4,437	199	8	8	4,921
1992	4,003	198	44	18	4,644
1993	4,075	199	17	44	4,747
1994	4,427	211	50	26	5,234
1995	4,585	223	16	42	5,438
1996	4,985	237	59	28	5,721
1997	5,110	251	22	33	5,847
1998	5,165	253	2	52	5,967
1999	5,308	280	59	6	6,200
Projections				**Food gap**	
				SQ NR	(w/o food aid)
2000	5,310	270	31	***165*** ***0***	6,074
2005	5,813	291	35	***328*** ***0***	6,648
2010	6,301	312	42	***536*** ***0***	7,212

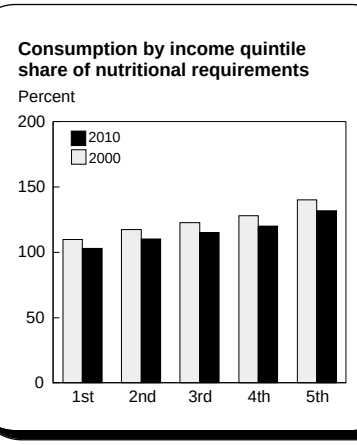
Production growth is projected to be outstripped by population growth that remains high relative to other countries in the region—more than 2 percent per year. The diets of roughly 40 percent of the population will be nutritionally inadequate.



Statistical table 48--Pakistan (Asia)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grains)	Aggregate availability of all food
			---1,000 tons ---		
1991	19,390	248	604	373	31,599
1992	20,458	279	1,816	236	32,246
1993	21,915	301	2,832	67	36,286
1994	20,537	331	1,829	93	36,127
1995	22,833	343	2,680	18	38,359
1996	23,013	336	1,942	48	38,868
1997	22,826	316	2,355	159	38,991
1998	25,285	425	2,232	300	41,180
1999	24,774	425	2,256	267	43,068
Projections				**Food gap**	
				SQ NR	(w/o food aid)
2000	27,720	402	2,442	***0*** ***0***	45,030
2005	28,687	444	2,675	***0*** ***0***	48,013
2010	32,208	488	3,058	***0*** ***0***	53,971

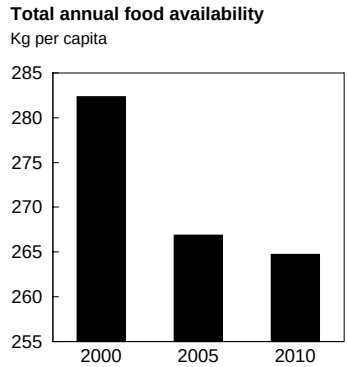
Per capita consumption is projected to decline marginally as production and import growth fall just short of the high population growth. However, nutritional food needs will be met across all income groups through 2010.



Statistical table 49--Philippines (Asia)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grains)		Aggregate availability of all food
			---1,000 tons ---			
1991	10,426	924	1,652	48		17,037
1992	11,000	934	2,003	53		16,731
1993	11,480	940	2,150	52		17,856
1994	11,343	972	2,391	44		18,705
1995	11,587	978	2,819	11		18,394
1996	11,480	984	2,420	40		19,183
1997	10,016	992	3,763	9		19,626
1998	11,568	909	4,786	3		20,669
1999	12,295	909	3,387	128		20,418
Projections				**Food gap**		
				SQ	NR	(w/o food aid)
2000	11,900	955	4,214	***0***	***0***	21,450
2005	12,182	1,003	4,560	***0***	***0***	22,271
2010	12,863	1,053	5,192	***0***	***0***	23,972

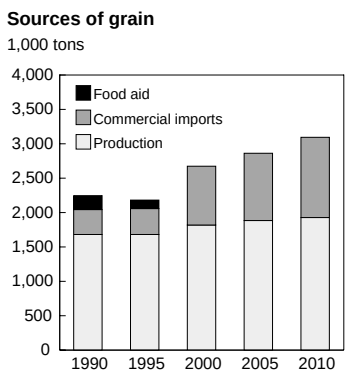
Although there are no food gaps at the aggregate level, consumption for roughly 20 percent of the population will fall below minimum nutritional requirements. Growth in grain yields is projected at 1 percent per year—half that of the historical period. Grain area is projected to stagnate.



Statistical table 50--Sri Lanka (Asia)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grains)		Aggregate availability of all food
			---1,000 tons ---			
1991	1,691	162	423	439		4,264
1992	1,649	140	818	249		4,417
1993	1,748	145	806	338		4,507
1994	1,905	140	596	346		4,910
1995	1,679	138	1,034	120		4,731
1996	1,502	137	1,242	57		4,744
1997	1,758	118	1,257	83		5,007
1998	1,845	107	1,106	82		5,092
1999	1,815	107	1,150	49		5,138
Projections				**Food gap**		
				SQ	NR	(w/o food aid)
2000	1,815	111	1,222	***0***	***0***	5,194
2005	1,879	115	1,323	***0***	***0***	5,460
2010	1,927	119	1,494	***0***	***0***	5,831

Population growth is projected to remain steady at 1 percent per year—the lowest rate in the region. Food supplies are projected to be adequate throughout the next decade. Consumption in all income groups is projected to exceed minimum nutritional requirements.

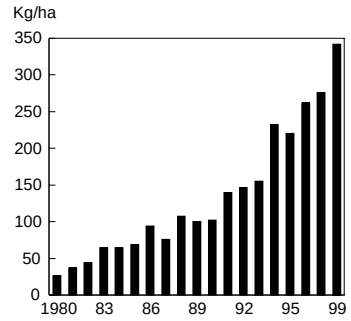


Statistical table 51--Vietnam (Asia)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grains)	Aggregate availability of all food
			---1,000 tons ---		
1991	15,310	1,488	190	80	17,635
1992	15,389	1,654	156	84	17,005
1993	16,931	1,561	293	87	18,978
1994	17,390	1,400	248	64	19,217
1995	18,860	1,281	466	20	20,860
1996	19,540	1,246	388	65	19,900
1997	20,744	1,213	418	49	21,029
1998	21,720	1,120	688	50	22,003
1999	22,500	1,197	603	0	26,073
Projections				**Food gap**	
				SQ NR	(w/o food aid)
2000	22,200	1,211	622	***33*** ***0***	23,638
2005	24,261	1,311	784	***0*** ***0***	25,996
2010	26,227	1,420	1,049	***0*** ***0***	28,410

Growth in grain output is expected to slow considerably from the historical rate of more than 5 percent per year. However, per capita consumption relative to nutritional requirements will remain the highest in the region through 2010.

Fertilizer use, 1980-99
Kilogram per hectare arable land

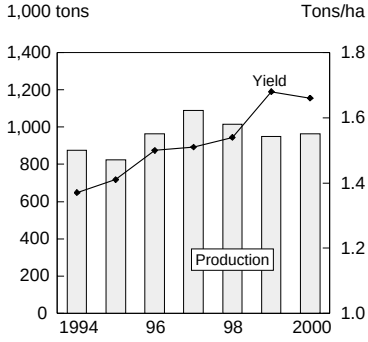


Statistical table 52--Bolivia (Latin America & Caribbean)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grains)	Aggregate availability of all food
			---1,000 tons ---		
1991	760	309	143	238	1,732
1992	780	291	130	243	1,699
1993	1,055	318	89	205	1,808
1994	875	268	155	176	1,664
1995	825	272	247	94	1,805
1996	965	296	92	143	1,789
1997	1,090	336	71	149	1,916
1998	1,015	250	81	144	1,935
1999	950	338	249	23	2,012
Projections				**Food gap**	
				SQ NR	(w/o food aid)
2000	965	323	173	***128*** ***189***	1,876
2005	1,395	364	181	***0*** ***0***	2,479
2010	1,712	408	198	***0*** ***0***	3,008

Grain production is projected to continue and even accelerate its fast growth of about 4 percent per year. Yield improvements are the driving force for fast production increases that may succeed in eliminating all food gaps within a few years.

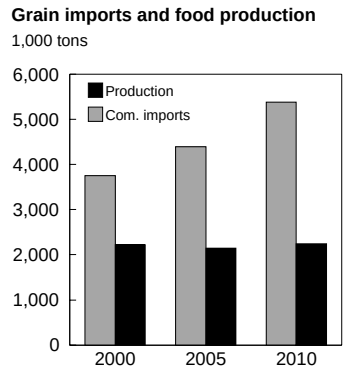
Grain production and yields



Statistical table 53--Colombia (Latin America & Caribbean)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grains)	Aggregate availability of all food
			---1,000 tons ---		
1991	2,777	1,053	792	8	9,096
1992	2,804	1,037	1,592	17	9,844
1993	2,777	1,250	1,697	31	9,726
1994	2,610	1,257	2,392	15	10,423
1995	2,469	1,247	2,582	0	10,596
1996	2,129	1,296	3,267	9	11,451
1997	1,834	1,172	3,290	7	10,918
1998	2,026	1,116	3,861	11	11,861
1999	2,214	1,256	3,109	0	11,513
Projections				**Food gap**	
				SQ NR	(w/o food aid)
2000	2,219	1,220	3,754	***0*** ***0***	12,334
2005	2,144	1,316	4,400	***0*** ***0***	13,704
2010	2,241	1,416	5,389	***0*** ***0***	15,956

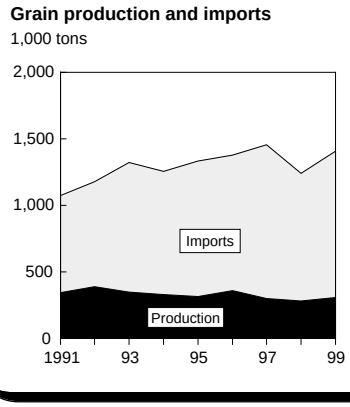
In 1999, Colombia suffered its worst recession in 60 years. However, there is reason to hope that economic growth will be positive in 2000 and continue to improve. Commercial imports will be the main source of grains, projected to increase 70 percent over the next 10 years.



Statistical table 54--Dominican Republic (Latin America & Caribbean)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grains)	Aggregate availability of all food
			---1,000 tons ---		
1991	343	76	732	14	1,688
1992	390	84	786	7	1,704
1993	350	57	972	7	1,949
1994	329	63	925	3	1,899
1995	316	85	1,018	1	1,990
1996	360	78	1,017	2	1,955
1997	301	63	1,152	5	2,137
1998	282	77	960	31	1,869
1999	307	82	1,100	0	1,977
Projections				**Food gap**	
				SQ NR	(w/o food aid)
2000	305	77	1,192	***0*** ***0***	2,245
2005	316	85	1,460	***0*** ***0***	2,765
2010	330	94	1,872	***0*** ***0***	3,587

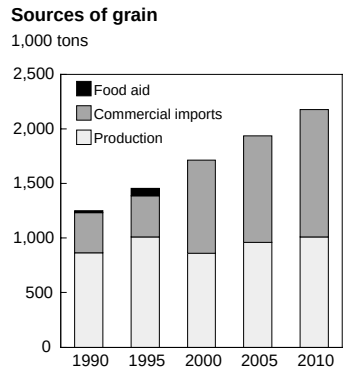
While food production is projected to virtually stagnate over the next 10 years, commerical imports are expected to increase more than 60 percent. Improvements in food security thus depend on sufficient export earnings to pay for these grain imports.



Statistical table 55--Ecuador (Latin America & Caribbean)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grains)	Aggregate availability of all food
			---1,000 tons ---		
1991	956	104	416	45	2,795
1992	1,028	128	346	14	2,761
1993	1,104	113	271	12	2,582
1994	1,050	137	322	32	2,738
1995	1,009	123	377	1	2,792
1996	767	120	433	8	3,027
1997	831	164	643	20	2,682
1998	791	136	1,063	20	3,389
1999	901	196	661	70	3,012
Projections				**Food gap**	
				SQ NR	(w/o food aid)
2000	861	165	854	***0*** ***0***	3,177
2005	959	174	977	***0*** ***0***	3,555
2010	1,012	183	1,163	***0*** ***0***	4,024

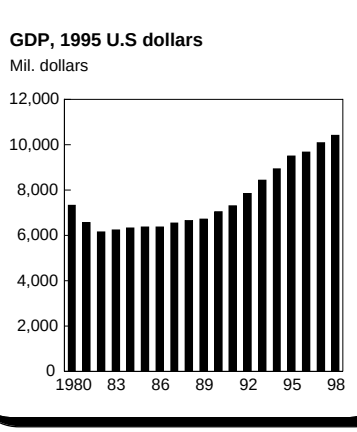
While 1999 was a year of economic crisis, 2000 brought several encouraging changes: the dollar was chosen as the country's currency, part of the large foreign debt could be renegociated, and an agreement with the IMF has contributed to raising confidence in the Ecuadorean economy, which helps to attract international investors.



Statistical table 56--El Salvador (Latin America & Caribbean)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grains)	Aggregate availability of all food
			---1,000 tons ---		
1991	699	11	373	86	1,551
1992	953	15	147	131	1,455
1993	858	14	213	79	1,359
1994	690	32	469	7	1,533
1995	873	27	415	14	1,454
1996	841	26	398	7	1,202
1997	860	26	567	8	1,693
1998	790	20	325	49	1,284
1999	855	26	474	0	1,598
Projections				**Food gap**	
				SQ NR	(w/o food aid)
2000	890	25	459	***0*** ***0***	1,545
2005	942	27	453	***0*** ***0***	1,580
2010	1,030	30	465	***24*** ***0***	1,685

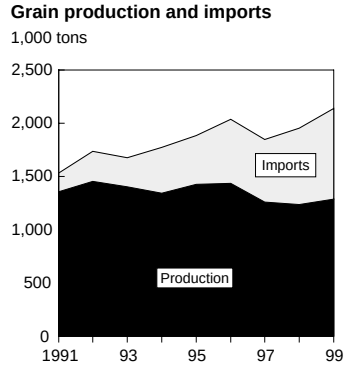
Even though El Salvador does not have a national nutritional food gap, the share of people unable to purchase nutritionally adequate diets is projected to increase from 40 percent to 60 percent over the next 10 years. The skewed income distribution as well as insufficient income keep the poor segments of the population in food insecurity.



Statistical table 57--Guatemala (Latin America & Caribbean)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grains)	Aggregate availability of all food
			---1,000 tons ---		
1991	1,355	14	176	252	2,242
1992	1,454	16	280	109	2,271
1993	1,400	17	276	151	2,230
1994	1,343	17	431	144	2,417
1995	1,423	17	460	35	2,371
1996	1,436	17	599	45	2,363
1997	1,258	17	588	18	2,289
1998	1,235	17	719	43	2,443
1999	1,285	17	853	110	2,774
Projections				**Food gap**	
				SQ NR	(w/o food aid)
2000	1,285	18	800	***0*** ***0***	2,540
2005	1,368	21	973	***0*** ***6***	2,845
2010	1,446	24	1,249	***0*** ***0***	3,295

In Guatemala as in other countries in the region, commercial imports become increasingly important compared with domestic food production. By 2010, imports are projected at 46 percent of grain supplies, up from 12 percent in 1990 and 36 percent in 2000.

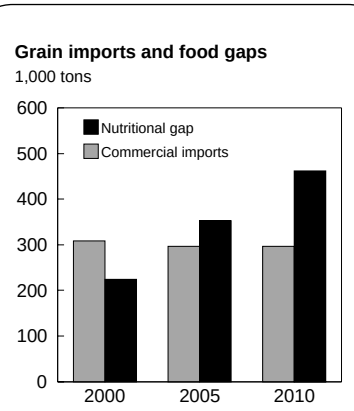


Statistical table 58--Haiti (Latin America & Caribbean)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grains)	Aggregate availability of all food
			---1,000 tons ---		
1991	330	225	218	55	1,380
1992	320	231	268	75	1,447
1993	340	223	217	114	1,411
1994	330	216	159	117	1,353
1995	345	219	291	126	1,591
1996	345	215	210	151	1,549
1997	405	211	203	146	1,660
1998	455	213	284	139	1,796
1999	455	217	424	101	1,940
Projections				**Food gap**	
				SQ NR	(w/o food aid)
2000	455	218	309	***85*** ***225***	1,713
2005	474	231	297	***202*** ***353***	1,749
2010	503	245	296	***297*** ***462***	1,817

Presidential elections in Haiti were held in for November 2000. Political deadlock has made political as well as economic progress impossible. Poverty and hunger continue to be pervasive.

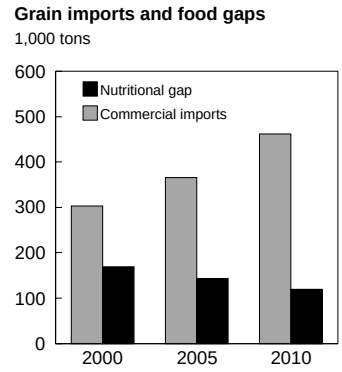
The lowest income quintile is projected to consume only 57 percent of its nutritional requirements.



Statistical table 59--Honduras (Latin America & Caribbean)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grains)	Aggregate availability of all food
			---1,000 tons ---		
1991	693	7	100	160	1,087
1992	710	8	73	64	1,059
1993	690	8	67	149	1,118
1994	617	7	251	73	1,187
1995	780	7	233	43	1,230
1996	679	8	212	36	1,085
1997	705	8	398	20	1,432
1998	560	9	123	92	1,152
1999	613	9	301	88	1,368
Projections				**Food gap**	
				SQ NR	(w/o food aid)
2000	613	9	304	***50*** ***170***	1,290
2005	723	10	366	***8*** ***144***	1,509
2010	776	11	462	***0*** ***120***	1,726

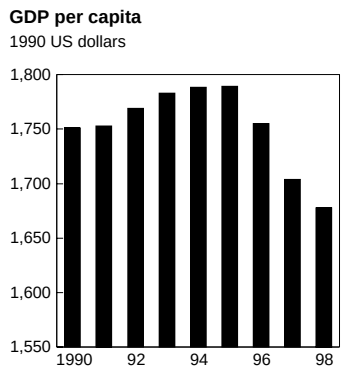
Hurricane Mitch hit Honduras in fall 1998, but its repercussions continue to be felt. However, as houses and infrastructure are being repaired, prospects for an improved food security situation become brighter. The nutritional food gap is projected to halve during the next 10 years.



Statistical table 60--Jamaica (Latin America & Caribbean)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grains)	Aggregate availability of all food
			---1,000 tons ---		
1991	3	72	131	323	756
1992	4	84	252	201	711
1993	5	92	299	157	792
1994	5	97	316	53	674
1995	5	102	379	60	719
1996	5	108	288	27	653
1997	5	90	499	13	836
1998	5	86	489	13	811
1999	5	86	530	0	835
Projections				**Food gap**	
				SQ NR	(w/o food aid)
2000	5	92	524	***0*** ***0***	864
2005	5	100	533	***0*** ***0***	884
2010	5	108	557	***0*** ***0***	929

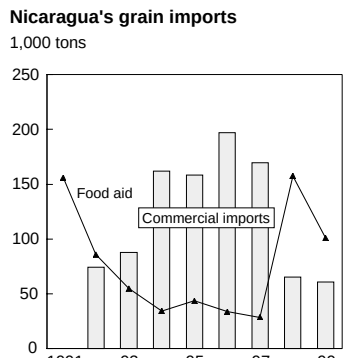
Jamaica continues to be one of the better off countries in the region, and hunger is not prevalent. However, poverty is rising because of a weak economy for the last 5 years. Recovery may not start until 2001 or later.



Statistical table 61--Nicaragua (Latin America & Caribbean)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grains)	Aggregate availability of all food
			---1,000 tons ---		
1991	409	20	0	156	909
1992	427	20	74	86	943
1993	485	21	88	55	993
1994	290	21	162	34	921
1995	409	21	158	43	994
1996	557	21	197	33	1,072
1997	494	22	170	28	1,035
1998	490	21	65	158	1,034
1999	530	21	61	101	1,021
Projections				**Food gap**	
				SQ NR	(w/o food aid)
2000	530	22	107	***24*** ***152***	991
2005	580	24	124	***76*** ***223***	1,083
2010	604	26	153	***148*** ***313***	1,157

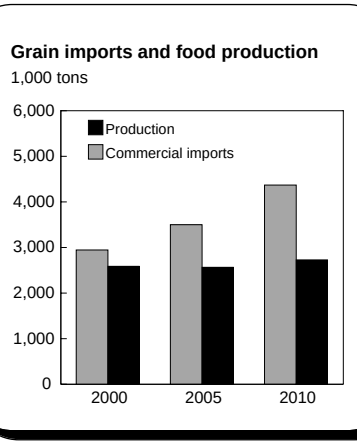
Nicaragua's nutritional gap in 2010 is projected twice as big as total commercial imports. International investment into agriculture and export industries is desparately needed but will depend on whether Nicaragua will manage to receive relief on its $6.3 billion debt.



Statistical table 62--Peru (Latin America & Caribbean)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grains)	Aggregate availability of all food
			---1,000 tons ---		
1991	1,250	577	1,227	492	4,370
1992	1,669	462	2,211	377	5,390
1993	1,972	611	1,864	410	5,185
1994	1,821	686	2,231	348	5,715
1995	1,634	850	2,459	105	6,319
1996	1,827	857	2,593	95	6,432
1997	1,953	917	2,565	61	5,973
1998	2,432	1,001	2,756	148	6,677
1999	2,510	1,121	2,849	0	7,098
Projections				**Food gap**	
				SQ NR	(w/o food aid)
2000	2,585	1,056	2,943	***0*** ***0***	6,994
2005	2,559	1,156	3,497	***0*** ***0***	7,811
2010	2,723	1,263	4,369	***0*** ***0***	9,287

Peru now has the highest income —$2,390 per capita—of all 11 LAC countries studied here. This year the economy recovered from the 1998/99 recession, and GDP is expected to grow 4.5 percent. All this bodes well for further improvements in food security. Less than 20 percent of the population will fall short of nutritional requirements.

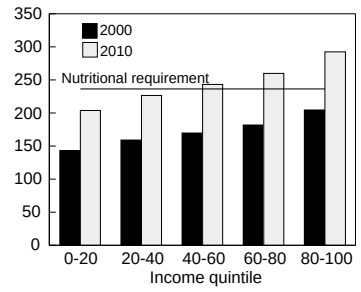


Statistical table 63--Armenia (New Independent States)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grains)	Aggregate availability of all food
			---1,000 tons ---		
1991	292	---	---	---	---
1992	292	62	456	117	808
1993	301	80	119	277	722
1994	213	77	53	367	870
1995	236	87	-19	267	873
1996	306	82	29	104	758
1997	290	69	79	158	849
1998	320	82	52	11	710
1999	290	82	94	12	729
Projections				**Food gap**	
				SQ NR	(w/o food aid)
2000	188	81	77	***97*** ***208***	623
2005	384	90	77	***0*** ***0***	869
2010	412	99	81	***0*** ***0***	935

Armenia's grain production was 39 percent below trend in 2000. Food gaps will be relatively severe: food supplies will be 14 percent below recent per capita consumption target and 25 percent below nutrition target. Food supplies in all income groups may fall short of nutrition requirements in 2000.

Armenia's food supplies relative to requirements by income quintile

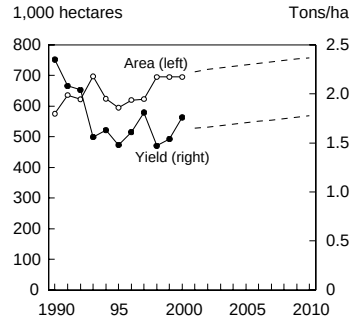


Statistical table 64--Azerbaijan (New Independent States)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grains)	Aggregate availability of all food
			---1,000 tons ---		
1991	1,324	---	---	---	---
1992	1,266	30	585	6	1,982
1993	1,084	29	557	58	1,790
1994	1,015	29	-3	424	1,707
1995	878	30	298	167	1,642
1996	1,000	41	327	34	1,696
1997	1,130	43	662	63	2,238
1998	1,020	60	787	13	2,271
1999	1,070	65	624	31	2,191
Projections				**Food gap**	
				SQ NR	(w/o food aid)
2000	856	59	735	***47*** ***0***	2,055
2005	1,233	65	752	***0*** ***0***	2,486
2010	1,325	72	803	***0*** ***0***	2,675

Azerbaijan's grain production in 2000 was 11 percent below trend, leading to a modest food gap. Food supplies in most income groups are above nutritional requirements in both the short and long run. Azerbaijan is poised to gain strongly from recent oil and gas pipeline developments in the region.

Azerbaijan area and yield projections

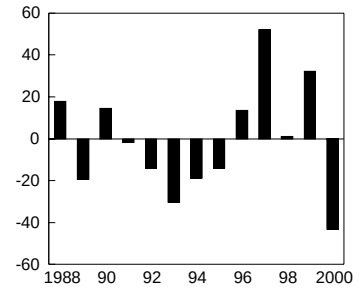


Statistical table 65--Georgia (New Independent States)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grains)	Aggregate availability of all food
			---1,000 tons ---		
1991	565	---	---	---	---
1992	496	41	394	194	1,370
1993	403	49	260	585	1,291
1994	470	58	165	569	1,265
1995	497	69	175	355	1,265
1996	658	70	523	97	1,422
1997	882	69	502	142	1,434
1998	588	68	412	94	1,427
1999	768	85	439	61	1,461
Projections				**Food gap**	
				SQ NR	(w/o food aid)
2000	330	77	496	***26*** ***104***	1,069
2005	905	82	501	***0*** ***0***	1,691
2010	961	87	533	***0*** ***0***	1,815

Georgia's grain production in 2000 was 43 percent below trend. However, the country's commercial import capacity and other factors may lead to more modest food gaps. In the short run, many of the lower income groups may face inadequate food supplies, but not in the long run.

Georgia's grain production: Deviation is large

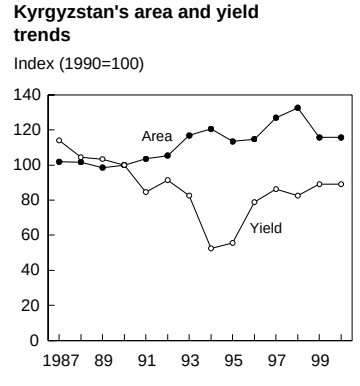


Statistical table 66--Kyrgyzstan (New Independent States)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grains)	Aggregate availability of all food
			---1,000 tons ---		
1991	1,369	---	---	---	---
1992	1,510	70	332	91	1,323
1993	1,511	59	119	156	1,183
1994	993	60	140	61	1,119
1995	985	83	83	139	1,263
1996	1,415	108	78	31	1,296
1997	1,713	130	52	70	1,613
1998	1,713	139	105	1	1,575
1999	1,611	184	-5	108	1,659
Projections				**Food gap**	
				SQ NR	(w/o food aid)
2000	1,613	162	53	***0*** ***0***	1,528
2005	1,926	184	54	***0*** ***0***	1,867
2010	2,075	209	58	***0*** ***0***	2,037

Kyrgyzstan's 2000 harvest was not affected by the drought. Production should be close to levels of recent years, which have allowed for a small volume of exports. Per capita food consumption levels should continue to exceed nutrition requirements for most income groups.

Kyrgyzstan's area and yield trends

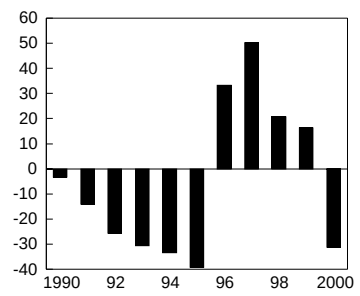


Statistical table 67--Tajikistan (New Independent States)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grains)	Aggregate availability of all food
			---1,000 tons ---		
1991	264	---	---	---	---
1992	241	32	1,116	71	1,515
1993	236	28	834	82	1,570
1994	237	26	488	104	1,306
1995	226	22	191	168	1,059
1996	516	21	142	115	1,077
1997	606	25	212	141	1,288
1998	506	25	283	40	1,171
1999	506	26	244	66	1,170
Projections				**Food gap**	
				SQ NR	(w/o food aid)
2000	311	25	263	***256*** ***520***	941
2005	659	27	261	***0*** ***243***	1,315
2010	710	30	271	***0*** ***285***	1,399

Tajikistan's drought greatly reduced production in 2000. Because per capita consumption was already low, the shock may lead to relatively severe food gaps in percentage terms. Food supplies are projected to be inadequate for all income groups in both the short and long run.

Tajikistan's grain production is down in 2000



Appendix 1—Food Security Model: Definition and Methodology

The Food Security Assessment model used in this report was developed at the USDA-ERS for use in projecting food consumption and access, and food gaps (previously called food needs) in 67 low-income countries through 2010. The reference to food includes 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 commercially minus nonfood use) and a consumption requirement. Although food aid is expected to be available during the projection period, it is not included in the projection of food consumption. It should be noted that while projection results will provide a baseline for the food security situation of the countries, they depend on assumptions and specifications of the model. Because 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 (1997-99) 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 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, work, or any activity other than food gathering.

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 67 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 is 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. 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 projections of consumption for the "other" commodities are 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 to the diet of commodities 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:

$$FC_{cnt} = DS_{cnt} - NF_{cnt} \quad (1)$$

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

$$NF_{cnt} = SD_{cnt} + FD_{cnt} + EX_{cnt} + OU_{cnt} \quad (2)$$

Domestic supply of a commodity group is the sum of domestic production (*PR*) plus commercial imports (*CI*) and changes in stocks (*CSTK*):

$$DS_{cnt} = PR_{cnt} + CI_{cnt} + CSTK_{cnt} \quad (3)$$

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

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

where *AR* is area, *YL* is yield, *LB* is rural labor, *FR* is fertilizer use, *K* is 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:

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

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:

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

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 economic access is the most important cause of chronic undernutrition among developing countries and is related to the level of income. 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 countries is the key factor preventing estimation of food consumption by income group. We attempted 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):

$$C = a + b \ln Y \quad (11)$$
$$C = C_o/P \quad (12)$$
$$P = P_1 + \ldots\ldots + P_i \quad (13)$$
$$Y = Y_o/P \quad (14)$$
$$i = 1 \text{ to } 5$$

where *C* and *Y* are known average per capita food consumption (all commodities in grain equivalent) and per capita income (all quintiles), C_o is total food consumption, *P* is the total population, *i* is income quintile, *a* is the intercept, *b* is the consumption income propensity, and *b/C* is consumption income elasticity (point estimate elasticity is calculated for individual countries). To estimate per capita consumption by income group, the parameter of *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 1980-99 for most variables are from a USDA database. Data for grain production in 2000 for most countries are based on a USDA database as of October 2000. Food aid data are from the UN's Food and Agriculture Organization (FAO), and financial data are from the International Monetary Fund and World Bank. Historical nonfood-use data, including seed, waste, processing use, and other use, are estimated from the FAO *Food Balance* series. The base year data used for projections are the average for 1997-99, except export earnings that are 1996-98.

Endogenous variables:

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

Exogenous variables:

Population— data are medium UN population projections as of 1998.

World prices—USDA/baseline projections data.

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 UN population projections, accounting for urbanization growth.

Food aid—historical data from FAO; *no food aid* assumed during the projection period.

Gross Domestic Product—World Bank data.

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

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.

(Shahla Shapouri)

Appendix table-2a--List of countries and their food gaps, 2000

	2000 food gaps				2000 food gaps		
	Status quo	Nutrition	Distribution		Status quo	Nutrition	Distribution
		1,000 tons				1,000 tons	
Cameroon	0	0	113	Algeria	361	518	755
Centr. Afr. Rep.	23	56	118	Egypt	0	0	0
Congo, Dem. Rep.	156	2,141	2,439	Morocco	0	1,045	1,215
Burundi	28	412	462	Tunisia	0	0	0
Eritrea	89	236	252	**North Africa**	**361**	**1,563**	**1,970**
Ethiopia	793	3,479	3,764				
Kenya	0	191	991	Afghanistan	1,273	1,928	2,103
Rwanda	443	436	462	Bangladesh	0	0	641
Somalia	159	939	991	India	0	0	1,557
Sudan	0	0	0	Indonesia	0	0	0
Tanzania	0	838	1,105	Korea, Dem. People's Rep.	1,155	997	1,121
Uganda	274	0	104	Nepal	165	0	68
Angola	231	440	577	Pakistan	0	0	0
Lesotho	25	34	82	Philippines	0	0	0
Madagascar	92	146	366	Sri Lanka	0	0	0
Malawi	0	0	35	Vietnam	33	0	0
Mozambique	132	558	1,034	**Asia**	**2,627**	**2,925**	**5,489**
Swaziland	10	0	18				
Zambia	0	479	582	Bolivia	128	189	277
Zimbabwe	0	373	619	Colombia	0	0	84
Benin	105	0	0	Dominican Rep.	0	0	43
Burkina Faso	0	28	221	Ecuador	0	0	246
Cape Verde	66	19	21	El Salvador	0	0	45
Chad	0	0	149	Guatemala	0	0	235
Côte d'Ivoire	0	0	0	Haiti	85	225	370
Gambia	18	1	17	Honduras	50	170	261
Ghana	0	0	39	Jamaica	0	0	0
Guinea	0	0	78	Nicaragua	24	152	213
Guinea-Bissau	10	0	10	Peru	0	0	124
Liberia	171	42	108	**Latin America and**			
Mali	0	0	93	**the Caribbean**	**287**	**735**	**1,897**
Mauritania	30	10	53				
Niger	0	0	37	Armenia	97	208	30
Nigeria	344	0	5	Azerbaijan	47	0	0
Senegal	0	0	79	Georgia	26	104	0
Sierra Leone	63	142	198	Kyrgyzstan	0	0	0
Togo	61	0	69	Tajikistan	256	520	322
Sub-Saharan Africa	**3,325**	**10,999**	**15,294**	**New Independent States**	**426**	**832**	**352**
				Total	**7,026**	**17,054**	**25,004**

Appendix table-2b--List of countries and their food gaps, 2010

	2010 food gaps				2010 food gaps		
	Status quo	Nutrition	Distribution		Status quo	Nutrition	Distribution
		1,000 tons				1,000 tons	
Cameroon	237	0	253	Algeria	718	909	1,131
Centr. Afr. Rep.	98	137	192	Egypt	0	0	0
Congo, Dem. Rep.	1,551	4,218	4,578	Morocco	0	0	0
Burundi	142	629	689	Tunisia	0	0	1
Eritrea	237	424	441	**North Africa**	**781**	**909**	**1,132**
Ethiopia	0	2,525	3,020				
Kenya	0	399	1,281	Afghanistan	1,847	2,795	3,048
Rwanda	595	585	616	Bangladesh	0	0	975
Somalia	548	1,640	1,700	India	0	0	0
Sudan	0	0	0	Indonesia	0	0	0
Tanzania	55	1,252	1,537	Korea, Dem. People's Rep.	835	658	861
Uganda	830	0	347	Nepal	536	0	182
Angola	785	1,065	1,201	Pakistan	0	0	0
Lesotho	87	97	138	Philippines	0	0	227
Madagascar	591	661	818	Sri Lanka	0	0	0
Malawi	14	401	461	Vietnam	0	0	0
Mozambique	0	95	844	**Asia**	**3,218**	**3,454**	**5,294**
Swaziland	45	21	45				
Zambia	70	862	976	Bolivia	0	0	19
Zimbabwe	0	62	444	Colombia	0	0	0
Benin	227	0	0	Dominican Rep.	0	0	0
Burkina Faso	129	264	459	Ecuador	0	0	175
Cape Verde	94	35	37	El Salvador	24	0	118
Chad	0	4	203	Guatemala	0	0	287
Côte d'Ivoire	0	0	0	Haiti	297	462	576
Gambia	82	60	68	Honduras	0	120	263
Ghana	0	0	43	Jamaica	0	0	0
Guinea	139	0	155	Nicaragua	148	313	375
Guinea-Bissau	32	0	18	Peru	0	0	0
Liberia	446	264	313	**Latin America and**			
Mali	81	119	250	**the Caribbean**	**470**	**894**	**1,813**
Mauritania	286	260	284				
Niger	451	77	276	Armenia	0	0	30
Nigeria	0	0	0	Azerbaijan	0	0	0
Senegal	265	108	383	Georgia	0	0	0
Sierra Leone	166	264	314	Kyrgyzstan	0	0	0
Togo	22	0	70	Tajikistan	0	285	322
Sub-Saharan Africa	**8,303**	**16,530**	**22,454**	**New Independent States**	**0**	**285**	**352**
				Total	**12,709**	**22,072**	**31,045**

Appendix 3--Country indicators

Region and country	Population 2000	Population growth rate	Grain production: Growth 1980-99	Grain production: Coefficient of variation 1980-99	Root production growth 1980-99	Projected annual growth in supply	Per capita GNP 1998	Macroeconomic indicators: Per capita GNP growth 1998	Macroeconomic indicators: GDP growth 1998	Export earnings growth 1998	Official development assistance as a share of GNP 1998	External debt (present value) as a share of GNP 1998
	1,000		---------- Percent ----------				U.S. dollars			---------- Percent ----------		
North Africa:												
Algeria	31,471	2.3	0.1	45.9	4.4	0.8	1,550	3.6	5.1	3.5	0.9	66.0
Egypt	68,470	1.8	5.0	6.8	3.2	1.2	1,290	4.5	5.6	-7.7	2.3	29.0
Morocco	28,351	1.7	1.3	46.7	4.9	1.2	1,240	5.3	6.5	3.3	1.5	54.0
Tunisia	9,586	1.3	2.6	45.7	5.0	1.5	2,060	4.1	5.0	3.7	0.8	56.0
Central Africa:												
Cameroon	15,085	2.7	1.9	11.0	2.1	2.0	610	3.8	5.0	4.7	5.0	98.0
Central African Rep.	3,615	1.8	1.1	14.3	0.0	1.1	300	2.6	4.7	0.6	11.6	55.0
Congo, Dem.Rep.	51,654	2.6	3.6	9.8	1.5	1.9	110	0.7	3.0	14.3	2.0	196.0
West Africa:												
Benin	6,097	2.7	4.8	9.1	6.3	2.1	380	1.9	4.5	-1.0	9.2	46.0
Burkina Faso	11,937	2.8	5.3	13.7	-5.5	2.2	240	3.8	6.2	10.5	15.5	32.0
Cape Verde	428	2.4	9.3	56.3	1.2	0.6	1,200	2.2	5.0	-3.9	--	--
Chad	7,651	2.6	4.2	18.5	1.1	2.7	230	5.5	8.1	12.2	10.0	38.0
Côte dílvoire	14,786	1.8	2.7	6.0	2.3	1.9	700	3.9	5.4	0.9	7.6	122.0
Gambia	1,305	3.0	1.5	17.2	0.0	1.1	340	2.0	4.7	5.5		--
Ghana	20,212	2.7	7.1	15.3	8.5	2.4	390	1.9	4.6	14.4	9.6	55.0
Guinea	7,430	1.0	3.4	5.9	3.0	1.7	530	1.5	4.5	12.8	9.8	69.0
Guinea-Bissau	1,213	2.2	4.7	18.7	3.3	1.5	160	-30.4	-28.1	-35.8	--	--
Liberia	3,154	7.6	-5.5	34.4	-0.5	0.9	--	--	--	--	--	--
Mali	11,234	2.5	4.7	11.9	1.9	2.1	250	1.3	3.6	1.3	13.5	84.0
Mauritania	2,670	2.7	9.2	33.8	-0.3	0.6	410	1.5	3.5	8.7	17.8	148.0
Niger	10,730	3.2	2.9	14.7	0.6	2.0	200	4.8	8.4	8.7	14.4	55.0
Nigeria	111,506	2.4	5.9	16.8	9.4	2.0	300	-1.5	1.8	-8.3	0.5	74.0
Senegal	9,481	2.6	1.1	19.7	1.7	1.2	520	3.8	5.7	5.2	10.8	58.0
Sierra Leone	4,854	2.9	-2.5	9.3	5.7	1.3	140	-2.9	0.7	--	16.2	126.0
Togo	4,629	2.6	4.6	16.2	2.3	2.4	330	-3.5	-1.0	-0.3	8.6	68.0
East Africa:												
Burundi	6,695	2.0	-2.7	16.3	1.5	1.8	140	2.6	4.8	-8.6	8.8	72.0
Eritrea	3,850	3.5	1.0	53.9	0.5	1.0	200	-6.7	3.0	-33.5	19.7	11.0
Ethiopia	62,565	2.4	4.0	16.0	2.9	3.0	100	-4.2	-1.0	-9.4	10.0	135.0
Kenya	30,080	1.8	0.4	14.6	2.9	1.4	350	0.3	1.8	-5.8	4.2	45.0
Rwanda	7,733	2.9	-2.9	13.9	-2.6	1.6	230	7.1	9.5	-0.6	17.3	34.0
Somalia	10,097	2.7	-3.5	37.5	2.2	1.2	--	--	--	--	--	--
Sudan	29,490	2.1	3.9	30.7	-3.7	2.3	290	2.7	5.0	--	--	--
Tanzania	33,517	6.9	2.0	12.8	0.0	1.9	220	3.8	3.5	-10.0	12.5	71.0
Uganda	21,778	3.0	2.2	9.2	1.0	2.4	310	2.8	5.6	-14.9	7.0	35.0

See note at end of table.

continued--

Appendix 3--Country indicators--Continued

Region and country	Population 2000	Population growth rate	Grain production: Growth 1980-99	Grain production: Coefficient of variation 1980-99	Root production growth 1980-99	Projected annual growth in supply	Per capita GNP 1998	Macroeconomic indicators: Per capita GNP growth 1998	Macroeconomic indicators: GDP growth 1998	Export earnings growth 1998	Official development assistance as a share of GNP 1998	External debt (present value) as a share of GNP 1998
	1,000		---------- Percent ----------				U.S. dollars			---------- Percent ----------		
Southern Africa:												
Angola	12,878	3.2	2.0	26.1	5.0	1.4	380	16.3	5.0	-20.5	8.1	279.0
Lesotho	2,153	2.1	0.6	29.9	9.2	1.0	570	-5.3	-3.6	15.8	5.7	42.0
Madagascar	15,942	4.4	1.3	3.5	1.7	1.6	260	1.7	3.9	1.1	13.5	89.0
Malawi	10,925	3.0	1.8	22.9	0.5	1.8	210	-1.0	3.1	3.8	24.4	77.0
Mozambique	19,680	2.2	6.8	33.8	1.9	2.0	210	9.7	12.0	6.5	28.2	74.0
Swaziland	1,008	2.9	0.7	27.4	-1.0	1.5	1,400	-1.3	2.0	3.0		
Zambia	9,169	2.1	-1.2	33.0	5.7	1.9	330	-4.1	-2.0	-7.5	11.4	181.0
Zimbabwe	11,669	1.2	-1.1	31.9	5.3	1.9	620	-1.4	2.5	25.2	4.7	69.0
Asia:												
Afghanistan	22,720	3.6	-1.5	12.6	-0.8	1.3	--	--	--	--	--	--
Bangladesh	129,155	1.7	2.1	4.5	0.7	1.7	350	4.2	5.1	14.3	2.7	22.0
India	1,013,662	1.6	2.7	4.2	3.1	1.7	440	4.3	6.1	4.2	0.4	20.0
Indonesia	212,107	1.4	2.0	4.0	1.2	1.7	640	-18.0	-13.2	11.2	1.5	169.0
Korea, D. People's Rep.	24,039	1.4	-2.2	--	-1.3	0.0	--	--	--	--	0.0	43.0
Nepal	23,930	2.3	3.1	6.6	6.9	1.6	210	0.3	2.3	-10.0	8.3	31.0
Pakistan	156,483	2.7	2.5	4.9	6.0	2.3	470	0.5	3.3	3.7	1.6	41.0
Philippines	75,967	2.0	2.0	5.9	0.6	1.4	1,050	-2.1	-0.5	-10.4	0.9	66.0
Sri Lanka	18,827	1.0	0.7	8.3	-4.9	1.1	810	3.3	4.7	1.0	3.2	41.0
Vietnam	79,832	1.4	5.2	6.3	-2.2	1.7	350	4.3	5.8	--	4.3	76.0
Latin America and the Caribbean:												
Bolivia	8,329	2.3	3.0	13.3	0.6	3.6	1,010	2.7	4.7	2.7	7.5	59.0
Colombia	42,321	1.8	-1.5	11.8	1.4	2.6	2,470	-2.4	0.6	8.8	0.2	32.0
Dominican Republic	8,495	1.6	-1.2	10.8	1.8	3.9	1,770	4.9	7.3	4.4	0.8	28.0
Ecuador	12,646	1.9	1.9	18.4	8.2	2.1	1,520	2.2	0.6	-2.5	0.9	75.0
El Salvador	6,276	2.0	0.8	10.2	1.6	1.3	1,850	1.1	3.2	1.8	1.5	27.0
Guatemala	11,385	2.7	0.0	7.2	0.1	1.8	1,640	2.8	5.1	6.0	1.2	23.0
Haiti	8,222	1.7	1.9	16.5	4.0	0.7	410	1.1	3.1	21.8	10.5	16.0
Honduras	6,485	2.7	-3.6	13.0	2.7	2.7	740	1.1	3.0	1.8	6.3	64.0
Jamaica	2,583	0.9	1.5	51.1	3.2	0.8	1,740	0.1	0.1	-3.2	0.3	61.0
Nicaragua	5,074	2.8	3.9	15.7	0.6	1.5	370	3.3	4.0	-6.4	28.1	262.0
Peru	25,662	1.7	2.9	14.7	2.4	2.7	2,440	-3.3	0.3	3.3	0.8	55.0
New Independent States:												
Armenia	3,520	-0.2	1.7	17.0	2.0	1.4	460	3.1	7.2	-0.1	7.1	29.0
Azerbaijan	7,734	0.5	-1.5	15.3	13.2	1.4	480	8.9	10.0	-7.8	2.2	13.0
Georgia	4,968	-0.8	1.4	22.5	9.0	1.2	970	2.5	2.9	3.5	4.6	36.0
Kyrgyzstan	4,699	0.6	-0.2	17.6	17.7	1.5	380	2.8	3.6	-3.5	60.5	3.1
Tajikistan	6,188	1.4	6.7	31.1	-4.4	1.1	370	13.3	8.2	--	--	--

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

Source: Population=UN World Population Prospects, 1998; Macroeconomic indicators=World Bank.

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