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Contact:
Shahla Shapouri
Stacey Rosen

Principal Contributors
Chris Bolling
M.S. Deepak
Michael Kurtzig
William Liefert
Birgit Meade
Stacey Rosen
David Schimmelpfennig
Shahla Shapouri
Meredith Soule
Michael Trueblood
Keith Wiebe

Technical Editor
Diane Decker

Production/Design
Wynnice Pointer-Napper
Victor Phillips, Jr.

Cover Photos
FAO
Tanzania

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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, the analysis was widened beyond the assessment of aggregate food availability to include more aspects of food security. The title was therefore changed to Food Security Assessment.

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Summary

Food Gaps Continue To Widen for Low-Income Countries

Food production shortfalls continue to threaten the food security of low-income countries. The food security of these countries is evaluated by measuring the gaps between actual food consumption (domestic production, plus commercial imports, minus non-food use) and consumption targets, and projecting the gaps through the next decade. The targets are: 1) maintaining per capita food consumption at 1995-97 levels, and 2) meeting minimum recommended nutritional requirements. In addition, an attempt was made to estimate food consumption by different income groups within each country.

In 1998 the food gap to maintain per capita consumption at 1995-97 levels in 66 low-income developing countries is estimated at 11 million tons, up from 8.5 million estimated for 1997. The gap to meet minimum nutritional requirements is estimated to be substantially higher at 17.6 million tons, compared with 15 million last year. Weather-related production shortfalls are expected to account for about 15-40 percent of these food gaps. The 66 countries in the study either have been or may become food aid recipients. In the projections, however, the availability of food aid is excluded. Therefore, depending upon future food aid availabilities, some or all of the projected food gaps can be eliminated.

Over the coming decade, the food gaps with respect to both consumption targets are projected to widen. The gap to maintain per capita consumption increases 80 percent to 19.8 million tons in 2008, while the nutritional gap expands 61 percent to 28.4 million. In 2008, food consumption is projected to fall short of the nutritional requirement in 35 countries, while 47 countries are expected to face a decline in per capita food consumption.

Unequal purchasing power within countries exacerbates food insecurity in the 66 countries. Not surprisingly, people in lower income groups have larger nutritional gaps than their wealthier counterparts. Moreover, the ratio of food consumption to nutritional requirements of the lowest income quintile is much lower than the national average. In Sub-Saharan Africa, food consumption by people in the lowest income quintile is estimated to equal only 72 percent of the minimal nutritional requirement in 1998. The corresponding figures for Latin America and the New Independent States are 78 and 80 percent, respectively.

For the 66 countries as a whole, the "distribution gap" (the amount of food required to bring consumption of each income quintile up to the minimal nutritional requirement) is expected to rise 36 percent over the next decade and reach 38.4 million tons in 2008. The growth of this gap far surpasses the growth in the number of people becoming food insecure. In fact, the number of people failing to meet nutritional requirements is projected to grow 6 percent to 1.14 billion by 2008. This implies that the nutritional problems related to income distribution will intensify more than they will spread.

The two regions projected to face a deteriorating nutritional situation over the next 10 years are Asia and Sub-Saharan Africa. In Asia, however, the deterioration is negligible. Moreover, the region's consumption relative to nutritional requirements starts at a higher level. Conversely, the deterioration is measurable in Sub-Saharan Africa and consumption starts at a lower base. In this region, only the highest of the five income groups is projected to consume at a level above the minimum nutritional requirement, compared with the top three groups in Asia. Changes in the "distribution gap" confirm the severity of food insecurity in Sub-Saharan Africa. For other regions, this gap declines or increases negligibly by 2008. But for Sub-Saharan Africa the gap jumps more than 50 percent.

Selected countries of Latin America and North Africa depend heavily on food imports, which currently provide around 40 percent of their consumption needs. Food imports in both regions are projected to remain at this level or increase slightly during the next decade. Financing this volume of food imports, however, could become difficult unless the real prices of Latin America's and North Africa's export commodities recover from their current lows.

Of the five New Independent States included in the study, only Tajikistan and Azerbaijan are projected to be vulnerable to food insecurity in 1998. In the next decade, assuming continued peace, Azerbaijan is projected to eliminate its food gaps, but Tajikistan will continue to face substantial food deficits.

Global Food Security: Overview

A continuation of present trends in food supplies is projected to lead to deteriorating food security of many low-income countries. The unequal distribution of food within countries exacerbates the situation. Significant increases in investment in agricultural sectors, along with adjustments in trade and producer policies, will be imperative to improve food security in resource-poor countries. [Shahla Shapouri and Stacey Rosen]

Food Insecurity Grows Despite Adequate Global Food Supplies

Global food supplies continue to grow faster than population. According to FAO data, average world calorie consumption was about 2,745 per day in 1996, up nearly 9 percent from 1980. The Economic Research Service projects this trend of rising per capita food supplies to continue through the next decade. If the available food was divided equally, each and every person would be able to consume more than the minimum nutritional requirement (a target of 2,100 calories per day is used in this report). However, the level and growth in food consumption vary among countries. While food consumption is growing in higher income developing countries, many lower income countries remain vulnerable to food insecurity. Among lower income countries, the nature of this problem differs both in magnitude and in causes. In some countries, many of them in Sub-Saharan Africa, a lack of resources (physical and financial) is the root cause of the food security problem and unequal food distribution exacerbates the situation. In other countries, mostly in Latin America and Asia, food insecurity is caused by the unequal distribution of food resulting from wide disparities in income. The differences in the causes of food insecurity influence the assessment of the amount of food needed and strategies required to achieve food security.

This report focuses on 66 countries that have been or are potential food aid recipients. The future food security of these low-income developing countries is evaluated by projecting the gaps between food consumption (domestic production, plus commercial imports, minus non-food use) and consumption targets through the next decade. The two consumption targets are: 1) maintaining per capita consumption at 1995-97 levels (also referred to as status quo), and 2) meeting minimum recommended nutritional requirements (see box "How Food Security Is Assessed"). In addition to aggregate measures, an attempt was made to estimate food consumption by different income groups within each country. **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 micro nutrients and lack of health and sanitary facilities**.

The results indicate that food production shortfalls continue to be a threat to the food security of countries facing foreign exchange constraints that limit their ability to use food imports to compensate for slow domestic production. The food gap to maintain per capita consumption at the base level (1995-97) in the 66 countries is estimated at 11 million tons for 1998 (see table 1). The gap to meet minimum nutritional requirements is estimated at 17.6 million tons. Weather related production shortfalls account for about 15 to 40 percent of food gaps in 1998. The estimates are based on USDA data as of October 1998. It should be emphasized that the availability of food aid is excluded in these projections. Therefore, depending upon the future availability of food aid, a proportion or all of the projected food gaps can be eliminated. For example, in 1997 roughly 5.5 million tons of food aid were distributed globally. If the same amount of food aid is provided in 1998, it would fill slightly more than 50 percent of the calculated gap to maintain per capita consumption and about 30 percent of the nutritional gap.

The long term projections indicate growing food gaps with respect to both consumption targets in the 66 countries. The food gap to maintain per capita consumption increases 80 percent during 1998 to 2008, while the nutritional gap increases 61 percent (see table 1 and figure 1). In 2008, in 35 countries, food consumption is projected to fall short of nutritional requirements and 47 countries are expected to face a decline in per capita consumption.

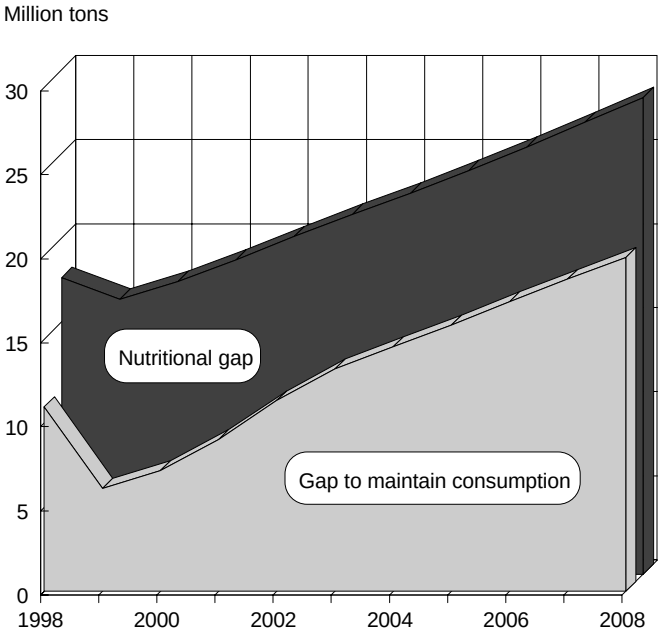
National level analysis, however, masks the impact of unequal access to income on food security. People in lower income quintiles have larger nutritional gaps than their wealthier counterparts. The estimated results show the ratio of food consumption to nutritional requirements of the lowest income quintile to be much lower than that of the national average. In Sub-Saharan Africa, the lowest income quintile is estimated to consume only 72 percent of its nutritional requirement in 1998, followed by 78 percent in Latin America, and 80 percent in the New Independent States (NIS) (see table 2). The amount of food required to bring food consumption of each income quintile up to the nutritional requirement is the ***distribution gap***. This gap is projected to rise from 28 million tons in 1998 to 38.4 million tons by 2008, an increase of 36 percent.

Table 1--Food Availability and Food Gaps for 66 Countries

Year	Grain production	Root production (grain equiv.)	Commercial imports	Food aid receipts (grains)		Aggregate availability of all food (grain equiv.)	Population
			---1,000 tons ---				Million
1988	352,316	47,695	39,417	9,420		486,758	2,061
1989	351,311	49,603	34,948	10,136		491,222	2,108
1990	365,395	53,633	33,525	10,638		506,901	2,155
1991	369,597	56,285	39,572	10,189		522,584	2,202
1992	377,815	57,466	42,216	8,224		540,416	2,249
1993	389,248	58,592	45,549	7,682		547,965	2,296
1994	393,952	59,485	53,843	5,381		576,459	2,344
1995	413,124	60,940	46,211	5,045		586,385	2,392
1996	405,209	60,572	56,957	3,841		586,832	2,442
1997				**Food gap***			
				SQ	NR	(w/o food aid)	
1997	415,082	61,843	56,199	***10,974***	***17,630***	591,788	2,543
2002	458,835	67,002	62,696	***13,236***	***21,407***	650,614	2,802
2007	498,690	72,988	72,864	***19,862***	***28,369***	713,711	3,066

* SQ stands for *status quo* and describes the amount of grain equivalent needed to support 1995-97 levels of per capita consumption and NR stands for *nutritional requirements* and describes the amount needed to support minimum nutritional standards (see box "How Food Security Is Assessed.")

Figure 1
Food Gaps in All 66 Countries, 1998-2008



The growth of the distribution gap is not simply the result of more people becoming food insecure. In fact, the number of people failing to meet their nutritional requirement is projected to grow only 6 percent from 1998 to 1.14 billion by 2008. This means distribution-related nutritional problems will *intensify* more than they will *spread*.

Sub-Saharan Africa Remains the Most Vulnerable Region

Sub-Saharan Africa (37 countries) is projected to account for about 60 percent of the food gap to maintain consumption and 79 percent of the total nutritional gap (of the 66 study countries) in 2008. Meanwhile, Sub-Saharan Africa's population is projected to account for less than 26 percent of the total of the study countries by 2008 (see figure 2). Sub-Saharan Africa's food gap to maintain per capita food consumption is estimated at 6.7 million tons for 1998, while the gap to meet the nutritional requirement is estimated at 13.9 million tons. These gaps are 2.5 times and 5 times higher than the average regional food aid received during 1995-97. The 1998 estimates of food gaps are highly influenced by production variability, either weather-related or due to civil strife. The projected long term food outlook for the region shows a steady increase in the food gaps. Historically, Sub-Saharan Africa showed the smallest improvement in average daily per capita calorie consumption. Unfortunately, the growing share of food aid received by the region failed to reverse this trend. Our projections of per capita food consumption for the next decade also indicate a continued declining trend, unless more food aid is provided.

In addition to inadequate food availability, skewed distribution of purchasing power amplifies the nutritional problem in the region as scarce food supplies have been distributed unevenly among populations. The *distribution gap* for the region is estimated at 18 million tons in 1998, increasing to 27 million by 2008. The number of people who cannot meet

Table 2--Ratio of Food Consumption to Nutritional Requirement

Region	Year	Income quintiles				
		Lowest	Second	Third	Fourth	Highest
North Africa	1998	1.07	1.17	1.23	1.29	1.41
	2008	1.11	1.17	1.22	1.27	1.38
Sub-S. Africa	1998	0.72	0.80	0.85	0.91	1.06
	2008	0.70	0.78	0.83	0.89	1.03
Asia	1998	0.88	0.96	1.02	1.07	1.19
	2008	0.89	0.96	1.00	1.06	1.19
Latin America	1998	0.78	0.92	1.00	1.08	1.23
	2008	0.85	0.95	1.03	1.11	1.31
NIS 1/	1998	0.80	0.90	0.95	1.01	1.10
	2008	0.92	1.00	1.06	1.13	1.24

1/ Based on average regional income distribution.

their nutritional requirement is projected to increase 34 percent between 1998 and 2008, to 516 million.

Low-income Asia and Latin America Face Consumption Declines and Distribution Problems

The nine countries in the Asian region studied here are projected to face declining per capita consumption levels that produce an estimated gap of 3.8 million tons in 1998, with Afghanistan, Bangladesh, and Indonesia making up the bulk of the total. By 2008, these three countries plus Pakistan will account for 94 percent of the total consumption deficit of the 9 Asian countries in the study. In terms of meeting nutritional requirements, Afghanistan and Bangladesh will be the only countries in the region consuming below their respective requirements in 1998. By 2008, the region's nutritional gap is projected to widen and Nepal will join the other countries that face a deficit.

Low-income Asian countries have made significant gains in increasing food consumption over the past three decades. However, average calorie consumption remains low compared to the world average. Therefore, when the inequality in purchasing power is taken into account, the estimated *distribution gap* in 2008 is projected at almost two times the average nutritional gaps. Although the number of people who cannot meet their nutritional requirement is projected to decline 11 percent over the next decade, the region is still projected to account for more than half of the undernourished people in the study countries.

Government policies could reduce the magnitude of the problem. Countries such as India and Pakistan have restricted food imports as part of their policy of food self-sufficiency, but have the capacity to increase their imports. The import dependency of this region is less than that of the other regions, averaging less than 3 percent during 1980-97. Increasing food imports, for example, would reduce food prices and increase purchasing power of the poor.

In Latin America and the Caribbean, food gaps are a growing problem and annual production variations tend to intensify the vulnerability of individual countries. El Niño brought drought in Central America and heavy flooding in Ecuador and Peru in 1997 and 1998. In the long term, five of the eleven countries (Bolivia, Guatemala, Haiti, Honduras, and Nicaragua) are projected to be unable to maintain recent consumption levels or fulfill minimum nutritional requirements. These five countries also have the lowest average per capita calorie consumption in the region. It should be noted that the impact of the recent hurricanes to hit the region has not been considered in our quantitative analysis and food insecurity is likely to be a more serious problem than reflected in our results. In the study countries of Latin America, food import dependencies are high, averaging about 40 percent in 1995-97 and are projected to remain at this level during the projection period. This, while not alarming, may not be sustainable over the long term. In Haiti, Honduras, and Nicaragua, debt service payments continue to be burdensome, with the value of debt exceeding the value of GNP in 1995.

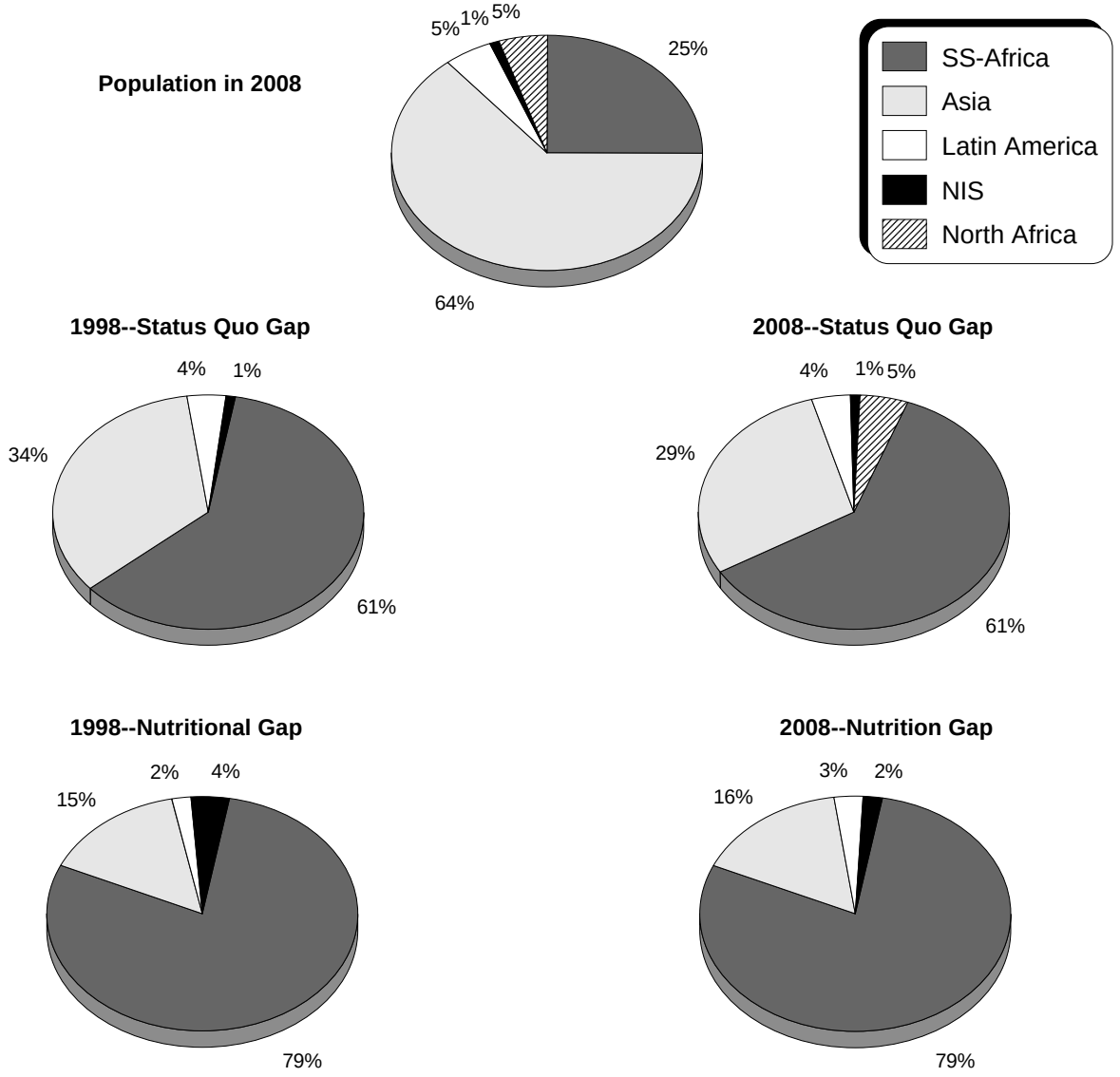
In low-income Latin American countries, the *distribution gap* is almost three times the average national nutritional gap. The number of people who cannot meet their nutritional requirement is projected to decrease slightly between 1998 and 2008. If more disaggregated data were available, the results would likely indicate the depth of the region's food insecurity to be even more severe.

North Africa and NIS Less at Risk

North Africa, despite the wide variation of incomes among and within countries, has been successful in protecting food consumption of low-income consumers. The two dominant features of food production of the region are scarcity of physical resources and highly variable output due to erratic rainfall (except in Egypt, where irrigation is prevalent). Imports currently make up about 39 percent of the region's consumption needs and the share is projected to rise slightly to 45 percent by 2008. Financing this level of imports in the next decade may be difficult. The region's two largest

Figure 2

Sub-Saharan Africa Has Only 25 Percent of the World's Population, But Accounts for 80 Percent of the World Nutritional Gap



food importers, Egypt and Algeria, are, to varying degrees, dependent upon oil and gas revenues (directly through exports and also indirectly for Egypt through worker remittances from neighboring OPEC countries). If real prices of oil and gas gradually recover from their current low levels, these countries should be able to cover their import needs. However, continuation of current prices portends long run financial difficulties.

Of the 5 NIS countries covered in this report, only Tajikistan and Azerbaijan are vulnerable to food insecurity. In the next decade, assuming continued peace, Azerbaijan is projected to eliminate its food gaps, but Tajikistan will continue to face substantial food deficits and low absolute food consumption levels in comparison to the other NIS countries.

Food Aid Remains Vital to Many Countries

Food aid, although valuable to food-insecure countries, is inadequate both in terms of availability and capacity to alter the food security prospects of low-income countries. Food aid shipments for 1997/98 are estimated at roughly 5.5 million tons, the same as the previous year. Food aid donations have not been this small since the mid-1970s. If the food aid continues at the 5.5-million-ton level, it will cover 28 percent of the needs to maintain per capita consumption and only 19 percent of the nutritional gap by the year 2008.

As food aid donations have been declining, the type of food aid being supplied has also changed. Early on, most food aid was program food aid, which is non-targeted food assistance. This type of aid is provided on a bilateral basis to

support recipient governments' budgets or reduce balance of payments deficits. More recently, donors have moved toward relief and project aid, which is targeted to specific groups of nutritionally vulnerable people. This approach is clearly evident in the appropriations for the U.S. Public Law (PL) 480 program. PL 480's Title I program provides government-to-government sales of agricultural commodities to developing countries under long term credit arrangements. This program was cut roughly 25 percent between fiscal years 1996 and 1998. Conversely, funding for Title II, the program under which the United States delivers emergency food and World Food Program shipments, has remained relatively stable.

Food Security of Lower Income Countries: Opportunities and Obstacles

Based on the projected results, countries covered in this report can be grouped into four different food security categories: 1) countries with severe food insecurity problems, where average food consumption is projected to fall to less than 75 percent of the minimum nutritional requirement by 2008; 2) countries that are moderately food insecure, where projected average food consumption falls in the range of 75 to 99 percent of the nutritional requirement; 3) countries that are projected, on average, to have adequate food, but because of inequality in purchasing power, segments of their population face food insecurity; and 4) countries where all income groups are projected to have adequate food (table 3).

1) Twelve of the study countries fall in the most vulnerable group, and all but two are in Sub-Saharan Africa. A common characteristic among these countries is that they have been or are currently faced with internal or external political problems. While the projections did not account for a worsening of their situation over time, projected population growth alone will severely deteriorate their food security situation because of their weak base period position.

The political problems of these countries reinforce long term trends in poverty, food insecurity, and a breakdown of social structure. Consequently, events such as drought, disease (human or livestock), or floods can easily trigger acute food shortages and famine. For these countries, political stability and better policies are essential for improving food security.

2) The moderately food insecure group includes 27 countries. There is, however, a wide variation in severity of food insecurity in these countries. Some are experiencing civil unrest, while others have shown progress in their agricultural performance and may be able to sustain the recent growth momentum. For example, in Congo, civil unrest during the last 2 years has displaced populations, adversely affecting food production and hindering marketing activities. This factor, coupled with flooding from El Niño in early 1998 that damaged houses, infrastructure, and crops, led to higher food prices and food insecurity in many parts of the country. On

How Food Security Is Assessed

The commodity coverage in this report has been expanded from the Food Security Assessment published in 1997. In addition to grains and root crops, the commodity coverage now includes a new group called "other." The "other" category includes meat and dairy products. The three commodity groups in total, account for as much as 90 percent of all calories consumed in the study countries. This report projects food consumption and access in 66 lower income developing countries—37 in Sub-Saharan Africa, 4 in North Africa, 11 in Latin America and the Caribbean, 9 in Asia, and 5 in the NIS (see appendix 1 for a list of countries and appendix 2 for a detailed description of the methodology). The projections are based on 1995-97 data. The period covered is 1998 (current), 2003 (5 years out), and 2008 (10 years out). Projections of food gaps for the countries through 2008 are based on differences between consumption targets and estimates of food availability, which is domestic supplies (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 1995-97 levels of per capita consumption, and 2) meeting nutritional requirements (NR), which is the gap between available food and food needed to support minimum per capita nutritional standards (for definitions of terms used see Methodology in appendix 2). 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 fail to 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 bring food consumption of each income quintile up to the nutritional requirement. Finally, based on the projected population, the number of people who cannot meet their nutritional requirements is projected.

The common terms used in the reports are: domestic food supply, which is the sum of domestic production and commercial imports; food availability, which is food supply minus non-food 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.

Table 3--Food Insecurity in 2008: Unequal national food distribution is the principal factor behind food insecurity for 30 percent of the population

	National food secure 1/	Moderately food insecure 2/	Highly food insecure 3/
N. Africa:	Algeria		
Sub-Saharan Africa:	Benin, Cote dí Ivoire, Guinea-Bisseau, Nigeria	Cameroon, Centr.Afr. Republic, D.R. of Congo, Ethiopia, Kenya, Sudan, Uganda, Tanzania, Lesotho, Madagascar, Malawi, Mozambique, Zambia,Zimbabwe, Burkina Faso, Guinea, Mali, Mauritania, Senegal, Togo	Burundi, Eritrea, Rwanda, Somalia, Angola, Cape Verde, Chad, Liberia, Niger, Sierra Leone
Asia:	India, Pakistan, Sri Lanka	Bangladesh, Nepal	Afghanistan
Latin America:	El Salvador, Ecuador, Peru	Bolivia, Guatemala, Honduras, Nicaragua, Haiti	
NIS:	Azerbaijan		Tajakistan

1/Adequate food but unequal distribution. 2/ Meet 75 percent or more of requirement. 3/ Meet less than 75 percent of requirement.

the other hand, Mozambique is reaping the benefits of sustained peace. Production has risen steadily for the last 6 years. Grain output in 1997 was estimated to be roughly 3 times higher than the average output of the late 1980s.

The common characteristic of this group, however, is the large contribution of domestic food production to food consumption. The use of modern technologies in agricultural production in general and food production in particular is limited. As countries remain unsuccessful in adopting new technologies to increase productivity, labor remains the principal input in production and large families will be the main hope for survival. With slow growth in domestic food production, these countries use commercial imports to fill food gaps. Historically, imports of these countries were supported by external assistance; food aid helped reduce the financial burden of food imports. With the decline in external assistance, a larger share of foreign exchange availability must be allocated to food imports. However, any increase in spending on food imports will crowd out spending on essential raw materials and spare parts, raising concern over the long term economic health of these countries.

Roughly half of the Sub-Saharan countries fall in this moderately insecure group. To improve food security of this group, a special article in this report, *"Agricultural Productivity and Food Security in Sub-Saharan Africa,"* argues that returns to any single intervention in isolation are likely to be limited in the absence of broad improvements in physical infrastructure, political stability, and the institutional environment. Policy reforms directed at improving physical and institutional infrastructure not only increase use of inputs by lowering prices, but also improve output prices and thus directly stimulate output. In addition, investment in education of the rural labor force and agricultural research will improve the future prospects for productivity growth.

3) In the third category of insecure countries, skewed income distribution limits access of low-income groups to sufficient amounts of food despite adequate aggregate food supplies. Nearly 40 percent or 27 of the 66 study countries have adequate supplies, but in 12 of them, skewed income distribution limits purchasing power of the lowest income groups, precluding adequate diets. In these countries, improved agricultural performance can reduce income inequality. Statistics show that most poor live in rural areas with limited access to resources such as land or credit. In these countries, food insecurity among the low-income groups is expected to continue unless special attention is focused on targeted programs that create employment and increase productivity of the poor. Increasing investment to improve market infrastructure will also help markets work and increase returns to farming communities.

4) Fifteen of the study countries are projected to be "food secure" because both on average and by individual income group their consumption will be higher than the minimum nutritional requirement.

In summary, the two regions projected to face a deteriorating nutritional situation are Asia and Sub-Saharan Africa. In Asia, however, this deterioration is negligible. Moreover, the region's consumption relative to nutritional requirements starts at a higher base level. In 1998, consumption as a share of nutritional requirements is estimated at 106 percent for the region, on average. Conversely, in Sub-Saharan Africa, this deterioration is measurable and consumption has a lower base value. In this region, only the highest income group is projected to consume at a level exceeding the minimum nutritional requirement, compared with the top three groups in Asia. The severity of the situation in Sub-Saharan Africa is confirmed upon examining the changes in the distribution gap. For all the regions other than Sub-Saharan Africa, this gap declines or increases negligibly during the projection period. For Sub-Saharan Africa, however, the gap jumps more than 50 percent over the next decade. This statistic alone is a strong indicator of the intensity of the region's food insecurity problem.

North Africa

There is no food gap in 1998, but a small gap may develop in the region by 2008. Financing a growing share of imports will become more critical over time. Maintaining political stability will be important to this end. [Mike Kurtzig]

North Africa is known for its highly variable grain production (four droughts in the last 8 years). However, the region's output this year is remarkably on trend. As a result, there is no food gap in the region based upon recent per capita consumption levels as countries will be able to purchase the balance of their grain imports. Given that current consumption levels exceed nutritional requirements, there is no nutrition-based food gap this year either. In the next decade, a relatively small food gap (about 1 million tons) is projected in the region (primarily in Egypt and to a lesser extent Algeria) which is expected to have difficulty sustaining the high per capita grain consumption.

Despite the wide variation of incomes between and within countries, North Africa has successfully protected the food consumption of low-income consumers, in part due to policies that subsidize the prices of staple foods. Average per capita incomes vary widely from $700 in Egypt to $1,800 in Algeria. Income distribution is skewed in the region with the lowest 20 percent income group sharing only 7.1 percent of total income. Yet, except for the lowest quintile income group in Algeria, it is estimated that the average consumer in all income groups throughout the region currently meets his or her nutritional requirements. This situation is projected to remain the same through 2008.

Financial import capacity will become increasingly critical to the region's food security—Food production in the region is characterized by two dominant features: 1) a scarcity of physical resources that limit output under current technologies and which are inadequate to meet demand, implying the necessity of imports even in good years; and 2) a highly variable output pattern due to erratic rainfall (except in Egypt, where irrigation is widespread). These factors underscore the critical nature of imports to meet demand. Structurally, grain imports make up about 39 percent of the region's consumption needs and are projected to increase to 45 percent in 2008.

Financing these imports will be critical in the next decade. The two largest grain importers, Egypt and Algeria (recently both accounted for about three-fourths of the region's imports), are to varying degrees dependent upon oil and gas revenues (directly through exports and also indirectly for Egypt through worker remittances from neighboring OPEC countries). If oil and gas real prices gradually recover from their current glut-induced lows, these countries should be able to cover their import needs. However, continuation of the current low prices portends long run financial difficulties. All of the countries in the region have manageable debt ratios, but may be vulnerable to a variety of political instability risks, ranging from terrorism in Algeria and Egypt to unclear succession issues.

Egypt to develop food gap despite productivity gains—Egypt is projected to have the largest food gap in the region by 2008 (about 3 percent, or 819,000 tons) based upon recent per capita food consumption levels. Egyptian food consumption, which has been climbing since the early 1980s and is now estimated at 308 kilos per person, is well above nutritional requirement levels and remains much higher than in countries with comparable purchasing power. Food subsidies, although reduced, continue for staples such as bread. Policy reform and investment in agricultural research have generated productivity gains since the early 1990s. Grain production has increased at an average annual rate of 5.2 percent from 1980 to 1997, mostly from high yield growth rates. The current average yield for all grains is about 6 tons per hectare, among the highest in the world. Egypt is projected to have lower production growth rates due to a slower growth rate in yields.

Civil strife threatens food security in Algeria—Algeria is the most import dependent country in the region. Grain imports, for example, have averaged 73 percent of supplies over the past 5 years. Projected food production growth at just over 1 percent reflects the country's generally difficult growing conditions. To offset the slowing production growth, imports will rise, making Algeria even more import dependent. Algeria's import capacity, although highly dependent on energy revenues—which in 1995-97 accounted for 95 percent of its export earnings and 60 percent of its budgetary revenues—has an immediate problem of civil strife that could cause economic collapse. Since 1992, civil strife has caused many international companies to scale back their investments. This trend, if continued, could have long term negative implications for the country's economic performance and thereby reduce import capacity, making the country more vulnerable to food insecurity.

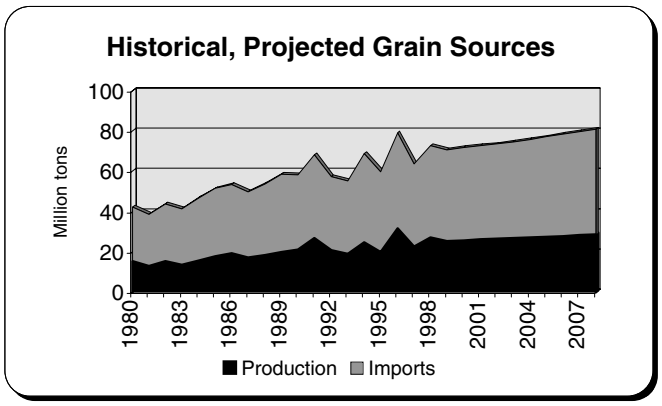
Table 4--Food Availability and Food Gaps for North Africa

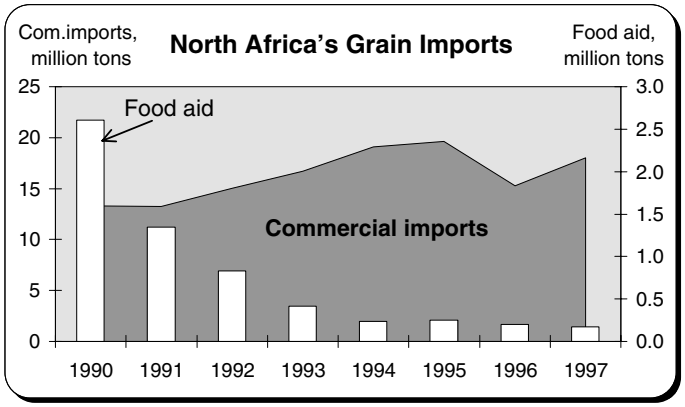
Year	Grain production	Root production (grain equiv.)	Commercial imports	Food aid receipts (grains)		Aggregate availability of all food (grain equiv.)
			---1,000 tons ---			
1989	19,908	1,034	16,844	1,993		33,576
1990	21,261	988	13,277	2,604		31,225
1991	26,890	1,162	13,219	1,345		33,859
1992	20,765	1,085	15,013	831		33,090
1993	19,082	1,053	16,731	418		33,799
1994	24,780	945	19,073	239		35,968
1995	19,937	1,318	19,656	249		41,230
1996	31,825	1,428	15,270	204		37,687
1997	22,771	1,452	18,036	169		34,567
Projections				**Food gap**		
				SQ	NR	(w/o food aid)
1998	27,204	1,275	19,206	***0***	***0***	42,208
2003	26,834	1,385	20,964	***882***	***0***	43,124
2008	28,595	1,501	23,841	***1,000***	***0***	47,615

North Africa:
131 million people

Production in this highly erratic grain producing region is near the trend level this year.

The region's grain import-dependency is increasing as land and water resources are limited and populations' incomes are rising. However, the food aid share of imports has dropped sharply in the past decade. It may be difficult to sustain current consumption levels, which for most consumers are above nutritional levels. A proportionally small food gap is projected to develop by 2008.





2008 Food Consumption as a Share of Nutritional Requirements by Income Quintile

	Lowest quintile	2nd	3rd	4th	Highest quintile
Algeria	0.97	1.04	1.08	1.13	1.22
Egypt	1.21	1.26	1.29	1.33	1.43
Morocco	1.00	1.06	1.11	1.16	1.27
Tunisia	1.26	1.34	1.40	1.46	1.58

Sub-Saharan Africa

Per capita food consumption is projected to decline during the next decade. This translates into a near doubling of the food required to maintain per capita consumption between 1998 and 2008. The nutritional gap is expected to grow 60 percent during the same period. Income inequality, in addition to widespread poverty, intensifies food insecurity in the region. The number of people in the region with inadequate access to food is projected to jump 34 percent during the next 10 years. [Shahla Shapouri and Stacey Rosen]

Sub-Saharan Africa's food gap to maintain per capita food consumption is estimated at 6.7 million tons for 1998, while the gap to meet the nutritional requirement is estimated at 13.9 million tons. These gaps are 2.5 times and 5 times higher than the average food aid received during the base year (1995-97). The large gap projected for 1998 stems from poor crops in much of the region.

In Sub-Saharan Africa, variability in crop production is a major source of instability in food consumption. The main factors contributing to the region's uneven production include weather variability and civil strife. While deviations in food production above the trend are of little concern, large and frequent deviations below the trend are critical, especially for countries with a history of chronic food deficits. Coefficients of variation (CV) in production among Sub-Saharan countries range up to 48 percent. For countries where domestic production contributes to a large share of food consumption, high production variability can cause severe nutritional problems. For example, Somalia has one of the highest production CVs of 40, and variability in production has widened its food gaps. In 1998, Somalia's grain production is estimated to decline roughly 50 percent from 1997— to a fraction of the pre-strife levels of the late 1980s.

Long-term outlook is grim—The projected long-term food outlook for the region shows a steady increase in food gaps, both to maintain per capita consumption and to meet nutritional requirements. Between 1980 and 1997, Sub-Saharan Africa showed the smallest improvement of all the regions in average daily per capita calorie consumption. In fact, if Nigeria is excluded, the region's per capita calorie consumption declined annually by 0.2 percent. Unfortunately, the growing share of food aid received by the region failed to reverse this trend. Our projections of per capita food consumption for the next decade also indicate a declining trend. This translates into a sharp increase in food required to maintain per capita consumption from 6.7 million tons in 1998 to 12.1 million in 2008. The nutritional gap is expected to grow 60 percent during the same period.

What are the driving forces behind such a gloomy outlook? The answers lie in the region's historically poor policy environment, slow changes in policies, slow growth in investment, and high population growth. Because of these factors growth in food production in 26 of the 37 countries failed to keep up with population growth during 1980-97. The assumptions for the projected food gaps are extrapolations of the historical trends that shaped these countries' food markets (i.e., no dramatic increase in investment, changes in policies, or improvements in market infrastructure are assumed). Countries are also projected to continue to struggle with their financial difficulties, which will limit their food imports. According to the International Monetary Fund (IMF), 28 of the 41 countries in the region are categorized as severely indebted. These "severely indebted" countries have debt service valued at more than 80 percent of their GNP and three times their export earnings.

Projected food production growth in Sub-Saharan Africa, although varying by country, averages about 2.3 percent from the base year (1995-97) to 2008. About 60 percent of production growth is due to expansion of crop area, which is less than the historical contribution of 80 percent. The lower projected growth for area is driven by the growing scarcity of good land in many countries.

Food import growth is not expected to compensate for the region's slow production growth. Annual growth in commercial imports is projected to follow the historical path of 1.9 percent. The main determinant of commercial import growth is growth in export earnings and the net flow of capital. World food and non-food prices also influence food imports. Growth in export earnings in all countries is projected to exceed historical levels, 2.1 percent annual real growth compared with 0.8 percent during 1980-96. The higher projected growth in export earnings reflects trade policy adjustments and the expected growth in market access due to liberalization of global markets for agricultural products. The net flows of capital are assumed constant during the projection period. This assumption can significantly influence food imports of the countries. A country such as Mozambique, which relies on external assistance for two-thirds of its import bill, is likely to face significant financial difficulties if its export growth does not compensate for the per capita decline in capital flows.

Table 5--Food Availability and Food Gaps for Sub-Saharan Africa

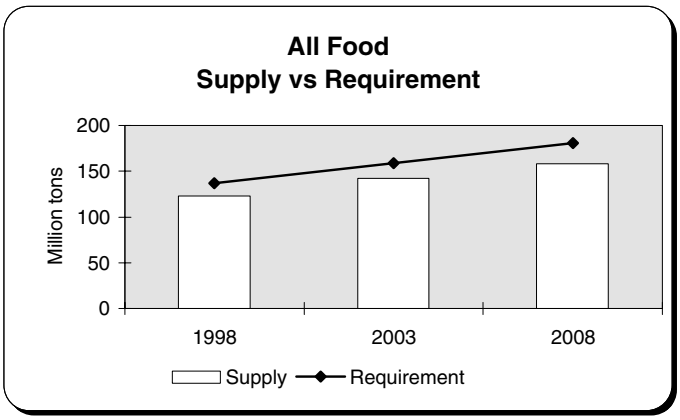
Year	Grain production	Root production (grain equiv.)	Commercial imports	Food aid receipts (grains)	Aggregate availability of all food (grain equiv.)
			---1,000 tons ---		
1989	50,421	29,232	4,385	3,351	92,548
1990	53,026	31,768	4,794	3,586	99,159
1991	59,185	35,289	5,308	4,756	108,576
1992	57,512	37,044	6,485	5,687	109,105
1993	61,386	38,092	7,719	3,485	116,712
1994	64,884	39,172	8,101	3,040	120,795
1995	65,025	39,413	7,518	2,091	122,159
1996	67,573	40,171	6,924	2,159	123,838
1997	65,804	40,154	9,368	1,857	125,883
Projections				**Food gap**	
				SQ / NR	(w/o food aid)
1998	66,141	41,200	8,636	***6,651*** / ***13,883***	122,892
2003	80,849	45,152	9,011	***6,242*** / ***16,589***	142,395
2008	90,661	49,864	9,750	***12,092*** / ***22,369***	158,369

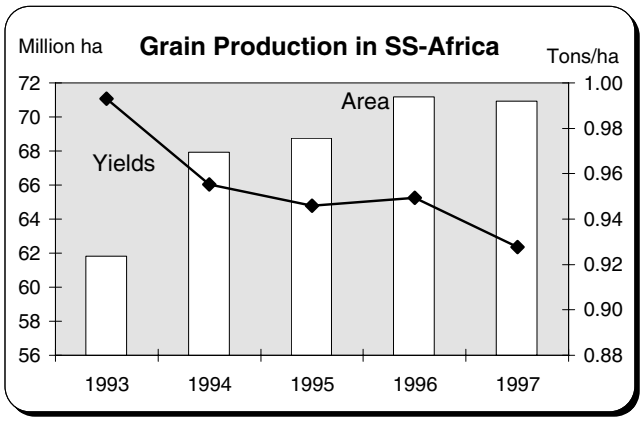
Sub-Saharan Africa
584 million people in 1998.

The gap between available food supplies and the amount of food needed to meet nutritional targets jumps 64 percent during 1998-2008.

Twenty-six of the 37 countries face gaps to maintain consumption and meet nutritional targets.

While Sub-Saharan Africa will have only 25 percent of the population of the study countries, the region is projected to account for 80 percent of the total nutritional gap.





2008 Food Consumption as a Share of Nutritional Requirements by Income Quintile

	Lowest quintile	2nd	3rd	4th	Highest quintile
Congo, Dem.Rep.	0.72	0.78	0.83	0.88	1.00
Ethiopia	0.61	0.67	0.71	0.75	0.88
Kenya	0.60	0.67	0.71	0.75	0.88
Nigeria	0.95	1.09	1.19	1.29	1.47
Sudan	0.77	0.83	0.88	0.93	1.06

Unequal purchasing power intensifies food security problems—The national estimates of food supplies discussed above mask the enormous food insecurity problems of the region that stem from inequality in food access. Second only to the Latin American countries, Sub-Saharan Africa has the highest income inequality in the world. This, in addition to widespread poverty, intensifies the food insecurity of the region. Of the 50 lowest income countries in the world, 34 are in Sub-Saharan Africa. In 1996, the average per capita daily income for the region was less than $1.50. The very low average purchasing power and the high inequality in purchasing power are major threats to the food security of the region.

The region's ratio of actual food consumption to the nutritionally required level is estimated at 91 percent in 1998, on average. This ratio is projected to decline to 88 percent during the next decade. When the inequality in purchasing power is added to the picture, food consumption of 60 percent of the population is projected to fall short of the nutritional target by 2008. The distribution gap, which is the quantity of food required to cover the food gap of the different income groups, is projected to be 20 percent higher than the average country-level food gap—27 million versus 22 million tons. When the portion of the population that consumes less than the requirement is multiplied by the total population in each country, the estimate of the number of people in Sub-Saharan with inadequate access to food jumps from 386 million in 1998 to 516 million in 2008, a 34-percent increase.

Closing the food gap: Can it be achieved in one decade?—To determine the potential to close the food gaps, we examined two options: expanding domestic food production and increasing imports. Domestic production in Sub-Saharan Africa contributes to almost 90 percent of food consumption. The growth in domestic production required to close nutritional gaps varies depending on which food gap is chosen. To close the region's average nutritional gap, food production must grow 3.4 percent per year—about 1.1 percentage points higher than our baseline projection. If the goal is to adopt a targeted program to increase consumption of those income groups that consume less than the nutritional requirement (or fill the distribution gap), the required production growth rate rises to 3.6 percent per year. While this growth rate matches what was achieved historically in the region, it far outstrips the growth that is expected under the current model assumptions.

Closing the food gap solely by increasing imports will be very difficult, given the region's historical financial performance. The region's commercial imports are projected to fall relative to the size of the nutritional food gap throughout the projection period with the share measuring 44 percent in 2008. To fill the average nutritional and distribution food gaps, imports must grow 13 and 17 percent a year, considerably higher than the baseline projection rates of 1.9 percent.

Sub-Saharan Africa responds to the challenge of food insecurity by promoting agricultural production. For many countries in this region, agricultural exports are the main source of foreign exchange earnings (see the import article). Increasing agricultural output also improves food access for a majority of the poor population who live in rural areas. Therefore, investment in the agricultural sector will not only increase food production and foreign exchange earnings, it will improve the purchasing power of the poor. The process, however, will be long and require consistent policies and credible institutional bodies for implementation.

Asia

During the coming decade, the food security situation in Asia is expected to worsen marginally. However, nutritional prospects vary widely across countries and among population segments within countries. To the extent that the lowest income group could become more food secure while higher income groups face increasing food gaps, there appears to be some tendency towards more equitable food consumption in Asia. [M. S. Deepak]

Regional per capita consumption grew 1 percent a year during 1980-89 and has been stagnant since then, although it remains well above the minimum nutritional requirement in 1997.[1] The Asian region is projected to fall short of 1995-97 base per capita consumption levels by 3.8 million tons in 1998, with Afghanistan, Bangladesh, and Indonesia making up the bulk of the total. By 2008, these three countries plus Pakistan account for 94 percent of the total consumption deficit of 5.8 million tons.

In terms of minimum nutritional standards, Afghanistan and Bangladesh will be the only countries in the region consuming below their respective requirements in 1998, yielding a regional nutritional shortfall of 2.7 million tons. By 2008, the nutritional gap is projected to widen to 4.7 million tons, with Nepal facing a deficit as well. Historically speaking, Afghanistan's per capita consumption was steadily above its nutritional standard in the 1980s but fell below it during 1990-96. Bangladesh, on the other hand, experienced a very volatile pattern throughout 1980-96, and its average per capita consumption was barely nutritionally adequate.

Unequal purchasing power threatens food security—The national-level food gaps described above do not account for differences in consumption among the income groups in the population. Adequate nutrition depends on purchasing power, and it is often the case that the poorest segments of a country's population are simply unable to afford complete diets. In Asia, on average, the poorest income quintile receives only 8 percent of the region's income and the richest quintile 43 percent. Of the nine Asian countries studied in this report, the Philippines show the highest degree of income inequality, with income shares ranging from 6 percent for the poorest quintile to 50 percent for the richest. At the other extreme, Bangladesh has corresponding shares of 10 percent and 39 percent for the poorest and richest quintiles.

Allowing for consumption differences across income groups, the *distribution gap* in 1998 is estimated at 8.4 million tons. The lowest quintile, including 45 percent of the undernourished, will bear 68 percent of the total shortfall. Indonesia and Vietnam are the only countries with no *distribution gap*, while Afghanistan will be the only country with a gap across all income quintiles, assuming its current climate of political instability persists.

Overall, between 1998 and 2008 food security in Asia will improve, and the food gap in the lowest income quintile will shrink towards more equitable food consumption. In 1998, food consumption of 612 million people, or 37 percent of the region's population, is estimated to fall short of nutritional requirements. A reduction of 70 million hungry people in Asia is projected between 1998 and 2008. The entire population of Afghanistan and up to 80 percent of the population of Bangladesh and Nepal are threatened by inadequate nutrition. As such, these latter countries are considered at risk.

Measures for closing national food gaps—The import share of total food supply is projected to rise marginally, from 5 percent to 6 percent by 2008. The region's aggregate nutritional gap relative to projected commercial food imports is about 16 percent in 1998 and is projected to rise to 20 percent by 2008. This nutritional gap exceeds the recent level of food aid received. Given the declining global trend in food aid, it is clearly impractical to expect that food aid will cut these gaps. For the food insecure countries, therefore, the challenge is to either increase domestic production or raise imports on a commercial basis.

To close the nutritional gap in Afghanistan, domestic production has to grow 4.2 percent annually during the next decade. However, our assumption is that food production will grow a very modest 1.3 percent per year through 2008. Achieving high and sustained growth in food production is unlikely, given the continuing current political instability and civil strife, with no quick resolution in sight.

Afghanistan's imports accounted for 9 percent of its total food supply during 1980-96, of which roughly 42 percent came from food aid. Closing the food gap with commercial imports alone is unlikely because the projected aggregate nutritional gap is more than three times the projected volume of commercial imports in 1998 and almost nine times

[1]Nine countries that traditionally depend on food aid define the Asian region for purposes of this study: Afghanistan, Bangladesh, India, Indonesia, Nepal, Pakistan, the Philippines, Sri Lanka, and Vietnam.

commercial imports in 2008. These ratios become even more pronounced if the income distribution of the population is acknowledged.

Bangladesh is the region's second most threatened country. Ninety percent of the food supply in Bangladesh is grown domestically and 10 percent imported, both commercially (66 percent) and as food aid. The aggregate food gap to meet nutritional requirements is expected to be 1.7 million tons in 1998 and 2 million tons in 2008.[2] Given that food aid received by the country decreased steadily during 1980-96, it is difficult to foresee the two- or three-fold growth in food aid required to meet these gaps.

Domestic resources may be only partially adequate for the purpose. The ratio of the aggregate food gap to domestic production is about 8 percent during the projection period. A significant increase in production may be difficult to attain, given that grain production in the country was nearly stagnant during 1990-96 as improved yields were offset by a gradual withdrawal of cultivated area. Commercial imports need to grow 6 percent per year to close the nutritional gap completely. This requirement contrasts with the historical import trend of -1.3 percent during 1980-97.

Nepal shows an aggregate nutritional gap of 194,000 tons in 1998. However, in view of its highly skewed income distribution, this gap widens to 450,000 tons when the differences in consumption levels across income groups are taken into account. Nepal has traditionally been a nearly self-sufficient country, and targeted food gaps are expected to be as much as 75 times its commercial imports in 1998 and 2008. As in the case of Bangladesh, Nepal is unlikely to be able to close its food gaps in the next decade. Grain production grew 3 percent per year during 1980-96 with area expansion contributing to 56 percent of the growth. With limits on further area expansion, however, crop production is projected to grow much slower in the coming decade, at 1.6 percent annually. This growth rate is not sufficient to provide nutritional support for a population growth of 2.4 percent per year.

[2]These figures do not include the impact of the widespread floods that ravaged the country in July and August.

Drought and Financial Crisis Overhang Indonesia's Food Security

Although per capita food consumption in Indonesia has historically been above its nutritional requirement, a prolonged drought and an ongoing financial crisis seriously threaten the country's living standard. An unpublished IMF report estimates real per capita income to have declined 15 percent in 1997-98 and to remain at this level through 1999. In the food sector, per capita grain consumption went down 10 percent during 1995-97. Net outflows of foreign capital have reduced the country's capital account balance, and the rupiah weakened considerably from 2,450 per U.S. dollar in July 1997 to 11,500 at the end of August 1998. Unfortunately for Indonesia, this currency depreciation made imports of intermediate goods in its export industries more expensive and therefore did not provide the desired stimulus to its exports and foreign exchange earnings.

To make matters worse, a severe drought has affected about 500,000 hectares of farmland in the Irian Jaya, Kalimantan, and Sulawesi regions of Indonesia. Plantings of rice, the country's staple crop, have been reduced; as of October 19, 1998, current-year production is forecast at 46 million tons, down from 51 million tons in 1996 and 49 million in 1997. Panic hoarding and distribution problems due to social unrest, coupled with the exchange rate devaluation, have fueled inflation, while the financial crisis is causing rampant unemployment. As a result, the purchasing power of the poor is seriously curtailed. Despite these problems, consumption, on average, remains higher than the nutritional requirement.

Several measures are being adopted to ease Indonesia's food shortages. For example, social safety net expenditures are being stepped up, and the targeted supply of subsidized rice has been expanded from 7½ million households to 17 million. Value added taxes on rice and other essential commodities are being suspended, and private traders are being allowed to freely import rice, wheat, sugar, and soybeans. Subsidies on wheat and sugar are being eliminated and those on soybeans are being phased out, on the grounds that consumers are not really benefiting from them due to illegal exports and trader markups. Quotas on the sale of livestock are being abolished; import duties on soybean meal, fishmeal, and corn have been dismantled, and mechanisms are being developed to adjust administered food prices regularly.

Given the time required for the above measures to take effect, Indonesia's ability to maintain its current food consumption levels in the immediate future remains suspect. As such, substantial infusions of international food aid may be necessary for a country that has, in recent years, relied on the commercial sector for 99 percent of its food imports. [M.S. Deepak]

Table 6--Food Availability and Food Gaps for Asia

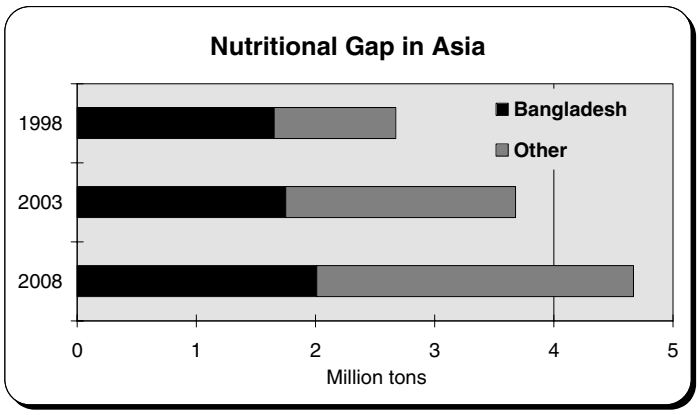
Year	Grain production	Root production (grain equiv.)	Commercial imports	Food aid receipts (grains)		Aggregate availability of all food (grain equiv.)
			---1,000 tons ---			
1989	268,244	14,830	8,183	2,756		337,128
1990	263,007	14,353	7,354	2,522		336,884
1991	265,879	14,716	5,858	2,721		340,332
1992	277,086	15,551	10,017	1,859		349,893
1993	282,588	15,364	9,694	1,792		358,790
1994	286,400	15,413	10,233	1,877		360,180
1995	295,900	15,498	17,182	1,495		380,378
1996	299,897	16,069	13,759	1,328		390,878
1997	302,570	15,469	18,173	1,113		391,923
Projections				**Food gap**		
				SQ	NR	(w/o food aid)
1998	302,931	16,049	16,555	***3,756***	***2,680***	296,635
2003	331,774	16,971	19,370	***5,336***	***3,683***	321,628
2008	363,683	17,947	23,426	***5,789***	***4,676***	353,730

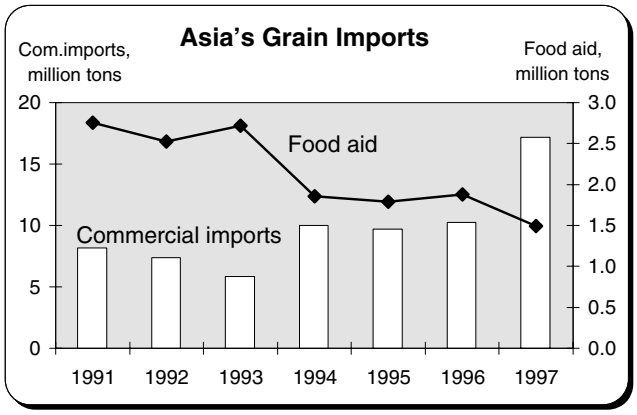
Asia
1,669 million people

By 2008, Asia's population--64 percent of the world's total--is projected to account for 16 percent of the nutritional food deficit.

Amid regional prosperity and growth, countries such as Bangladesh and Afghanistan remain food insecure. A growing number of countries may be unable to maintain their recent consumption levels.

Growing population, rapid urbanization, and industrialization continue to put pressure on the region's fragile resource base.





2008 Food Consumption as a Share of Nutritional Requirements by Income Quintile

	Lowest quintile	2nd	3rd	4th	Highest quintile
Asia (average)	0.90	0.96	1.01	1.06	1.19
Afghanistan	0.50	0.57	0.63	0.69	0.85
Bangladesh	0.81	0.87	0.90	0.94	1.05
Nepal	0.78	0.84	0.89	0.94	1.09
Pakistan	0.88	0.94	0.98	1.03	1.13

North Korea Relies Heavily on Food Aid

North Korea has experienced years of economic stagnation followed by floods in 1995 and 1996 and a drought in 1997. Decreasing capacity for commercial food imports and lack of agricultural inputs have made the country heavily reliant on food aid to meet the nutritional needs of vulnerable groups. In June 1998, the Foreign Agriculture Organization estimated a cereal shortfall of 522,000 tons beyond projected levels of commercial imports and food aid, for the crop year that ended in October 1998. Reports by fact-finding missions from various groups have yielded widely different estimates of the severity of North Korea's food difficulties. This underscores the great uncertainty about agriculture and food caused by the lack of key data.

Infrastructural constraints impair the efficient functioning of the economy. Transport of food aid and commercial goods is hampered by the shortage of fuel and parts. After 5 years of insufficient imports and disappointing harvests, food stocks are assumed to be very low. Even the government's Public Distribution System reportedly ceased operations in some areas at times, and its negligible buffer stocks preclude all but extremely limited food distribution. An increasing number of North Korean households now depend on self-grown vegetables, wild plants and berries, and informal food contributions. Barter exchange, including across the border with China, is being used to secure food.

The agricultural sector suffers from lack of fertilizers, depreciated farm machinery, and energy shortages. For these reasons, even under an optimistic weather scenario, cereal production would be short of needs, especially given the limited potential for expansion of cultivable area.

Double cropping of barley with rice or maize was introduced in North Korea in 1996. An estimated 70,000 hectares were double-cropped in 1998, compared with only 38,000 in 1997. A United Nations initiative has called for donor assistance of U.S. $99 million to extend double cropping to 200,000 hectares by the year 2000.

North Korea's economic decline is linked to the loss of its protected trading arrangements with China and the former COMECON, which were the main sources of imported raw materials and other inputs into the country's manufacturing sector. Manufacturing exports were exchanged both for commercial food imports and for purchases of yield-enhancing agricultural inputs.

Like its neighbors, Japan and South Korea, North Korea cannot be self-sufficient in its food supply, and needs to find ways to import food. Increased investment in income-generating light industry operations in North Korea by companies based in South Korea and elsewhere offered promise. However, the current global financial turmoil has had a negative effect on foreign companies' ability to invest in and finance such enterprises.

Food assistance has come from donations by foreign governments in response to appeals by the World Food Program. The U.S. government has announced donations of 500,000 tons in 1998 (chiefly wheat, rice, and corn) in support of the WFP plans. Other food donations have come through non-governmental organizations. Considerable food has come from China as a result of barter trade, governmental assistance, and commercial purchases. [M.S. Deepak]

Latin America and the Caribbean

Despite strong economic growth in the region, five countries are projected to face substantial food insecurity over the next decade. Grain production is not expected to keep up with population growth and foreign exchange is projected to be insufficient to close the gap with commercial imports. The destruction caused by hurricanes Georges and Mitch will increase hunger and delay improvements. [Birgit Meade]

Food security remains a problem in the region and annual production variations tend to intensify the vulnerability of the countries.[3] El Niño brought drought to Haiti and the Dominican Republic and heavy flooding in Ecuador and Peru in 1997 and 1998. In fall 1998, hurricanes Georges and Mitch destroyed lives, crops, and infrastructure. The result has been a decline in food supplies and damaged distribution systems. It should be noted that the impact of the recent hurricanes has not been considered in our quantitative analysis and food insecurity is likely to be more severe than reflected in our results. Average per capita food production in this region is projected to decline in 1998 with 436,000 tons of food gap to maintain per capita consumption. The nutritional gap in 1998 is projected at 368,000 tons.

Grain and root consumption in the eleven countries increased, on average, 1.8 percent per year between 1980 and 1997, while population grew 2.2 percent per year. As a result, per capita consumption failed to increase in several countries. This trend is expected to continue into the next decade and the food gap to maintain per capita consumption is projected to almost double between 1998 and 2008. The 2008 projected gap to maintain consumption is 845,000 tons while the nutritional gap is 724,000 tons. Despite the decline in per capita consumption, basic nutritional needs are projected to be met in the majority of countries.

In the long term, five of the eleven countries are projected to remain vulnerable to food insecurity. Bolivia, Guatemala, Haiti, Honduras, and Nicaragua are all projected to be unable to maintain recent consumption levels or fulfill minimum nutritional requirements. Per capita consumption will decline, as much as -1.1 percent per year in Honduras. Average per capita calorie consumption is lower in these five countries than in other countries in the region. Colombia, the Dominican Republic, Ecuador, El Salvador, Jamaica, and Peru will be able to increase per capita consumption steadily. In the latter set of countries, per capita food projections range from an annual increase of 0.1 percent in El Salvador to 1.2 percent in Jamaica.

[3]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. These countries have a total population of 130 million, roughly one-third of all Latin America.

The *distribution gap*, the quantity of food required to cover the food gap of the different income groups, is estimated at 1.8 million tons in 1998. This is five times the national nutritional gap. The key problem is inequality in purchasing power. In Guatemala, the country with the most unequal income distribution in the world after Brazil, the poorest 20 percent receive just 2.1 percent of the entire national income while the richest 10 percent receive 46.6 percent. This means that while the average per capita income was $1,470 in 1996, the lowest income group's income was only $154. Such large income inequality inevitably leads to food insecurity of the poor, despite nationally adequate food availability.

Consumption of the lowest income quintile is estimated to average 22 percent less than the nutritional requirement, whereas the richest 20 percent of the population is estimated to consume 23 percent more than the recommended minimum in 1998. Overall, food consumption of almost half of the population with the lowest incomes falls below the nutritional requirement during the projection period.

How do these gaps compare with recent food aid levels?—Between 1980 and 1998, food aid shipments represented more than 12 percent of the region's grain consumption. There is, however, a declining trend in food aid allocated to the region. This is due to declining or stagnant donor budgets and the shift of donations away from Latin America and the Cari bbean towards other needy regions such as Sub-Saharan Africa and parts of Asia. With food aid becoming increasingly rare in this region, food security must be achieved through a country's own resources, meaning that gaps have to be filled by increasing either production or commercial imports or both.

Improved production performance is projected—During 1980-1997, the region's grain and root production grew at an annual rate of 1.2 percent, considerably lower than the population growth rate of 2.2 percent. Area planted increased at 0.7 percent and yields grew only 0.5 percent per year. The poor performance stemmed from the debt crises of the early 1980s, which led to dramatic market liberalization policies. These policies, despite improving the terms of trade of the agricultural sector through currency devaluation, reduced investment in the sector because of the fiscal austerity also imposed. The slow agricultural growth

has increased poverty in rural areas which, in turn, has promoted migration to urban areas.

Despite the growing food gaps, the performance of the region's food sector is expected to improve in the next decade. The policy adjustment has contributed to economic growth in recent years in most countries, and thus there is reason to assume that agricultural performance will improve in the future. Growth in crop production is projected to accelerate in the next decade, to about 1.7 percent per year. Most of the projected growth stems from yield growth, with area contributing to about 30 percent of the growth. Fertilizer use has risen markedly in recent years and efforts to improve inputs and cropping practices are expected to lead to higher yield growth. The potential to expand production area varies by country. Haiti, Guatemala, and El Salvador are the most densely populated countries, and urban growth is competing for agricultural land. Peru, on the other hand, has the highest potential to expand area of production. In fact, it is estimated that in the highlands of Peru, only 20 percent of potential land is cultivated.

Can the five food insecure countries close their food gaps?—Domestic production still provides between 70 and 80 percent of domestic food consumption in Bolivia, Guatemala, Honduras, and Nicaragua. The annual growth in grain yields in these countries ranged from 0.11 percent in Nicaragua to 1.34 percent in Bolivia. Much higher growth is required to satisfy food needs. In Nicaragua, fertilizer use declined in the last 15 years. Increasing availability of inputs should improve the production performance of these countries. The main challenge is to keep a balance between productivity growth and demand growth. To simply keep up with population growth, food production must grow 2.4 to 2.8 percent per year in these countries. Closing food gaps requires even higher growth rates. In Bolivia, for example, annual grain production growth was 2.8 percent during 1980-97, but a higher growth of 3.2 percent is required to close the nutritional gap.

Food imports can play an important role in improving food security of the countries. Grain import dependency of the region grew from 38 percent in the early 1980s to 44 percent in the mid-1990s, and is projected to remain at this level during the next decade. The five food insecure countries face a wide range of required growth rates in food imports to close their food gaps. Honduras requires the lowest import growth of 4 percent per year to close the nutritional gap in 10 years, while Nicaragua requires the highest at 7 percent per year. It should be noted, however, that the problem in these countries is not only an inadequate supply of food, but access to food, particularly by the low-income population. This means that an increase in productivity of the agricultural sector, which employs most of the poor, is expected to have a greater impact on the food security of the population than increasing imports.

Haiti, the poorest country in the Western Hemisphere, has to increase its crop production 4.3 percent per year to close its nutritional gap by 2008. This is 3 percentage points more than the projected growth rate. Only 10 years ago, Haiti produced more than two-thirds of its grain consumption domestically, a share that fell to less than one-third in 1998, when close to 70 percent of grain consumption was imported. To close the nutritional food gap by 2008, Haiti would have to increase imports at an annual rate of 5.6 percent, too high a growth rate considering its present political and economic situation. Aid from the international community will be crucial in preventing further cuts in consumption.

Brazil and Poverty

In the midst of Brazil's successes as a leading agricultural producer and exporter, Brazilians deal with extreme poverty. Brazil, with more than 160 million people and the ninth largest economy in the world, is considered an upper middle-income country, with an average annual per capita income of $4,900. But Brazil also has the most unequal income distribution in the world, where the poorest 10 percent of the population live on an annual income averaging only $390 while the richest 10 percent have an income of close to $25,000.

Poverty is prevalent both in urban and in rural areas. However, the urban problems are a spillover of problems in rural areas, where employment is scarce. In rural areas, small farmers and the landless population are the most vulnerable group. Policies designed to improve the conditions of the agricultural sector tend to ignore small farmers, as income tax breaks and farm credit are policy tools with little impact on the rural poor. The landless population are even more vulnerable because many move to frontier or low quality land and are highly affected by weather variability.

In addition to low purchasing power in rural areas, the inadequate infrastructure is another major obstacle to food security in Brazil. Without roads, food cannot be transported to where it is needed. The northeast portion of the country, for example, is considered less developed compared to the more prosperous central south. The northeast also does not grow enough food to support its own needs and is subject to severe droughts.

The most recent drought began in the spring of 1998. About 9 million people were believed to be at risk of food shortages, and about 5 million were facing critical food supply problems because of a decline in food production in the northeastern region. The Brazilian government had implemented emergency relief operations, but these were hindered by transportation and distribution problems endemic to Brazil. The central south, one of the richest agricultural regions of the world, harvested record crops this year, but the high costs of transporting food made it too expensive to ship to food-deficient regions. [Chris Bolling]

Table 7--Food Availability and Food Gaps for Latin America and the Caribbean

Year	Grain production	Root production (grain equiv.)	Commercial imports	Food aid receipts (grains)		Aggregate availability of all food (grain equiv.)
			---1,000 tons ---			
1989	10,425	2,598	3,365	1,320		23,507
1990	9,947	2,493	4,005	1,423		23,954
1991	9,614	2,465	4,413	1,817		24,135
1992	10,423	2,369	5,609	1,335		25,199
1993	11,065	2,720	5,727	1,371		25,269
1994	10,161	2,811	7,559	1,002		26,156
1995	10,013	2,965	8,613	434		27,373
1996	9,941	2,949	9,297	294		28,269
1997	9,581	3,162	9,768	360		27,935
Projections				**Food gap**		
				SQ	NR	(w/o food aid)
1998	10,170	2,974	10,305	***436***	***368***	29,119
2003	10,909	3,121	11,653	***642***	***485***	31,973
2008	11,632	3,274	13,799	***845***	***724***	36,117

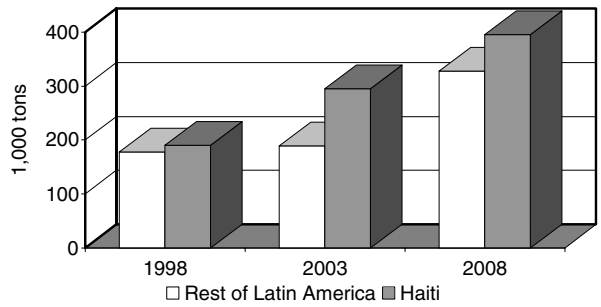
Latin America and the **Caribbean** (129 million people)

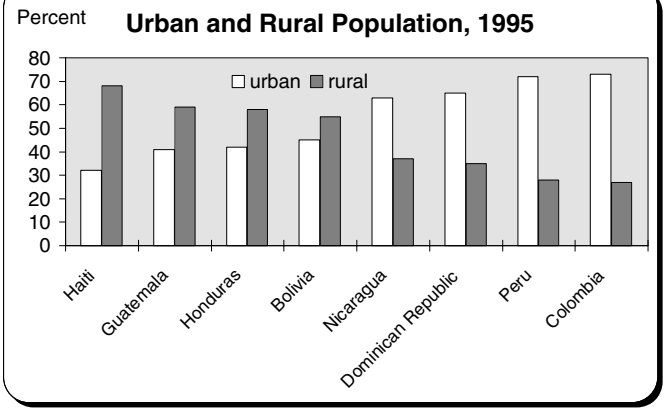
El Niño sharply cut output in a number of countries. In 1997, Central America's crops suffered from drought while parts of South America suffered from drought and excessive rains.

In fall 1998, two hurricanes swept away chances of fast economic recovery in several countries, especially Honduras, Nicaragua, Haiti, and the Dominican Republic.

A very unequal income distribution continues to threaten food security for low-income households.

Nutritional Food Gap in Haiti and the Rest of Latin America





2008 Food Consumption as a Share of Nutritional Requirements by Income Quintile

	Lowest quintile	2nd	3rd	4th	Highest quintile
Bolivia	0.75	0.83	0.89	0.96	1.10
Guatemala	0.70	0.83	0.91	1.00	1.22
Haiti	0.56	0.65	0.71	0.79	0.98
Honduras	0.71	0.80	0.86	0.93	1.11
Nicaragua	0.68	0.78	0.86	0.94	1.15

New Independent States (NIS)

With the assumption of peace and implementation of reform-oriented policies, the NIS with the exception of Tajikistan is projected to maintain base level consumption and meet nutritional requirements in the long term. Tajikistan's nutritional food gap is projected to grow significantly during the next decade due to slow production and import growth. [Michael Trueblood]

Of the five NIS countries covered in this report, only Tajikistan and Azerbaijan will have food gaps this year. For these two countries, the food gap in 1998 to maintain per capita consumption at recent levels is relatively small (average of 6 percent of total requirements), but the nutrition-based food gaps are relatively larger (16 percent for Azerbaijan, 32 percent for Tajikistan). In the next decade, assuming continued peace, Azerbaijan is projected to eliminate its food gaps (even for the nutritional standard), but Tajikistan still will have substantial food deficits and low absolute food consumption levels in comparison to other NIS countries. The agricultural sectors of Armenia, Georgia, and Kyrgyzstan appear to be recovering from their earlier contractions. These countries do not have any overall food gaps this year or in the foreseeable future. However, food consumption will remain a problem for some of the lowest income groups in these countries due to inadequate purchasing power.

As with other transition economies, the five NIS countries have experienced rapid changes in their diets due to falling real incomes resulting from general economic restructuring and removal of subsidies. Meat production and consumption have fallen sharply in most countries, leading to a rapid decline in feed grain use (about 68 percent during 1990-98). However, feed use has stabilized in the past couple years. Food grain consumption has fallen to some degree, but is also stabilizing in most of the countries as real incomes have started to recover slightly. The region's overall per capita grain consumption (both food and feed use) has declined from around 367 kg in 1990 to 242 kg in 1997, a 34-percent drop. Most of the decline has been due to a sharp reduction in imports, which before the transition period totaled 6.1 million tons annually and have recently averaged 2 million tons (given the contraction in consumption, this represents a change from about 61 percent of grain supplies to 31 percent). Production growth has been stagnant over the past decade, first dropping sharply and then recovering in recent years. Higher input costs have led to a decline in modern input use, causing yields to decline 3.4 percent annually since the transition period began. This has been offset by an expansion in area sown of about 3.7 percent annually.

Tajikistan and Azerbaijan remain vulnerable—Although Tajikistan has a small food gap this year based upon recent per capita consumption levels (48,000 tons, which is about 5 percent of required food availability), it is the most vulnerable country of the five NIS countries in terms of overall food security. Grain production has accelerated sharply in the past couple of years as producers have switched area from cotton to wheat, which has alleviated some food supply pressures. Recently, it has been estimated that about 85 percent of Tajikistan's population lives in poverty. Currently, even the average consumer in the highest income quintile group in Tajikistan does not meet the nutritional requirement of 216 kg per capita. The aggregate food gap to meet this nutritional target is estimated to be 431,000 tons in 1998, which represents 32 percent of the nutritionally required food availability.

For the NIS countries, we assume in our projections that there will be continued peace, reform- oriented policies, increased use of new technology, and real growth in export earnings of about 7 percent annually. Tajikistan's food gap based upon recent per capita consumption is projected to increase to around 12 percent of total requirements over the next decade, while the nutrition-based food gap is projected to reach about 37 percent. This scenario is relatively optimistic in that it assumes that the internal peace accord signed in June 1997 will continue to hold (despite the government's lack of follow-through thus far to appoint opposition leaders) and that the country can reverse the negative growth rates in production and imports. The food gap to maintain recent per capita consumption could be eliminated if production increased 3.2 percent annually. The base projection assumption is about half this rate but significantly higher than the negative growth rate experienced over the past decade. Alternatively, this gap could be eliminated if imports grow 4.1 percent annually as opposed to the base assumption of 2.5 percent. Meeting a nutrition-based target would require production to increase to about 5.1 percent annually or imports to increase by 6.2 percent annually, both of which appear overly optimistic.

Azerbaijan is the next most vulnerable country currently, but is expected to be much less vulnerable in the future as its oil production and pipelines are brought on line. Azerbaijan's 1998 food gap to maintain recent per capita consumption is estimated to be 83,000 tons, which is about 6 percent of the required food supply. Meeting a nutrition-based target would require about 268,000 tons or 16 percent of the food supply. In addition, Azerbaijan has a very high ratio of inter-

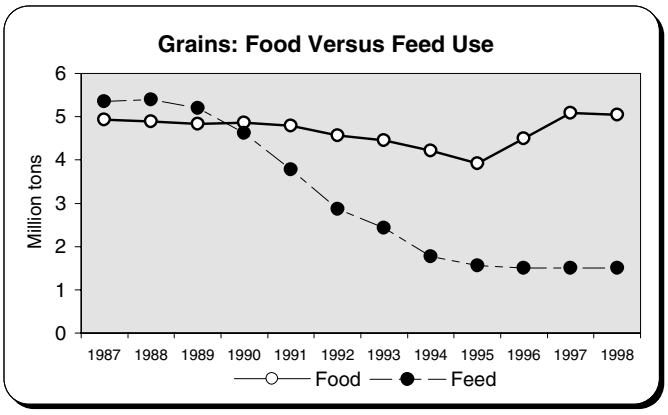
Table 8--Food Availability and Food Gaps for NIS

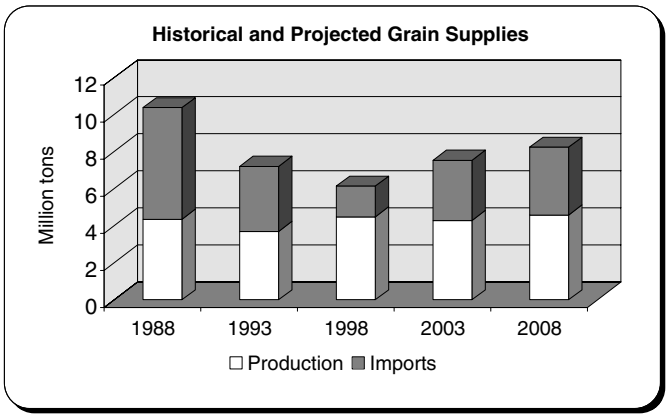
Year	Grain production	Root production (grain equiv.)	Commercial imports	Food aid receipts (grains)		Aggregate availability of all food (grain equiv.)
			---1,000 tons ---			
1989	3,318	---	6,639	---		---
1990	4,070	---	5,518	---		---
1991	3,827	---	4,726	---		---
1992	3,811	236	2,448	479		5,298
1993	3,694	237	2,346	1,159		5,846
1994	3,023	251	583	1,524		4,866
1995	3,077	290	874	1,112		5,318
1996	3,888	323	961	1,061		5,713
1997	4,483	335	1,612	342		6,524
Projections				**Food gap**		
				SQ	NR	(w/o food aid)
1998	4,468	345	1,496	***131***	***699***	5,880
2003	4,332	373	1,698	***135***	***650***	6,035
2008	4,628	403	2,048	***137***	***600***	6,786

NIS
27 million people

Only Tajikistan and Azerbaijan have food gaps in 1998. Azerbaijan is projected to eliminate its food gaps over time as the economy develops its resources, but Tajikistan still will have large food gaps and widespread poverty.

The other three NIS countries (Armenia, Georgia, and Kyrgyzstan) are starting to recover and do not show food gaps this year or in coming years. Resumption of hostilities in any of these countries could affect these projections.





2008 Food Consumption as a Share of Nutritional Requirements by Income Quintile

	Lowest quintile	2nd	3rd	4th	Highest quintile
Armenia	0.91	1.01	1.09	1.16	1.31
Azerbaijan	0.86	0.94	0.99	1.05	1.15
Georgia	1.11	1.22	1.29	1.36	1.50
Kyrgyzstan	1.18	1.28	1.35	1.42	1.55
Tajikistan	0.52	0.57	0.61	0.64	0.71

nally displaced persons relative to its population size due to the conflict with Armenia over the disputed Nagarno-Karabakh region. This large number of displaced persons contributes to disguised unemployment and undernutrition. In the long run, Azerbaijan is expected to grow its way out of poverty. It already has acheived a relatively high degree of land privatization (40-50 percent) that could help boost production. Expected petroleum revenues will enhance commercial food import capacity. Assuming there is no resumption of hostilities with Armenia, Azerbaijan is projected to eliminate its food gaps to maintain per capita consumption levels as early as 1999, while the nutrition-based food gap is projected to be gradually eliminated by 2006. Internal food distribution will remain a challenge, however.

Other NIS countries are recovering—Armenia, Georgia, and Kyrgyzstan have no food gaps this year and are not expected to have any gaps in the foreseeable future. Kyrgyzstan has experienced high economic growth recently, and another good grain harvest. Armenia actually has been able to increase its per capita meat supplies in recent years partly by importing poulty meat, a pattern similar to other transition economies, but unique among these NIS countries. Georgia has shown high real per capita GDP growth in the past 2 years and is expected to sustain these high growth rates in the next few years, in part due to pipeline construction and related employment activities. In the short run, internal food distribution will remain a problem for average consumers in the bottom income quintiles of Armenia and Georgia, who consume below nutritional requirements.

Sensitivity of projections to peace assumption—The long run forecasts presented above assume continued peace throughout the region. However, the political situations in several of the countries are fragile. To hypothetically examine the effect of resumed hostilities, we simulated a production shock of 20 percent below the baseline assumption 5 years out. This magnitude of shock is typical of other war-torn countries' experiences in the past few decades. The results suggest Azerbaijan and Tajikistan would be hit fairly hard by these shocks. The food gap based on recent per capita consumption levels would rise from 13 to 21 percent in Tajikistan and from 0 to 12 percent in Azerbaijan. The nutrition-based food gap would increase from 38 to 44 percent in Tajikistan and from 6 to 22 percent in Azerbaijan.

Western Food Aid for Russia

The economic crisis in Russia has raised concerns about the country's food security. The threat appears to involve not so much supply-side problems but more so the demand side and distribution. The main threat to food security is that the crisis will increase unemployment and lower consumers' real income such that some people might not be able to afford an adequately healthy diet.

The Russian grain harvest in 1998 is forecast (as of November) at a very low 49 million tons, compared to an average output of 71 million tons over the last 3 years. However, large grain stocks remain available from the bumper 1997 crop of 85 million tons. Yet, even if supplies might be generally adequate to feed the country, problems exist concerning consumer purchasing power and distribution. Before the crisis hit in August, Russia already had a sizable share of its population living below the established poverty level. The crisis will increase poverty by raising unemployment. Also, the depreciation of the ruble, one of the main immediate consequences of the crisis, has ignited inflation. Prices will almost certainly rise more than money wages and salaries, thereby reducing consumers' real income. A greater share of the population might therefore not be able to afford a minimally acceptable diet.

Another food security concern involves the reaction of Russia's regions to the economic crisis. In an apparent effort to protect their consumers from shortages, certain regions are restricting the outflow of foodstuffs. Another (related) cause of restrictions is that regions are imposing price controls on food. To prevent food from moving to neighboring areas that pay higher prices, controls on outflows are required. Widespread behavior of this type could prevent food-deficit regions, particularly in the north and far east, from obtaining needed supplies even if they are willing to pay higher prices.

In November the United States announced a food aid package for Russia. It involves 3.1 million tons of commodities, worth $625 million, and has three parts. First, under Food for Progress, Russia will be given 100,000 tons of foodstuffs, to be targeted to needy social groups and food-deficit regions, with distribution to be handled by private charities. Second, the United States will donate to Russia 1.5 million tons of wheat, to be sold in Russia with the proceeds intended to fund social welfare programs. Third, the United States will sell under the PL 480 Title I program another 1.5 million tons of products, involving mainly corn, rice, soybeans, soybean meal, wheat, beef, and pork. The European Union is also preparing an aid package for Russia, valued at around $475 million, involving about 1.5 million tons of grain and 250,000 tons of meat. [William Liefert]

Agricultural Productivity and Food Security In Sub-Saharan Africa

Keith D. Wiebe, Meredith J. Soule, and David E. Schimmelpfennig[1]

Abstract: Patterns of agricultural productivity growth in Sub-Saharan Africa are mixed. Most of the variation between countries in the region is due to differences in the application of conventional inputs, especially labor, but further gains from increased labor application are likely to be limited. Many countries in Sub-Saharan Africa still have considerable potential to raise productivity through increased use of other conventional inputs, such as fertilizer. Realizing such increases, however, will depend on additional investment in roads, education, research, and (in some areas) the cessation of armed conflict.

Introduction

Agriculture is the principal source of food, livelihood, and foreign exchange earnings in Sub-Saharan Africa (SSA) (Badiane and Delgado, 1995). Over the next 10 years, the region's food needs are projected to grow rapidly, driven by a population growth rate of 2.5 percent per year, the world's highest (World Bank, 1998). Although expansion of agricultural land has contributed much to increased agricultural production in the past, continued area expansion is likely to involve increasing economic and environmental costs (Crosson and Anderson, 1995). Growth in agricultural productivity remains critical to SSA's ability to meet food security and economic development objectives.

Yet evidence of agricultural performance in SSA is mixed at best (table A-1). *Total factor productivity* in agriculture (see "Definitions") is estimated to have grown an average of 1.3 percent annually between 1961 and 1991 for Africa as a whole (Lusigi and Thirtle, 1997). *Land productivity* in SSA agriculture rose an average of 1.9 percent per year between 1980 and the mid-1990s, while increasing 3.4 percent and 2.0 percent annually in South Asia and Latin America and the Caribbean, respectively (World Bank, 1998). Over the same period crop production in SSA grew 2.7 percent per year, and food production grew 2.4 percent per year. By contrast, *labor productivity* fell an average of 1.0 percent per year in SSA agriculture, while increasing 1.9 percent and 2.5 percent per year respectively in South Asia and Latin America and the Caribbean.

Complicating the differences in these indicators of agricultural productivity at the regional level are differences in the level and rate of change in each indicator across subregions and countries within SSA. Understanding these differences, and the various factors that generate them, is critical to determining how policy measures can best improve agricultural productivity.

Different Measures of Productivity Have Different Implications for Food Security

Different measures of agricultural productivity are explained in the "Definitions" box. In brief, each indicates the level of agricultural output per unit of a particular input or set of inputs. Distinguishing different measures of productivity is important. Output per unit of land, or crop yield, is commonly used by agricultural scientists or by national policymakers to assess agricultural production for meeting national food security needs. Output per agricultural worker, on the other hand, may be a more important indicator of rural standards of living and welfare (Block, 1995). As such, labor productivity may be particularly important as an indication of the ability of agricultural workers to acquire sufficient food, regardless of whether they produce food themselves. Thus labor productivity is linked to food security at the household level. By contrast, total factor productivity (TFP) controls for changes in the levels of multiple inputs, and is thus suited to assessing the impact of technical change in agriculture.

It is also important to distinguish sources of change in the productivity of a given input or set of inputs over time. The productivity of a particular input, such as land, may change for a variety of reasons. For example, agricultural output per unit of land (i.e. land productivity) in a particular area might increase due to adoption of improved seed varieties, expansion of irrigation, or increased fertilizer use. Increased labor application on a fixed land area would also be expected to increase land productivity (at least over a particular range). However, the increase in output would be expected eventu-

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

Table A-1--Agricultural Productivity Levels and Trends

	Land productivity		Labor productivity		Ag. land	Total factor productivity	
	$/hectare (1993)	Growth rate (1980-93)	$/worker (1995)	Growth rate (1980-95)	Ha/worker (1993)	Index (1991)	Growth rate (1961-91)
Sub-Saharan Africa	68	2	392	-1.0	6.0	0.8 1/	1.3 1/
South Asia	519	3	383	1.9	0.8	na	na
Latin America & Carib.	116	2	2,292	2.5	17.0	na	na
Central Africa							
Cameroon	313	2	827	-0.3	2.6	0.9	1.8
Central African Rep.	119	2	516	0.8	4.2	0.6	2.7
Congo	28	2	629	1.0	21.6	0.9	1.2
Gabon	74	1	1,516	0.5	22.3	0.3	-2.3
Zaire	113	2	219	0.0	1.9	0.6	8.1
East Africa							
Burundi	270	2	177	-1.4	0.8	2.9	3.4
Ethiopia	116	na	181	na	1.5	0.2	-1.7
Kenya	90	2	240	-0.7	2.7	0.6	1.9
Madagascar	34	2	178	-0.4	5.3	0.7	-0.1
Rwanda	378	-1	206	-2.6	0.7	0.7	6.1
Uganda	515	na	592	na	1.1	2.9	7.8
Sahel							
Burkina Faso	93	3	182	1.1	1.9	0.1	0.8
Chad	10	4	198	2.0	20.3	0.6	0.2
Gambia	199	2	167	-1.7	0.9	0.4	-1.5
Mali	33	3	259	0.2	7.6	0.8	0.8
Mauritania	7	3	na	na	na	0.1	-0.3
Niger	63	1	256	-0.9	3.9	0.7	1.5
Senegal	118	2	375	0.9	3.0	0.6	1.5
Somalia	na	na	na	na	na	0.8	1.2
Sudan	na	na	na	na	19.1	0.8	0.1
West Africa							
Benin	321	4	563	2.8	1.6	1.1	1.2
Ghana	227	0	684	-1.1	2.9	0.7	-0.5
Guinea	54	na	225	na	4.1	0.5	1.2
Guinea-Bissau	78	3	292	3.1	3.4	0.1	-2.1
Ivory Coast	212	1	1,354	-0.8	6.2	1.1	0.9
Liberia	na	na	na	na	na	1.1	0.0
Nigeria	150	2	684	2.4	4.4	0.6	-0.3
Sierra Leone	123	0	344	-0.4	2.7	0.5	0.5
Togo	189	4	461	0.9	2.6	0.4	-1.3
Southern Africa							
Angola	9	na	149	na	16.5	0.4	-0.8
Botswana	5	2	483	1.4	102.4	0.2	1.3
Lesotho	24	-3	194	-2.7	7.5	0.1	-1.7
Malawi	153	0	156	-0.3	0.9	0.7	0.3
Mozambique	12	na	92	na	6.9	0.3	0.3
Namibia	9	1	1,458	0.8	136.1	1.4	1.0
South Africa	49	1	2,870	1.3	51.0	1.4	1.3
Swaziland	na	na	na	na	na	1.2	3.3
Tanzania	na	na	na	na	3.2	0.4	0.2
Zambia	7	1	100	-1.0	14.7	0.5	1.5
Zimbabwe	41	2	266	-0.7	6.0	0.7	2.0

na = not available. 1/ These averages are for all of Africa.

Sources: World Bank (1998), Lusigi and Thirtle (1997).

ally to diminish as more and more labor is applied to a fixed land area.[2] If the percentage increase in output is less than the percentage increase in labor, labor productivity could well be falling while land productivity is increasing. Distinguishing sources of change in the productivity of a given input is important because it improves our understanding of how policy might generate additional increases in returns to that input. We look next at levels and changes in three measures of agricultural productivity, and then at some of the factors that drive those changes.

Trends in Agricultural Productivity Are Mixed

Land productivity averaged US$68 per hectare of agricultural land for SSA as a whole in 1993, compared with $519 in South Asia and $116 in Latin America and the Caribbean (table A-1). Values ranged from $5 to 10 per hectare in the drier countries of Southern Africa and the Sahel to $200 per hectare and more in the East African highland countries and tropical West Africa. For SSA as a whole, land productivity grew an average of 1.9 percent per year between 1980 and 1993, with slow to moderate growth in most countries. Land productivity grew most rapidly in the Sahelian countries and West Africa, and more slowly in Eastern and Southern Africa (see also figure A-1).

Labor productivity averaged $392 per agricultural worker for SSA as a whole in 1995, compared with $383 in South Asia and $2,292 in Latin America and the Caribbean. Values ranged from $100 to 200 per worker in many countries in Eastern and Southern Africa and the Sahel to more than $500 per worker in parts of West and Central Africa. Labor productivity declined an average of 1.0 percent per year for SSA as a whole between 1980 and 1995, with modest growth in parts of Western and Southern Africa (see also figure A-1).

As noted previously, low (or declining) labor productivity is consistent with high (or growing) land productivity in the context of a large (or expanding) agricultural labor force. Such patterns are evident in the data on agricultural land per worker presented in table A-1. The land/labor ratio is generally low in East Africa and high in Central and Southern Africa and the Sahel. Within regions, low land/labor ratios are generally associated with high land productivity (as in Rwanda, Gambia, Benin, and Malawi), while high land/labor ratios are generally associated high labor productivity (as in Gabon, Ivory Coast, and Namibia).

Land and labor productivity are both incomplete measures of agricultural productivity, since they measure the productivity of only a single factor of production, and may well move in opposite directions or conceal negative growth in broader productivity measures. In an effort to address this problem, economists estimate total factor productivity, which measures changes in agricultural output relative to changes in an aggregated index of multiple inputs. Table A-1 reports estimates by Lusigi and Thirtle (1997) of total factor productivity levels for 1991 and rates of change for 1961-91.[3] The TFP index is normalized to 1.0 for the most efficient countries in 1961. For Africa as a whole, the TFP index averaged 0.8 in 1991, up from 0.7 in 1961. This indicates that even though productivity has risen on average, many SSA countries were still not as efficient in 1991 as the most efficient countries were in 1961. TFP levels are mixed in each region, with the highest estimates in parts of Southern, Western, and Eastern Africa (particularly Uganda and Burundi). Uganda and Burundi are also among the countries with the highest rates of growth in TFP (see also figure A-1).

Changes in TFP are, by definition, driven by changes in factors that are not incorporated in the index of inputs constructed to estimate TFP. For example, TFP growth could reflect factors such as technical change or improvements in infrastructure or research. On the other hand, it could also reflect factors such as unmeasured depletion of soil or other natural resources, with very different implications for sustainability and food security. Identifying these sources of change is thus critical to designing appropriate policy responses.

Productivity Is Affected by Many Factors

We are interested in differences in agricultural productivity levels and growth rates across countries in SSA in order to better understand those factors that are particularly influential in generating or impeding productivity growth. Five recent studies have examined agricultural productivity in Africa and other developing countries, and are summarized in table A-2.

Frisvold and Ingram (1995) examine land productivity for 28 countries in four regions of SSA between 1973-75 and 1983-85. Land productivity was estimated to have grown at an annual rate of 1.5-1.8 percent in most regions over the period. Frisvold and Ingram found that increased application of agricultural labor was the single most important factor in explaining growth in land productivity, and concluded that substantial increases in land productivity should not be expected until land becomes relatively scarce, echoing

[2]The "almost universal" *law of diminishing marginal product* (Henderson and Quandt, 1980, p. 68) describes the relationship between the level of output of a particular commodity and the level of a particular input as the latter changes while the level of other inputs remains fixed. The pattern typically exhibited by this relationship is one in which, after a point, the incremental increase in output generated by continuing increases in a single input begins to diminish (all other inputs being fixed). The law does not apply if all inputs are increased proportionately.

[3]Several recent studies have presented Malmquist TFP indexes for various sets of countries (Fulginiti and Perrin, 1997; Lusigi and Thirtle, 1997; Trueblood and Coggins, 1997). We choose to present the results of Lusigi and Thirtle, since theirs is the only study that focuses exclusively on Africa.

Figure A-1—Productivity in Sub-Sahara Africa

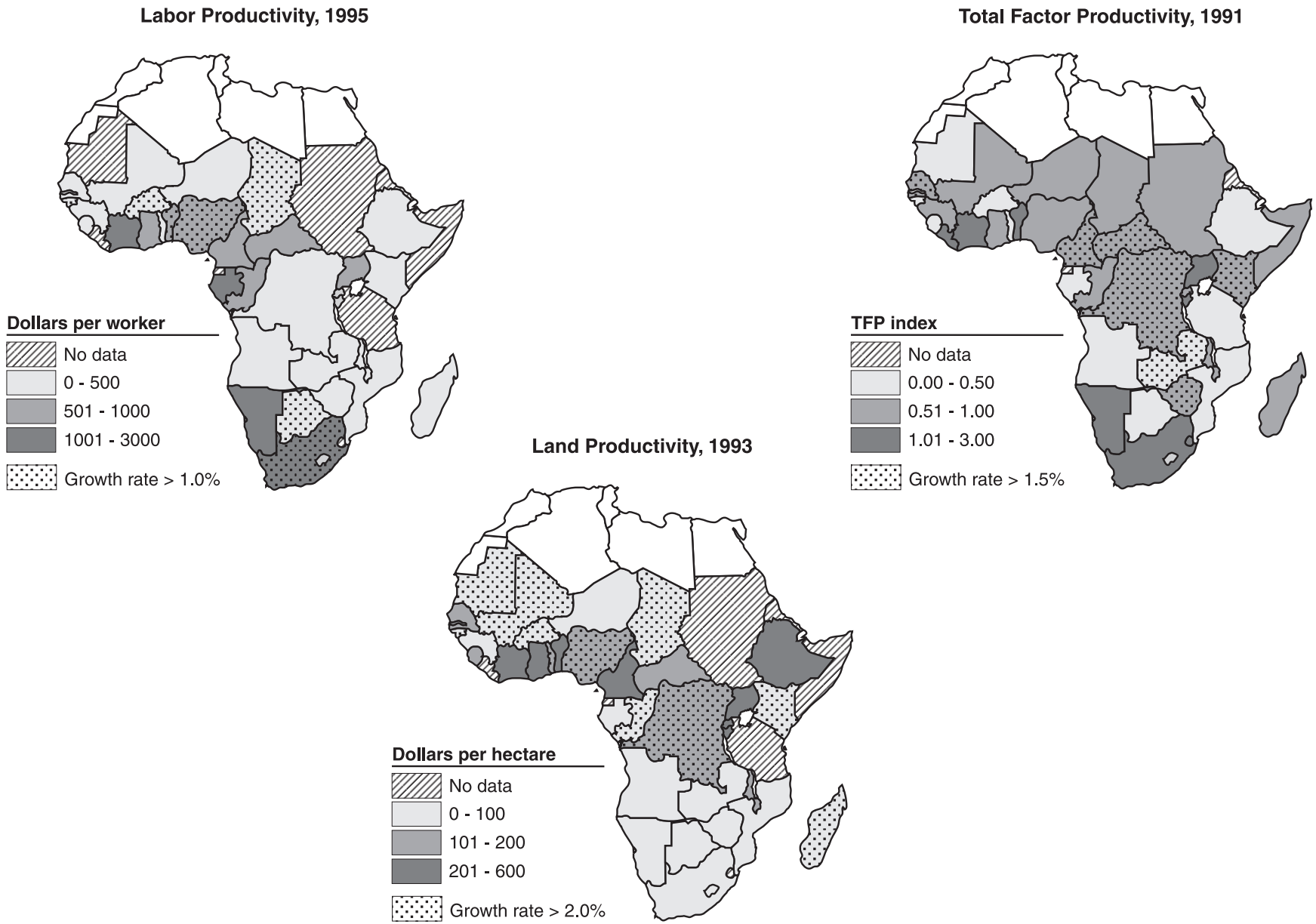


Table A-2-- Key Studies and Findings

Study	Countries	Time	Key findings
Frisvold & Ingram (1995)	28, in 4 SSA regions	1973-75 to 1983-85	Land productivity grew 1.5-1.8 percent per year in most regions, due mostly to increased labor input.
Craig, Pardey, & Roseboom (1997)	67, including 24 SSA and South Africa	1961-1990	Cross-sectional differences in labor productivity are explained mostly by conventional inputs; input quality and public infrastructure also matter.
Lusigi & Thirtle (1997)	47 African	1961-91	TFP grew 1.3 percent per year on average; noted role of population density.
Block (1995)	39 SSA	1973-88	TFP growth increased from -0.5 percent per year in the '70s to 1.6 percent per year in the '80s, mostly due to agricultural research and macroeconomic policies.
Thirtle, Hadley, & Townsend (1995)	22 SSA	1971-86	Low but positive TFP growth; significance of infrastructure, research, extension, education, and policy.

Binswanger and Pingali (1988) and Boserup (1965). Growth in the stock of *conventional inputs* (such as labor and machinery; see "Definitions" box) accounted for more than two-thirds of growth in land productivity, which in turn accounted for the majority of growth in agricultural output. *Nonconventional inputs* (such as land quality and historic calorie availability) were significant in explaining land productivity variation across countries, but did not contribute significantly to land productivity growth over time in most regions. Although agricultural research is often aimed specifically at improving yields, Frisvold and Ingram found no significant relationship between agricultural research expenditures and land productivity.

Labor productivity was examined in a study of 67 developing countries, including South Africa and 24 other SSA countries, by Craig, Pardey, and Roseboom (1997). They found that conventional inputs explain nearly three quarters of the variation in labor productivity across countries. Variables that adjust for quality differences in land and labor (rainfall, share of land that is arable, share of land that is irrigated, and life expectancy), and the amount of publicly provided infrastructure (including roads and agricultural research expenditures) are also significant in explaining cross-sectional differences in labor productivity.

Lusigi and Thirtle (1997) estimated an average rate of TFP growth of 1.3 percent per year for 47 African countries during 1961-91. They found that conventional inputs, land quality, and research expenditures together explain almost three-quarters of variation in production across the countries studied. Like Frisvold and Ingram (1995), Lusigi and Thirtle stress the contribution of population pressure to faster growth, arguing that land abundance depresses farmer incentives to increase land productivity by adopting yield-increasing technologies.

Block (1995) finds rates of growth in agricultural TFP in 39 SSA countries increasing from -0.5 percent per year (for 1973-78) to 1.6 percent per year (for 1983-88). Block suggests that expenditures for agricultural research and improved economic incentives (through improved macroeconomic policies) together explain two-thirds of measured productivity growth in SSA during 1983-88. This finding raises concerns about current reductions in public spending on agricultural research in SSA.

Thirtle, Hadley, and Townsend (1995) decompose the low but positive TFP growth rate they find for 1971-86 in most of the 22 SSA countries they studied into technical progress (from the time series for this panel of countries) and efficiency change (from the cross-section). Investments in infrastructure, extension, and the level of real protection on international agricultural markets are shown to be significant in explaining efficiency change, while tractors, the labor/land ratio, research and development (R&D), and secondary education are found to explain the variation in technical progress. They find the labor/land ratio, or population density, to be the single most important explanatory variable, again suggesting that productivity growth will accelerate in land-abundant countries as population density increases.

While the precise effects of different factors on the various measures of agricultural productivity vary from one study to the next, one broad pattern is clear. The studies are nearly unanimous in attributing most historic productivity growth to increases in the use of conventional inputs, especially labor. Policy reform, infrastructure, and agricultural research also make important contributions to productivity, although the estimated magnitude of these contributions is sensitive to the precise ways in which these variables are measured and analyzed.

Policy Reforms and Investment in Infrastructure and Research Are Keys to Productivity Growth

The studies reviewed here provide a guide to the factors that have historically affected agricultural productivity in SSA. Differences in the application of conventional inputs—espe-

cially labor—explain most of the historic variation in productivity between countries in SSA. Evidence of declining labor productivity and the costs of continued expansion of agricultural land, however, suggest that potential productivity gains yet to be realized from increased labor application are limited. Nevertheless, it is apparent that many countries in SSA still have considerable potential to raise productivity through increased use of other conventional inputs, namely fertilizer, machinery, and livestock. It has been argued that barriers to increased use of these inputs include lack of appropriate infrastructure and poor policy environments (Byerlee and Heisey, 1997; Heisey and Mwangi, 1996; Larson and Frisvold, 1996).

However, studies of historic productivity trends in SSA may provide incomplete guidance for future productivity growth. Analysis of a wider sample of countries with higher productivity may provide additional useful information on factors that could improve productivity in the future. In a review of such studies, Trueblood (1991) reports that the variables found to consistently affect productivity over a wide selection of countries include education, infrastructure, and research. For example, improved infrastructure may lead to increased productivity through enhanced access to output markets as well as through reduced costs for inputs such fertilizer and extension services. Investment in education and research may provide complementary increases in the efficiency with which fertilizer and extension services are used.

Given the importance accorded to physical infrastructure and education as nonconventional inputs in other multi-country studies of agricultural productivity (Craig, Pardey, and Roseboom, 1997) as well, it is surprising that these variables have not been included in the studies exclusive to Africa. It may be that data on infrastructure are not available for a large set of African countries. In an earlier study of agricultural productivity, Antle (1983) concluded that infrastructure investments help improve agricultural productivity in developing countries. In addition, a study of agricultural productivity in the United States has shown that infrastructure investments made important contributions to agricultural productivity through the 1960s (Shane, Roe, and Gopinath, 1998). Since that time, however, public and private R&D have become more important in spurring productivity growth in the United States. If a similar trend holds for other countries, we would expect that, for countries where the infrastructure is not yet well developed (as in much of Africa), large increases in agricultural productivity may be possible from investments in rural roads and utilities. It should also be noted that studies that include research as an explanatory variable but leave out infrastructure and other important nonconventional variables may be overstating the importance of research. It is for this reason that Block (1995) stresses that his estimate of research explaining up to one-third of the growth in TFP is an upper limit.

A few studies have looked explicitly at policy reform as an explanation for productivity growth. Block (1995) found that countries that depreciated the real exchange rate—and thus increased the prices paid to farmers for export crops—tended to have higher growth rates of total factor productivity. Fulginiti and Perrin (1997) used nominal price protec-

Definitions

Agricultural productivity is the amount of agricultural output per unit of input used in agricultural production.

Land productivity is the amount of agricultural output per unit of land used in agricultural production. Growth in land productivity reflects the growth in agricultural output not accounted for by (i.e. above and beyond) the growth in the amount of land used in agricultural production.

Labor productivity is the amount of agricultural output per unit of labor input used in agricultural production. Growth in labor productivity reflects the growth in agricultural output not accounted for by (i.e. above and beyond) the growth in the amount of labor used in agricultural production.

Total factor productivity (TFP) is the ratio of agricultural output to an index of inputs used in agricultural production. The inputs included in the denominator of the TFP index are typically the conventional inputs to agricultural production. The growth in agricultural TFP thus reflects the growth in agricultural output not accounted for by (i.e. above and beyond) the growth of conventional inputs.

Agricultural output is the sum of outputs of the agricultural sector, aggregated in monetary terms, less the cost of intermediate inputs.

Conventional inputs to agricultural production include land, labor, machinery, livestock, and fertilizer.

Nonconventional inputs to agricultural production include physical and institutional infrastructure, education, agricultural research and extension, and government programs and policies.

Data Limitations and Concerns

Data on agricultural inputs and outputs are costly to collect. Sub-Saharan African countries have limited budgets devoted to data collection, with the result that data on both conventional and nonconventional inputs are often unavailable or incomplete. Even for conventional inputs, data are often limited to large-scale, commercial, and/or more capital-intensive agricultural production rather than the smallholder sector that employs most of the region's agricultural labor force and produces most of the region's food.

These limitations are of concern because the more inputs that are unmeasured or incompletely measured, the fewer are the inputs that can be included in analyses of agricultural productivity, and the poorer are the estimates of the productivity of those inputs that are measured and analyzed. Lack of good estimates of the productivity of various inputs limits the ability of government and international agencies to establish policies that seek to achieve sustainable resource use, food security, and other objectives in the most cost-effective manner.

tion as a proxy for policy reform and concluded that countries that tax agriculture the most tend to have the most negative rates of productivity change. Recent World Bank findings suggest that countries with the most appropriate policy environments have experienced the highest levels of economic growth in SSA in recent years.

Other variables that deserve closer attention in studies of agricultural productivity include changes in resource quality over time and measures of political and institutional instability. Recent analysis indicates that changes in input quality accounted for one tenth of productivity growth in U.S. agriculture between 1948 and 1994 (Ahearn et al., 1998). Peterson's (1987) useful land quality index, which controls for irrigation, precipitation, and soil nitrogen, has been used frequently in international agricultural empirical work, but provides only one (constant) number per country that fails to reflect possible changes in land quality over time. If a portion of growth in agricultural productivity is actually due to soil fertility depletion, but soil depletion is left as an unmeasured explanatory variable (see box, "Data Limitations..."), growth in productivity may be incorrectly attributed to one of the variables that *is* measured and included in the analysis. As for measures of political instability, Messer, Cohen, and D'Costa (1998) estimate that cessation of armed conflict would have added 2 to 5 percent annually to Africa's per capita food production since 1980.

Improved Food Security Will Require Accelerated Productivity Growth

Almost three-quarters of the variation in agricultural productivity in SSA is explained by the use of conventional inputs, and research suggests that there remains significant scope to improve productivity in many countries through increased use of fertilizer, machinery, and livestock. Analysis elsewhere in this report projects that food production in SSA will grow an average of 2.3 percent per year over the next decade through a combination of area expansion (1.3 percent per year) and yield increases (1 percent per year). This report also projects that food production in SSA would have to grow 3.3 - 4.5 percent annually to meet a range of food security objectives over the next decade. If we further incorporate the World Bank's recommendation (Cleaver and Schreiber, 1994) that agricultural area expansion in SSA be limited to 0.5 percent per year on sustainability grounds, the need for gains in agricultural productivity growth becomes even more urgent. How might such gains be realized?

The studies reviewed indicate that continued growth of the agricultural labor force of 2.5 percent per year (World Bank, 1998) can be expected to increase agricultural output about 1 percent per year. As land becomes increasingly scarce relative to labor, farmers will increasingly seek ways to augment land through increased application of other inputs as well. Fertilizer application rates have been declining in SSA by an average of 1.3 percent per year since 1980 (World Bank, 1998). Reversing this trend and increasing fertilizer use by 5 percent per year could increase agricultural output by an additional 0.5 percent per year. Proportionate increases in the use of machinery and in research expenditures could be expected to add similar increases to output. Expected increases in output from improved infrastructure and price policies are difficult to quantify, but such improvements are also necessary to make possible the increases in productivity from conventional inputs and research.

In sum, agriculture in SSA is characterized by multiple constraints on accelerated productivity growth. On the one hand, this suggests that there are many means by which such constraints could be alleviated. For example, productivity gains from increased use of conventional inputs, such as fertilizer, could be supported through measures to improve smallholders' access to credit. On the other hand, in the absence of broad improvements in physical infrastructure, political stability, and the institutional environment, the returns to any single intervention in isolation are likely to be limited as other constraints quickly become binding. Policy reforms directed at improving physical and institutional infrastructure may not only increase use of inputs by lowering prices, but may also improve farmgate prices of agricultural output and thus more directly stimulate output. In addition, education of the rural labor force as well as agricultural

research will improve the future prospects for productivity growth in SSA. Finally, the full benefits of research are unlikely to be realized before these more basic constraints are surmounted. Nevertheless continued investment in research (along with attention to more basic sources of productivity growth) remains important due to potentially long lags in application.

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The Link Between Imports and Food Security

Stacey Rosen[1]

Abstract: In many low-income food deficit countries agricultural sectors have performed at full capacity. For these countries, as well as those where potential for agricultural growth is quite limited, commercial imports could play a major role in their future food security position. The objective of this article is to review the trends in import dependency, the contribution of food aid to food supplies, and factors affecting commercial import capacity in the countries of North Africa, Sub-Saharan Africa, Asia, and Latin America.

Introduction

To achieve food security—with respect to aggregate quantities, not household access—countries have two options: accelerate domestic agricultural production or increase imports. The first option is certainly a possibility for many of the low-income countries that have performed below their potential due to inappropriate producer policies, prolonged civil strife, or very low adoption of new technologies. However, agricultural sectors in many countries have been performing well, or have maximized their potential and yet they continue to face—or are projected to have— food gaps. For these countries, as well as those where potential for agricultural growth is quite limited, commercial imports could play a major role in their future food security position.

For low-income countries, food aid has been a supplement to commercial imports. However, food aid imports are at the discretion of donor countries and the recipient countries have little say in allocation decisions. At one time, food aid contributed a significant share of food supplies in some of the low-income, food deficit countries. However, donations peaked in the early 1990's and have fallen considerably since then. The prospects of food aid rebounding to historical levels are not promising given budgetary policies in many donor countries. This means that commercial imports will be the key to increasing food supplies in countries where production growth is unlikely.

As defined in the model used in this report, the principal determinants of commercial food imports are foreign exchange availability and food prices. The ability to finance commercial imports varies considerably across low-income countries. The performance of the export sector is crucial to providing the foreign exchange to enhance commercial import capacity. In addition to financing imports, exports have a direct effect on the domestic economy and also support debt service payments which are critical to maintaining a country's creditworthiness. World commodity prices also influence commercial import capacity. A decline in food prices raises the capacity to import. On the other hand, a decline in prices of goods exported by developing countries reduces import capacity.

This article reviews the trends in import dependency, the contribution of food aid to food supplies, and factors affecting commercial import capacity in the countries in four regions of this study: North Africa, Sub-Saharan Africa, Asia, and Latin America. The NIS region has been omitted from the historical discussion because of lack of data. The Food Security model is used to determine the impact of changes in major variables (such as export earnings and world prices) on food security in these regions.

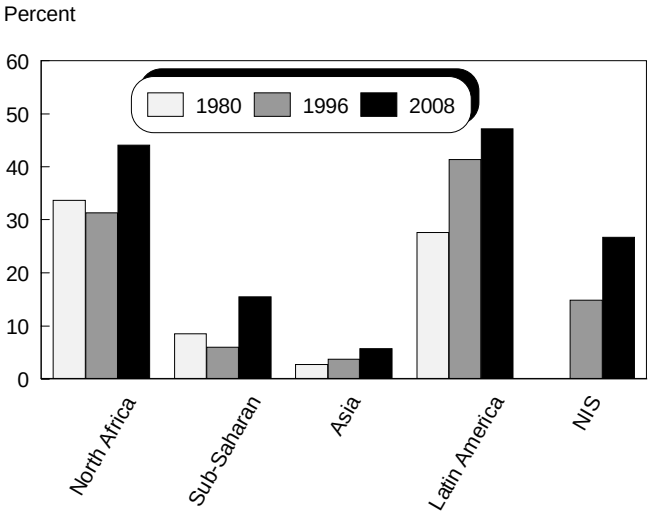
Import Dependency

Between 1980 and 1997, North Africa was the most import dependent region in this study with commercial imports contributing 39 percent of the food supply, on average (figure B-1). Latin America was close behind with a share of 34.3 percent. Sub-Saharan Africa and Asia relied on imports to a much lesser degree with dependency ratios of 6.3 and less than 3 percent. While imports accounted for a very small share of food supplies in Asia, commercial imports in this region were rising the fastest of all the regions at nearly 8 percent per year. Latin America's commercial import growth was also strong. Growth in Sub-Saharan Africa, however, was weak—less than 2 percent per year—reflecting the region's poor financial situation.

Examining the projection period (1998-2008), the strongest import growth is projected to occur in Latin America, 3.4 percent per year, and Asia, 3.1 percent. The jump in Latin America will lead to the highest import dependency of all regions, averaging 45 percent during the decade. Asia's import dependency will nearly double from historical levels, but remain low at 5.3 percent. Sub-Saharan Africa's import

[1]Agricultural economist with the Market and Trade Economics Division, Economic Research Service, USDA.

Figure B-1
Import Dependency



growth is projected to remain even with historical levels leading to an import dependency of nearly 16 percent.

Role of Food Aid

For many countries in the study, food aid has played a critical role in boosting food supplies. However, this role has diminished along with the declining trend in global donations. In the early 1990s, cereal food aid averaged roughly 14 million tons per year, but fell steadily thereafter to 5.5 million in 1997/98. FAO's forecast for 1998/99 is for aid to increase to roughly 8 million tons, still well below historical levels. For North Africa and Asia, food aid trends have followed similar paths. In both regions, the food aid share of food imports fell from around 20 percent in the early 1980s to roughly 2 percent in more recent years. In Latin America, the food aid share peaked at nearly 40 percent in the mid-1980s, but has since fallen to less than 5 percent. Sub-Saharan Africa is the only region where food aid has consistently played a major role in augmenting food supplies. While the share of imports has fluctuated widely during 1980-97—ranging from 22 to 57 percent—it has averaged nearly 40 percent. This average is much higher than any of the other regions, with Latin America next in line with an average of 23 percent.

Factors Influencing Import Capacity

In the model used in this report, commercial imports are assumed to be a function of domestic production, world commodity prices, and foreign exchange availability. Foreign exchange availability is defined here as the sum of export earnings and net flow of credit. Net credit flow is assumed constant in the model, which means among all the variables, export earnings and commodity prices are the key determinants of commercial imports. In the following sections, export earnings performance and international commodity price trends are reviewed.

Export Performance

Historical export earnings growth has varied widely across the regions and countries in this study. Data were reviewed for 61 low-income countries (the same set of countries covered in the report with the exception of the NIS countries because of the lack of data). To compare changes in trends in export earnings during the historical period, growth was calculated for two different time periods—1980-90 and 1990-96 for four regions: Sub-Saharan Africa, North Africa, Latin America, and Asia (table B-1). Sub-Saharan Africa is the only region that experienced a slowdown in earnings growth between the two time periods: from 3 percent per year to 1.6 percent. Growth in the other regions accelerated. Latin America saw the biggest jump—from roughly 1 percent in the early period to 5.4 percent in the more recent period. Asia's export earnings growth was the strongest of all the regions in both time periods and measured nearly 11 percent per year in the 1990s.

The differences in export performances of regions and countries stem from a variety of internal and external factors. Most developing countries are price takers in the international market, but their export volume response to these prices is not uniform and is influenced by internal policies and the flexibility of their production system. For example, Sub-Saharan Africa's regulatory policies have influenced trade patterns. The region's transportation policies have been structured in such a way that exports of higher valued processed goods are discouraged. This was one factor that contributed to the region's continued dependence on primary products.

Export volume: Evidence of policy successes and failures is clear upon review of the trends in export volume in each region. The historical period was divided into two periods, 1980-90 and 1990-96, to compare changes in growth rates over time (these time periods were chosen due to availability of data). Both North Africa and Sub-Saharan Africa experienced a slowdown in their export volume growth rates in between the two time periods. North Africa, however, started from a higher base rate. Export volumes in this region fell from an annual growth rate of 5 percent during 1980-90 to 4.4 percent in 1990-96. In Sub-Saharan Africa, growth in the early period measured less than 2 percent per year and fell to less than 0.4 percent in the more recent period. In other words, the region has experienced virtually no growth, on average, in export volume in the 1990s. In fact, half the coun-

Table B-1--Export Growth

	Value		Volume	
Region	1980-90	1990-96	1980-90	1990-96
	Percent per year			
North Africa	4.6	4.8	5.0	4.4
Sub-Saharan Africa	3.0	1.6	1.9	0.4
Asia	8.4	10.8	7.4	11.2
Latin America	1.1	5.4	0.8	3.0

Source: World Development Indicators, 1998.

tries in this region saw their export volumes decline during this time. In Latin America, growth in export volume strengthened from less than 1 percent per year in the early period to 3 percent in the more recent period. This change was driven by significant improvement by Ecuador, El Salvador, Honduras, and Peru. Asia had the greatest export volume growth of all the regions, averaging 7.4 percent annually through the 1980s and exceeding 11 percent in the 1990s.

There is a general consensus that such disparities in performance stem from micro- and macroeconomic policies of the countries. Studies have shown that trade and exchange rate policies in poor performing countries have often taxed exports in favor of import-substitute products. The evidence also indicates that these policies have been more widespread with respect to agricultural products. A 1988 study by the World Bank measured the effects of policy intervention on agricultural commodities in several developing countries. The policy interventions for selected commodities were decomposed into direct (sector specific) and indirect (economywide) interventions. The results showed that the negative indirect effects of intervention policies were much stronger than the negative direct effects. In fact, in Ghana and Zambia, the positive direct effects were eroded by strong negative indirect (economywide) effects.

Recognizing these costs, agencies attached conditionality to their multilateral and major bilateral lending to developing countries in an attempt to persuade the countries to amend their policies. The response of developing countries, in general, was positive. Many countries, including many in Sub-Saharan Africa, adopted flexible exchange rate policies to reduce the bias against export sectors. Currency depreciation, which lowers export prices, is expected to increase export volumes and export shares.

An FAO study that quantified the relationship between exchange rates and exports has also provided some insights. The results of the study showed that while exchange rate adjustments are necessary, they are not sufficient conditions to revitalize exports. A World Bank study concluded that uneven policy reforms across sectors and countries in Sub-Saharan Africa can explain the weakness of the export sectors. In Sub-Saharan Africa, the trade sector continues to be the main source of government revenue and according to available reports, trade policy distortions continue.

Export prices: In addition to export volume, export prices are the other principal determinants of trends in export earnings. Declining prices can mitigate growth in export volumes. Likewise, rising prices can compensate for a decline in export volumes. In the case of Sub-Saharan Africa, slow growth in export volumes has been exacerbated by weak prices for the commodities the region exports. This region exports principally primary products, prices of which peaked around 1980, fell considerably through the 1980s and have, in most cases, not fully recovered. Moreover, the World Bank is projecting these prices to decline more than 2 percent per year through the next decade. One reason is that demand for these primary products is not particularly strong.

Several countries in the region rely heavily on metals and minerals for much of their export earnings. Real prices of these products are equal to roughly 75 percent of their 1990 price—which was considerably lower than the 1980 price. Real prices are projected to remain flat through 2005. Many countries in the other regions included in this study have moved away from exports of primary products toward manufactured goods, prices of which have increased 3 percent annually since 1980.

It has been argued that export diversification can improve export earnings. A simple comparison of trends in exports and commodity composition in different regions demonstrates the likely linkages between these two factors. Sub-Saharan Africa experienced the lowest export growth of all the regions in this study and also had the largest share of agricultural exports. The bulk of these exports were beverages, sugar, and tobacco.

As in Sub-Saharan Africa, agricultural commodities account for a large share of export earnings in Latin America. However, Latin America has a larger and growing share of exports in manufactured goods, reaching 40 percent in 1996. In Sub-Saharan Africa, this share remained below 10 percent throughout the historical period. The obvious benefits of these products is that demand for them is growing faster than for primary agricultural commodities. Moreover, unlike agricultural commodities, they are not vulnerable to the vagaries of weather.

In North Africa, fuel exports continue to play an important role in total export earnings, but their share fell considerably during the historical period. During the same time period, earnings growth in the region has accelerated. Some of this growth can be attributed to a sharp increase in the share of exports coming from manufactured goods, reaching 41 percent in 1990.

A similar, but even more dramatic, path is evident in the Asian countries. The agricultural share of total exports was cut in half during the historical period while that of manufactured goods more than doubled. These changes were a major factor behind the region's strong export growth.

International Food Prices

In addition to exports, food prices play a significant role in determining import capacity. As import prices fall, capacity to import rises and vice versa. Grain prices, in real terms, fell nearly a half between 1980 and 1990. Other than price spikes in 1995 and 1996, prices have remained fairly steady in the 1990s. Exporters responded to the 1996 price hike with a sharp increase in output. This ability to respond to

price hikes reflects the excess capacity in major exporting countries and supports the opinion that sustained periods of higher prices are unlikely.

These price trends indicate that the low-income, food-deficit countries are in a much better position now than in the early 1980s. However, even a one-time price spike can adversely affect a country. Between 1994 and 1996, grain prices jumped more than 30 percent in real terms. Although the volume of grain imports of low-income, food-deficit countries increased nominally between 1994 and 1996, the grain import bill rose 50 percent. Given the financial constraints facing most of these countries, this volatility adversely affects short-term economic growth.

Modeling Food Imports and Gaps Under Alternative Scenarios

The Food Security model was used to determine the impact of changes in the growth path of export earnings and a one-time shock to food prices on imports and food security in these regions (table B-2). In the baseline, combined commercial imports by the 66 countries are projected to total nearly 73 million tons in 2008. The nutritional food gap is projected at 28.4 million tons, nearly 80 percent of which will be accounted for by Sub-Saharan Africa.

In the first scenario, a highly optimistic export growth path of 10 percent per year, in real terms, was used for each year of the projection period (1998-2008). This growth rates translates into a doubling of export earnings, on average, for the 66 countries over the next 10 years. In the baseline scenario, annual real export growth ranges from 2 to 6 percent.[2] The accelerated export growth assumption is projected to result in a 46 percent jump in commercial imports, on average, for all the regions relative to the base scenario. Reviewing the results by region, gains in commercial imports are projected to be the largest in Sub-Saharan Africa and the lowest in the NIS region. This is due to the differences in export growth rates in the baseline projections. The highest export growth was projected for NIS countries, while the lowest was for Sub-Saharan Africa. As for the implications for food security resulting from a boost in export earnings, the nutritional gap is projected to decline 16 percent, on average, relative to the base scenario. Latin America is projected to see the greatest decline in the gap, while the smallest change is projected for Asia. These impacts are consistent with the import dependency of these regions. In Latin America, imports account for a large share of food availability. Therefore, when imports are cut, the implications for food security will be significant. Conversely, in Asia, import dependency is quite low (generally below 5 percent). As a result, when imports are cut, the implications for food security are marginal. While the accelerated export growth is projected to improve the food security situation across all regions, the problem is not eradicated.

In the second scenario, the impact of a *one-time* shock—a 20-percent increase in grain prices—as was experienced in 1996, was examined. In the baseline scenario, the assumption was a 2-percent annual price decline. In accordance with expectations, the higher prices are projected to result in a decline in commercial imports—8.2 percent, on average, for all countries. The regional responses were fairly consistent with the overall results. The reduction in commercial imports is projected to result in a deterioration in food security and this is reflected in the 4.2 percent rise in the nutritional gap relative to the base scenario. The situation is projected to deteriorate the greatest in Latin America where the gap increases more than 40 percent. On the other hand, the price hike is projected to have a negligible effect on the food security situation in Sub-Saharan Africa. Again, these results can be explained by the degree of import dependency in these regions.

In the third scenario, the accelerated growth rath of the first scenario is combined with the one-time price shock of the second scenario. In this scenario, the negative effects of the one-time shock completely erode the positive effects of higher export growth. Commercial imports are projected to decline more than 8 percent relative to the higher export growth scenario. Moreover, the nutritional gap is projected to be 4.6 percent larger. However, the food security implications are projected to be better under this scenario than in the base scenario. Even when the price shock is added to the high export growth assumption, the food gaps are projected to be smaller than those under the base scenario. There is no surprise in this finding, but it illustrates the point that if countries can maintain a high export growth path, their food security situation can improve despite periodic price shocks.

In sum, the analysis clearly shows that improved export performance will enhance the food security of the countries, but it cannot eradicate the problem. In many cases, the export growth needed to boost the import capacity to the level necessary to close the food gaps is simply unrealistic. For example, in Sub-Saharan Africa, commercial food imports must grow nearly 13 percent annually to close the average nutritional gap by 2008. The parameters used in the model assume that the response of food imports to changes in foreign exchange availability is not one-to-one (i.e., inelastic response in the range of 0.6 to 0.8, depending on country—estimates based on cross-country data). This means that, everything being equal, to achieve a 1-percent growth in food imports, foreign exchange availability must grow 1.3 to 1.7 percent. If the net flow of capital stays constant or even declines as has been the case in many of these countries, exports will remain the sole source of import financing. This means that much higher export earnings will be required to attain the necessary foreign exchange availability. Clearly, achieving dramatically higher growth in

[2]Projected annual growth in real export earnings is 2.1 percent for Sub-Saharan Africa, 3.7 percent for North Africa, 4.1 percent for Asia, 5.1 percent for Latin America, and 6.1 percent for NIS.

Table B-2--Scenario Analysis

Region	Baseline	Scenario 1 1/	Scenario 2 2/	Scenario 3 3/
		Million tons		
North Africa				
Commercial imports	23.8	35.2	22.0	32.5
Nutritional gap	0.0	0.0	0.0	0.0
Sub-Saharan Africa				
Commercial imports	9.8	15.7	9.0	14.4
Nutritional gap	22.4	18.8	23.0	19.5
Asia				
Commercial imports	23.4	34.8	21.3	31.7
Nutritional gap	4.7	4.1	5.0	4.3
Latin America				
Commercial imports	13.8	18.3	12.7	16.8
Nutritional gap	0.7	0.4	1.0	0.5
NIS				
Commercial imports	2.0	2.5	1.9	2.3
Nutritional gap	0.6	0.4	0.7	0.5
Total 66 countries				
Commercial imports	72.9	106.5	66.9	97.7
Nutritional gap	28.4	23.8	29.6	24.9

1/ 10 percent real export growth. 2/ 20 percent increase in real grain prices. 3/ 10 percent real export growth plus a 20 percent increase in real grain prices.

export earnings is unlikely. This also means that eradicating food insecurity in the poor countries is a complicated task and requires a comprehensive strategy to increase export earnings as well as domestic production.

Conclusion

If the future growth path of exports follows the historical trends in these study countries, export earnings will remain far short of financing the required imports. Assuming an accelerated export growth path of 10 percent through the next decade will reduce, but not eliminate the food gaps. Periodic price hikes also remain a hinderence to financing imports and a threat to food security.

Domestic policies of the countries, however, can improve this outlook. In most countries, export markets continue to be distorted by a wide range of domestic policies and border measures that reduce opportunities for export diversification and growth. Improving trends in food security, however, requires a simultaneous effort to improve both export and domestic production performance. This is particularly important for most of the food-insecure countries, because agriculture continues to be the main source of income for the rural population, where most of the food insecure live. Moreover, agricultural products contribute to a large share of export earnings in many countries.

Research has shown that international trade is one of the most important factors affecting food security. Overall, food-deficit countries must continue their current policies of liberalizing trade and the agricultural sector and implement structural adjustments that improve the performance of the agricultural sector. Improving export performance will enhance the financial condition and creditworthiness of these countries and thereby attract foreign investment. For the low-income countries, increasing export earnings will increase the capacity for importing not only food, but capital goods as well that are essential for long term growth.

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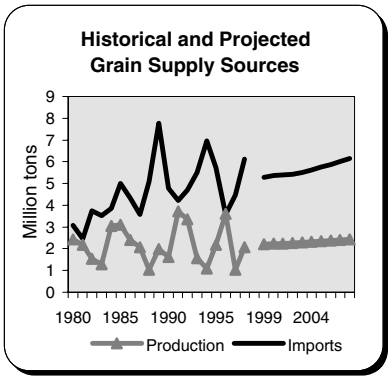
Statistical table 1--Algeria (North Africa)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grains)		Aggregate availability of all food (grain equiv.)
			---1,000 tons ---			
1989	1,993	255	7,764	11		9,462
1990	1,619	206	4,741	26		6,843
1991	3,730	275	4,190	19		7,674
1992	3,348	295	4,688	15		7,868
1993	1,563	272	5,482	18		7,515
1994	1,094	183	6,939	24		8,738
1995	2,193	306	5,719	17		10,846
1996	3,603	294	3,578	0		8,488
1997	1,023	281	4,469	0		5,217
Projections				**Food gap**		
				SQ	NR	(w/o food aid)
1998	2,078	278	5,092	***0***	***0***	9,197
2003	2,290	306	5,501	***134***	***0***	9,917
2008	2,433	336	6,140	***182***	***0***	10,925

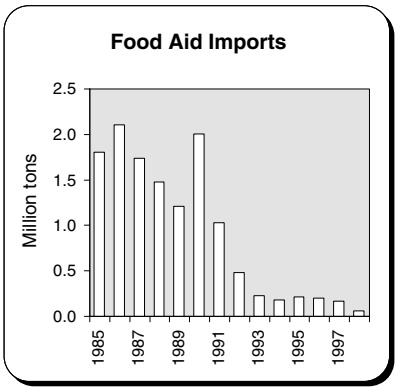
Food import dependency is projected to increase considerably over time, from 43 percent in the base period to 56 percent in 2008. Financing these imports will depend critically upon gas and oil revenues and political stability.



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 (grain equiv.)
			---1,000 tons ---			
1989	9,890	459	6,832	1,211		14,208
1990	11,787	460	6,076	2,003		15,050
1991	12,016	508	6,440	1,026		15,637
1992	12,329	460	6,545	482		15,441
1993	13,205	466	6,717	230		16,012
1994	13,510	398	8,886	180		17,712
1995	14,578	721	7,658	215		18,947
1996	15,323	731	7,551	202		17,842
1997	16,546	754	9,886	167		21,331
Projections				**Food gap**		
				SQ	NR	(w/o food aid)
1998	16,690	633	9,052	***0***	***0***	20,876
2003	16,751	677	9,785	***748***	***0***	21,149
2008	17,746	723	11,011	***819***	***0***	22,951

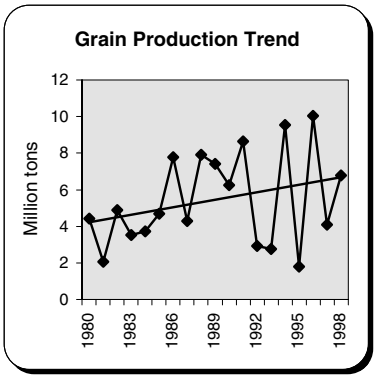
Grain production has grown substantially since 1980. Food aid imports have dropped sharply for the same period, due to higher production and improved financial capacity. However, Egypt is projected to develop a small food gap by 2008 due to the difficulty of sustaining high consumption levels.



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 (grain equiv.)
			---1,000 tons ---			
1989	7,404	275	1,130	227		7,868
1990	6,254	268	1,390	204		7,070
1991	8,636	325	1,758	203		7,826
1992	2,933	276	2,860	234		6,975
1993	2,753	265	3,531	124		8,000
1994	9,530	312	1,673	13		7,519
1995	1,800	232	3,602	0		7,943
1996	10,037	337	2,905	2		8,647
1997	4,101	343	2,310	2		6,174
Projections				**Food gap**		
				SQ	NR	(w/o food aid)
1998	6,785	303	3,084	***0***	***0***	9,266
2003	5,789	335	3,484	***0***	***0***	8,678
2008	6,255	369	4,151	***0***	***0***	9,881

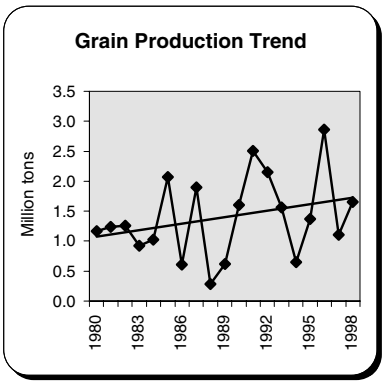
Morocco compensates for frequent production shortfalls with commercial imports. Although growth in food output is projected to be slow--2.1 percent annually--relatively strong import growth of nearly 3 percent per year is projected to preclude food gaps.



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 (grain equiv.)
			---1,000 tons ---			
1989	621	44	1,119	543		2,038
1990	1,601	54	1,070	371		2,261
1991	2,508	55	831	96		2,722
1992	2,155	54	920	100		2,807
1993	1,561	49	1,001	46		2,271
1994	646	52	1,576	22		1,999
1995	1,366	58	2,678	18		3,494
1996	2,862	67	1,236	0		2,710
1997	1,101	75	1,371	0		1,844
Projections				**Food gap**		
				SQ	NR	(w/o food aid)
1998	1,651	61	1,979	***0***	***0***	2,869
2003	2,004	67	2,194	***0***	***0***	3,381
2008	2,161	73	2,539	***0***	***0***	3,858

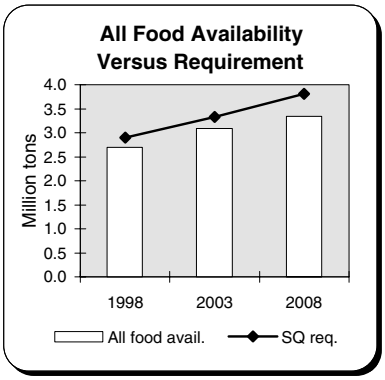
Tunisia's agricultural sector is characterized by high production variability--averaging roughly 50 percent since 1980. Production and import growth are projected to be more than adequate to maintain base consumption levels and meet nutritional requirements.



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 (grain equiv.)
			---1,000 tons ---			
1989	880	616	425	0		2,317
1990	826	755	381	10		2,408
1991	950	747	253	13		2,431
1992	868	755	434	1		2,576
1993	878	784	307	2		2,506
1994	892	778	417	2		2,650
1995	1,140	749	314	4		2,714
1996	1,240	926	118	4		2,841
1997	1,090	830	249	2		2,660
Projections				**Food gap**		
				SQ	NR	(w/o food aid)
1998	1,015	867	255	***204***	***0***	2,696
2003	1,281	936	268	***232***	***0***	3,093
2008	1,387	1,009	290	***462***	***187***	3,344

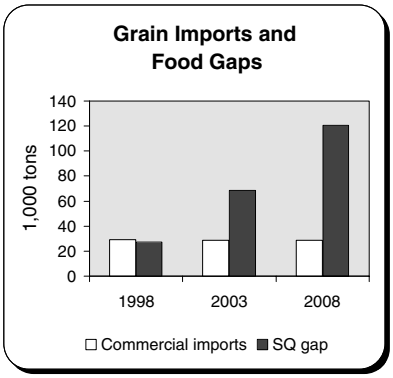
Food production would need to grow at twice the projected rate to maintain consumption at base levels. Domestic supplies, however, are sufficient to meet nutritional requirements through most of the projection period.



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 (grain equiv.)
			---1,000 tons ---			
1989	125	235	22	4		571
1990	123	258	32	4		594
1991	129	270	22	3		600
1992	93	281	25	5		580
1993	93	279	24	6		582
1994	85	271	43	1		602
1995	105	281	28	0		608
1996	110	298	14	0		623
1997	100	315	39	0		640
Projections				**Food gap**		
				SQ	NR	(w/o food aid)
1998	95	288	29	***27***	***112***	616
2003	105	302	29	***68***	***163***	646
2008	109	316	29	***120***	***225***	674

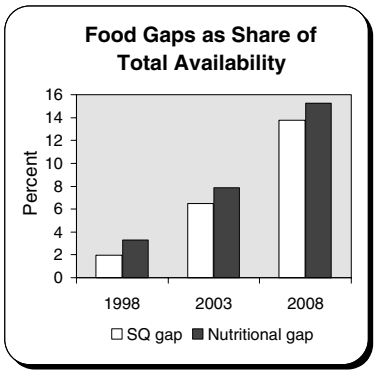
Production growth of less than 1 percent per year coupled with little import capacity are projected to lead to a deteriorating food supply situation. In 2008, average consumption levels are projected to equal only 75 percent of nutritional requirements.



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 (grain equiv.)
			---1,000 tons ---			
1989	1,038	6,345	236	109		8,541
1990	1,011	6,590	318	86		8,922
1991	1,229	6,826	164	129		9,292
1992	1,408	6,968	238	27		9,694
1993	1,567	6,668	246	31		9,678
1994	1,545	6,745	223	86		9,698
1995	1,452	6,679	333	35		9,729
1996	1,465	6,648	290	8		9,622
1997	1,370	6,648	244	7		9,421
Projections				**Food gap**		
				SQ	NR	(w/o food aid)
1998	1,445	6,931	301	***196***	***327***	9,948
2003	1,695	7,596	279	***710***	***860***	10,939
2008	1,839	8,314	267	***1,639***	***1,814***	11,911

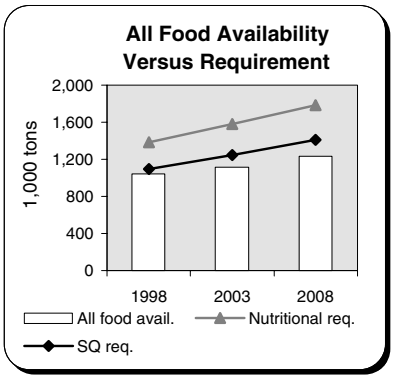
Food production growth of less than 2 percent per year and declining commercial imports are projected to generate rapidly expanding food gaps. Production would need to increase 3.3 percent per year to close these gaps by 2008.



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 (grain equiv.)
			---1,000 tons ---			
1989	268	375	11	3		985
1990	360	380	19	3		1,176
1991	385	389	33	1		1,220
1992	258	399	18	6		1,097
1993	249	389	0	28		1,063
1994	185	339	34	78		1,016
1995	225	356	40	5		1,018
1996	220	366	37	3		1,041
1997	255	373	37	0		1,173
Projections				**Food gap**		
				SQ	NR	(w/o food aid)
1998	230	362	40	***51***	***343***	1,041
2003	243	392	39	***135***	***468***	1,112
2008	288	424	39	***177***	***553***	1,232

The food gap to meet nutritional requirements is projected to rise from 33 to 45 percent of food availability between 1998 and 2008. Production would need to expand nearly 5 percent per year to close this gap--much higher than the projected rate of less than 2 percent.

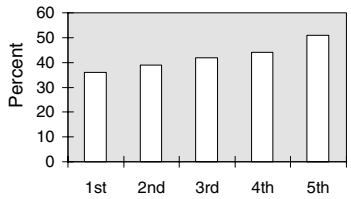


Statistical table 9--Eritrea (East Africa)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grains)		Aggregate availability of all food (grain equiv.)
			---1,000 tons ---			
1989	122	23	0	0		144
1990	72	23	0	100		94
1991	72	23	0	253		94
1992	198	23	0	39		220
1993	73	23	0	235		293
1994	298	23	192	63		679
1995	153	23	29	62		349
1996	132	23	39	72		359
1997	150	23	235	54		571
Projections				**Food gap**		
				SQ	NR	(w/o food aid)
1998	130	24	112	***96***	***407***	360
2003	161	26	115	***126***	***486***	402
2008	175	28	122	***158***	***561***	432

Eritrea is one of the most food insecure countries in the world. Consumption in 2008 is projected to equal only 45 percent of nutritional requirements. The nutritional food gap is projected to exceed aggregate food availability throughout the projection period.

Consumption by Income Quintile in 2008:
Share of Nutritional Requirements

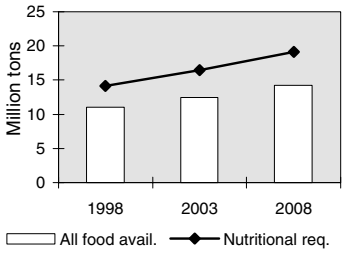


Statistical table 10--Ethiopia (East Africa)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grains)		Aggregate availability of all food (grain equiv.)
			---1,000 tons ---			
1989	5,001	707	0	678		5,871
1990	5,052	734	0	808		6,068
1991	4,876	748	0	1,046		6,160
1992	5,342	746	487	543		6,567
1993	5,363	746	0	942		8,302
1994	5,960	767	336	687		9,573
1995	7,075	773	248	403		10,200
1996	6,775	780	86	354		9,685
1997	7,800	780	0	394		11,138
Projections				**Food gap**		
				SQ	NR	(w/o food aid)
1998	8,385	797	63	***0***	***3,040***	11,061
2003	9,346	882	64	***182***	***4,051***	12,429
2008	10,764	975	68	***400***	***4,895***	14,257

While reliance on external sources to maintain per capita consumption will be negligible during the projection period, the nutritional situation is projected to worsen. Projected production growth of 3.1 percent per year falls well short of the 4.7 percent required to close the nutritional gap.

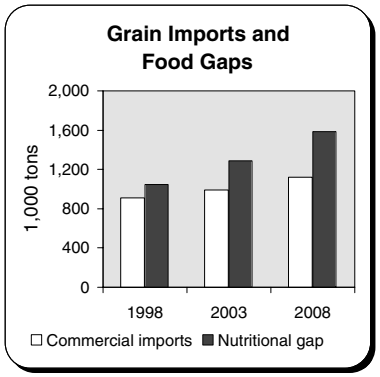
All Food Availability Versus Requirement



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 (grain equiv.)
			---1,000 tons ---		
1989	3,399	513	71	89	5,219
1990	2,723	485	296	65	5,341
1991	3,033	480	136	186	5,361
1992	3,085	500	359	288	5,330
1993	2,220	525	312	236	4,445
1994	3,554	520	1,004	111	5,853
1995	3,227	571	284	56	5,738
1996	2,778	578	393	32	5,010
1997	2,930	570	1,771	75	6,628
Projections				**Food gap**	
				SQ NR	(w/o food aid)
1998	2,930	576	907	***171 1,046***	5,640
2003	3,300	633	994	***298 1,285***	6,257
2008	3,670	695	1,119	***467 1,586***	6,964

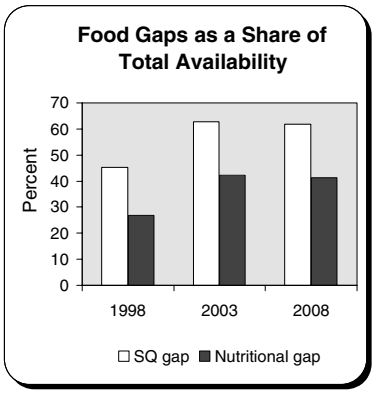
Although food production growth is projected to outstrip historical rates and import growth is among the strongest in the region, food gaps are projected to rise. By 2008, consumption in even the highest income group is projected to fall short--albeit marginally--of the nutritional target.



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 (grain equiv.)
			---1,000 tons ---		
1989	262	552	13	10	1,416
1990	269	629	15	15	1,440
1991	254	739	19	11	1,438
1992	267	673	0	90	1,435
1993	188	598	46	90	1,350
1994	149	499	0	272	1,156
1995	154	480	0	244	1,186
1996	159	584	72	218	1,436
1997	214	587	2	232	1,656
Projections				**Food gap**	
				SQ NR	(w/o food aid)
1998	184	524	0	***498 295***	1,101
2003	258	575	0	***791 531***	1,260
2008	309	631	0	***867 579***	1,402

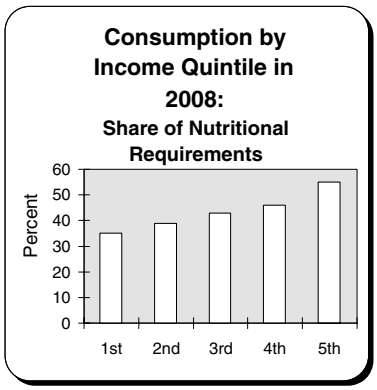
Food production is projected to remain below pre-strife levels in the near term, resulting in significant food gaps. Output growth would need to double from projected rates to close the gaps. Consumption in each income group is projected to fall below nutritional targets in 2008.



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 (grain equiv.)
			---1,000 tons ---			
1989	513	16	103	95		1,289
1990	477	16	97	100		1,189
1991	257	16	77	132		1,044
1992	202	14	38	312		1,102
1993	162	14	125	75		1,042
1994	228	12	115	13		1,199
1995	293	14	81	12		1,219
1996	313	14	94	12		1,210
1997	320	15	211	5		1,369
Projections				**Food gap**		
				SQ	NR	(w/o food aid)
1998	254	14	144	***129***	***1,005***	1,262
2003	327	15	144	***299***	***1,345***	1,360
2008	349	16	149	***502***	***1,720***	1,431

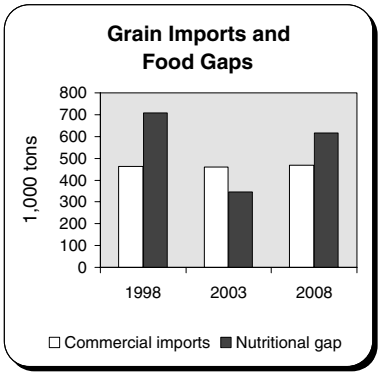
Per capita consumption is projected to fall more than 2 percent per year through 2008 as output rises less than 1 percent a year and commercial imports rise negligibly. In 2008, consumption in the highest income group is projected at only 55 percent of the nutritional target.



Statistical table14--Sudan (East Africa)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grains)		Aggregate availability of all food (grain equiv.)
			---1,000 tons ---			
1989	2,467	45	182	360		4,726
1990	2,119	36	120	513		4,274
1991	4,488	50	488	711		6,101
1992	5,307	51	334	286		5,932
1993	3,087	48	427	293		5,562
1994	5,152	50	811	134		6,485
1995	3,307	50	450	64		5,283
1996	5,207	50	383	40		6,632
1997	4,682	50	447	46		6,331
Projections				**Food gap**		
				SQ	NR	(w/o food aid)
1998	4,097	51	463	***486***	***707***	5,572
2003	5,112	53	459	***100***	***347***	6,663
2008	5,540	56	469	***342***	***617***	7,175

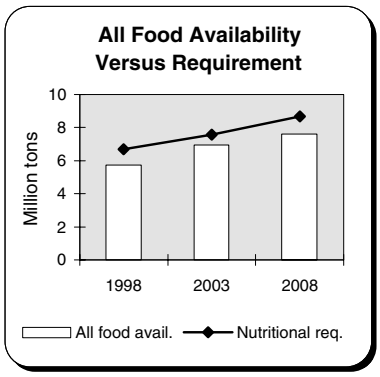
If the growth in food production followed historical trends of 3.5 percent per year, both food gaps would fall to zero. However, growth in output--particularly grains--is projected to slow considerably, reflecting a slowdown in area expansion.



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 (grain equiv.)
			---1,000 tons ---			
1989	4,470	1,628	24	28		6,325
1990	3,565	1,966	43	34		5,686
1991	3,540	1,736	111	18		5,887
1992	3,390	1,648	154	36		5,598
1993	3,700	1,593	150	47		5,647
1994	3,305	1,681	228	108		5,549
1995	4,355	1,451	194	25		5,815
1996	4,455	1,419	233	22		6,186
1997	3,140	1,416	62	5		4,777
Projections				**Food gap**		
				SQ	NR	(w/o food aid)
1998	3,805	1,531	177	***419***	***935***	5,750
2003	4,869	1,653	174	***50***	***634***	6,945
2008	5,384	1,783	179	***400***	***1,068***	7,608

Although food production is projected to grow at slightly higher rates than those of the historical period, food gaps persist. To close the nutritional food gap, output would need to rise nearly 3 percent per year, compared with the projected rate of roughly 2.2 percent.



Statistical table 16--Uganda (East Africa)

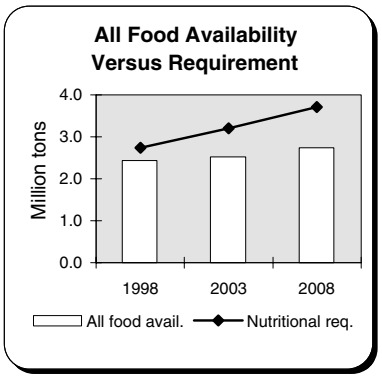
Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grains)		Aggregate availability of all food (grain equiv.)
			---1,000 tons ---			
1989	1,535	1,906	0	49		4,596
1990	1,520	1,858	0	74		4,583
1991	1,460	1,834	0	30		4,560
1992	1,666	1,765	0	40		4,603
1993	1,794	1,886	36	46		4,897
1994	1,900	1,593	0	60		4,792
1995	2,020	1,688	10	41		5,087
1996	1,750	1,431	35	20		4,681
1997	1,550	1,630	57	21		4,643
Projections				**Food gap**		
				SQ	NR	(w/o food aid)
1998	1,740	1,607	37	***198***	***0***	4,911
2003	2,267	1,786	39	***58***	***0***	5,819
2008	2,558	1,982	42	***307***	***0***	6,508

Uganda is one of a few countries in the region projected to have adequate food supplies to meet minimum nutritional targets through 2008. At the national level, consumption is projected to equal 105 percent of the nutritional target in 2008.

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 (grain equiv.)
			---1,000 tons ---			
1989	287	618	101	139		1,740
1990	227	617	210	124		1,761
1991	346	633	162	142		1,843
1992	452	714	200	116		2,083
1993	317	707	103	222		1,877
1994	261	887	173	229		2,148
1995	302	897	185	224		2,278
1996	473	934	276	228		2,597
1997	488	875	295	154		2,550
Projections				**Food gap**		
				SQ	NR	(w/o food aid)
1998	523	955	268	***173***	***304***	2,430
2003	473	1,025	294	***523***	***675***	2,528
2008	512	1,100	336	***789***	***965***	2,742

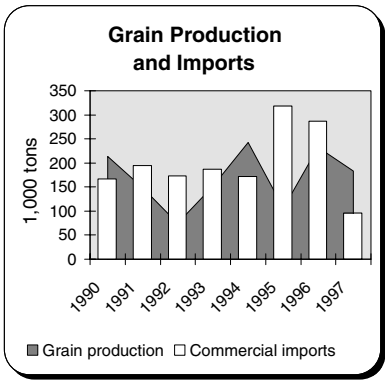
Domestic supplies are not projected to grow fast enough to preclude significant increases in food gaps. The nutritional food gap will more than triple during the projection period and equal 35 percent of aggregate food availability in 2008.



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 (grain equiv.)
			---1,000 tons ---			
1989	189	13	138	34		303
1990	214	13	167	36		419
1991	148	14	195	37		402
1992	75	16	173	45		306
1993	151	17	187	32		369
1994	243	20	172	15		367
1995	106	23	318	28		491
1996	233	23	287	30		553
1997	183	26	96	32		305
Projections				**Food gap**		
				SQ	NR	(w/o food aid)
1998	145	23	263	***51***	***109***	412
2003	192	24	273	***60***	***125***	464
2008	207	26	295	***94***	***168***	498

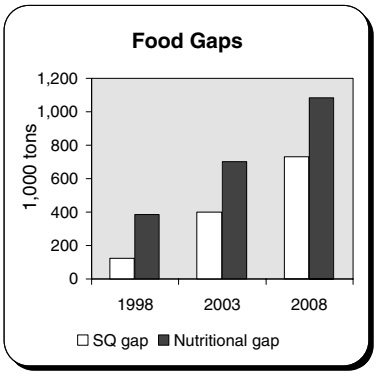
High production variability characterizes the agricultural sector. Commercial imports have compensated for many production shortfalls. Slow growth in output and imports are projected to lead to a 1-percent annual decline in per capita consumption through 2008.



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 (grain equiv.)
			---1,000 tons ---			
1989	1,645	919	76	51		2,762
1990	1,700	926	99	38		2,803
1991	1,553	932	28	54		2,660
1992	1,715	916	73	59		2,871
1993	1,812	952	77	34		2,963
1994	1,670	972	123	20		2,885
1995	1,780	955	131	21		3,005
1996	1,830	964	117	28		3,079
1997	1,880	965	69	18		3,095
Projections				**Food gap**		
				SQ	NR	(w/o food aid)
1998	1,880	996	114	***125***	***386***	3,098
2003	2,047	1,080	116	***399***	***703***	3,361
2008	2,217	1,170	121	***729***	***1,083***	3,636

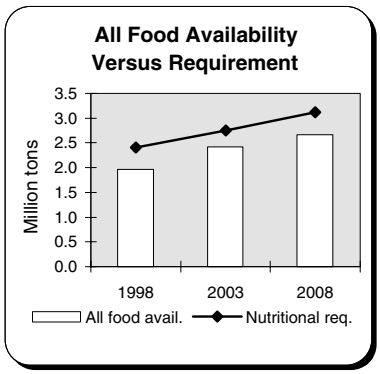
The nutritional gap as a share of aggregate food availability is projected to rise from 12 to 30 percent between 1998 and 2008. Production must rise 3.6 percent per year to close the nutritional gap; this is more than 2 times the projected growth rate.



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 (grain equiv.)
			---1,000 tons ---			
1989	1,531	108	0	347		2,026
1990	1,373	108	90	65		1,887
1991	1,629	116	0	285		2,165
1992	670	105	0	605		1,606
1993	2,016	128	493	67		2,459
1994	1,093	118	196	284		2,247
1995	1,628	124	198	105		2,106
1996	1,833	131	91	222		2,353
1997	1,395	138	76	99		1,887
Projections				**Food gap**		
				SQ	NR	(w/o food aid)
1998	1,545	126	133	***312***	***446***	1,964
2003	1,973	138	137	***174***	***327***	2,424
2008	2,180	151	147	***280***	***454***	2,667

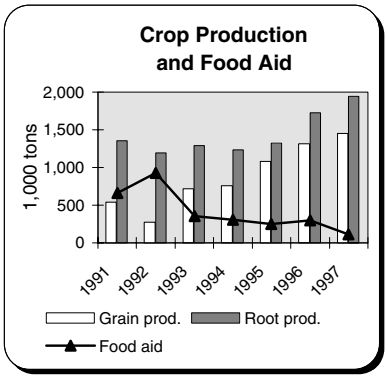
Despite a projected improvement in Malawi's overall nutritional situation during the next decade, consumption in each income group will remain below the nutritional target. Production is projected to grow at higher rates than the historical period due solely to gains in yields.



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 (grain equiv.)
			---1,000 tons ---			
1989	568	1,356	0	560		2,561
1990	706	1,674	0	523		2,946
1991	544	1,355	0	664		2,613
1992	278	1,193	123	929		2,512
1993	715	1,292	297	356		2,859
1994	756	1,238	214	304		2,750
1995	1,080	1,322	276	251		3,095
1996	1,313	1,727	170	302		3,697
1997	1,453	1,943	155	109		3,884
Projections				**Food gap**		
				SQ	NR	(w/o food aid)
1998	1,553	1,453	208	***78***	***681***	3,378
2003	1,676	1,558	206	***278***	***957***	3,616
2008	1,984	1,669	210	***355***	***1,124***	4,053

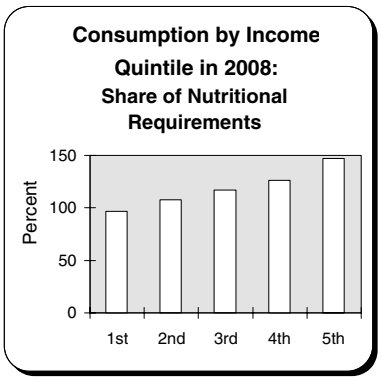
Grain output continues the post-war upward trend. Despite these gains, food gaps are projected to grow. Average per capita consumption in 2008 is projected at only 78 percent of the nutritional target; for the lowest income group, the number falls to 55 percent.



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 (grain equiv.)
			---1,000 tons ---			
1989	115	3	81	7		255
1990	85	2	84	4		234
1991	158	2	89	5		309
1992	59	2	57	40		222
1993	78	2	71	10		219
1994	104	2	100	1		269
1995	81	2	84	12		245
1996	140	2	90	6		308
1997	85	2	71	6		201
Projections				**Food gap**		
				SQ	NR	(w/o food aid)
1998	85	2	95	***19***	***0***	256
2003	114	2	107	***9***	***0***	306
2008	119	2	127	***15***	***0***	341

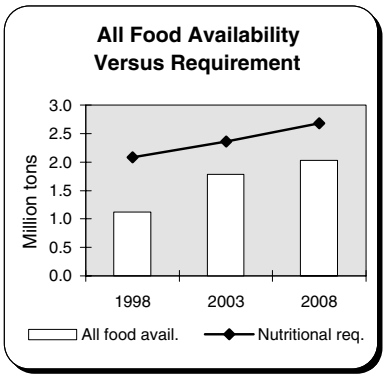
With food production projected to grow at two times the historical rate, output and commercial imports will be adequate to meet nutritional targets and nearly sufficient to maintain per capita consumption levels. On average, consumption is projected at 126 percent of the nutritional target.



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 (grain equiv.)
			---1,000 tons ---		
1989	1,797	198	125	6	2,034
1990	1,195	214	38	110	1,911
1991	1,309	219	1	56	1,795
1992	597	220	8	715	1,568
1993	1,759	222	342	11	2,062
1994	1,195	218	54	12	1,435
1995	929	213	78	74	1,380
1996	1,563	218	80	58	1,792
1997	1,162	221	118	4	1,468
Projections				**Food gap**	
				SQ NR	(w/o food aid)
1998	842	221	108	***471*** ***964***	1,122
2003	1,498	240	110	***17*** ***575***	1,787
2008	1,727	259	116	***14*** ***647***	2,030

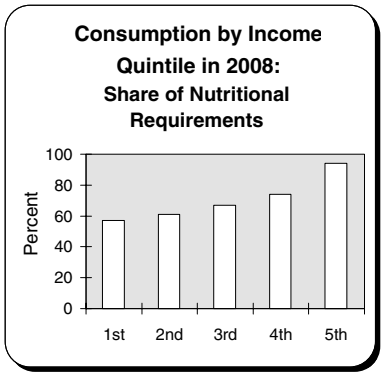
A weather-induced production shortfall will leave a huge nutritional gap for 1998. Output is projected to grow at roughly two times the historical rate, but it will not be sufficient to close food gaps. By 2008, consumption in each income group is projected to fall short of the nutritional requirement.



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 (grain equiv.)
			---1,000 tons ---		
1989	2,487	43	115	17	2,493
1990	2,758	45	95	54	2,598
1991	2,139	47	16	41	2,653
1992	675	52	0	896	995
1993	2,249	57	337	16	2,112
1994	2,622	58	61	5	2,412
1995	1,225	64	148	4	2,205
1996	2,900	65	138	0	2,548
1997	2,320	68	288	1	2,616
Projections				**Food gap**	
				SQ NR	(w/o food aid)
1998	1,955	64	212	***265*** ***788***	2,123
2003	2,325	67	219	***168*** ***749***	2,482
2008	2,566	70	231	***216*** ***860***	2,722

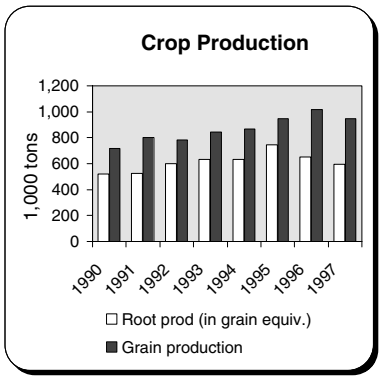
Production would need to grow nearly 3 percent per year to eliminate Zimbabwe's nutritional food gap. This is more than 1 percentage point above the projected rate. In 2008, consumption is projected to average only 76 percent of nutritional requirements.



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 (grain equiv.)
			---1,000 tons ---			
1989	557	719	82	13		1,260
1990	522	717	146	9		1,300
1991	524	802	138	7		1,382
1992	602	782	161	19		1,461
1993	635	843	106	26		1,524
1994	635	868	74	15		1,497
1995	746	946	87	18		1,670
1996	651	1,018	88	9		1,646
1997	595	945	112	32		1,556
Projections				**Food gap**		
				SQ	NR	(w/o food aid)
1998	645	992	107	***76***	***0***	1,615
2003	819	1,097	118	***63***	***0***	1,886
2008	925	1,210	136	***152***	***0***	2,107

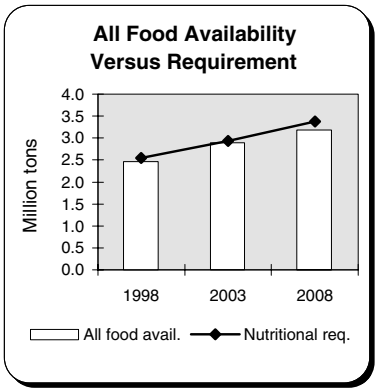
While production growth is projected to slow considerably from the strong historical growth of more than 5 percent per year, output will be sufficient to meet nutritional requirements. Consumption in each income group is projected to exceed the minimum nutritional requirement in 2008.



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 (grain equiv.)
			---1,000 tons ---			
1989	1,901	28	95	51		2,002
1990	1,547	20	0	124		1,692
1991	2,220	21	167	42		2,430
1992	2,438	25	127	31		2,536
1993	2,515	22	115	27		2,603
1994	2,453	19	104	19		2,499
1995	2,265	23	84	37		2,326
1996	2,425	23	101	26		2,508
1997	2,385	23	118	16		2,492
Projections				**Food gap**		
				SQ	NR	(w/o food aid)
1998	2,465	21	109	***65***	***91***	2,462
2003	2,903	22	112	***17***	***48***	2,888
2008	3,205	23	119	***157***	***192***	3,182

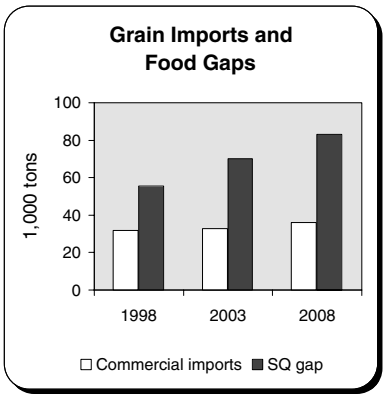
A continuation of historical production growth--6.1 percent per year--would certainly eliminate projected food gaps. However, output growth is projected to slow to 2.3 percent annually as gains in yields and area will be minimal.



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 (grain equiv.)
			---1,000 tons ---		
1989	7	5	0	72	116
1990	10	5	0	76	120
1991	4	3	0	76	115
1992	10	2	88	45	188
1993	12	5	13	58	135
1994	9	3	24	64	146
1995	10	2	27	50	137
1996	10	2	9	46	115
1997	10	2	51	61	172
Projections				**Food gap**	
				SQ / NR	(w/o food aid)
1998	10	3	32	***56*** / ***0***	94
2003	12	3	33	***70*** / ***3***	98
2008	13	3	36	***83*** / ***9***	103

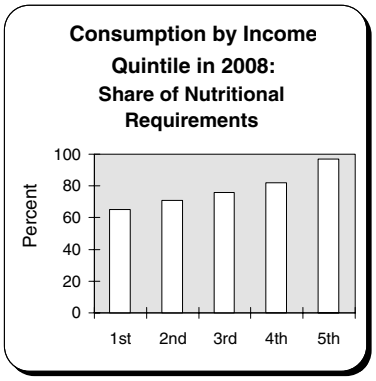
A relatively large long-run food gap is projected based primarily upon limited commercial import capacity, the principal source of food supplies. This country is highly dependent upon food aid to maintain per capita consumption.



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 (grain equiv.)
			---1,000 tons ---		
1989	716	210	0	36	1,082
1990	536	240	0	33	934
1991	794	233	0	67	1,204
1992	836	183	51	0	1,167
1993	671	187	58	17	1,045
1994	846	186	33	15	1,182
1995	779	215	24	11	1,165
1996	786	207	17	28	1,179
1997	796	209	63	26	1,245
Projections				**Food gap**	
				SQ / NR	(w/o food aid)
1998	796	208	37	***67*** / ***313***	1,156
2003	977	227	39	***15*** / ***294***	1,373
2008	1,094	246	41	***32*** / ***345***	1,526

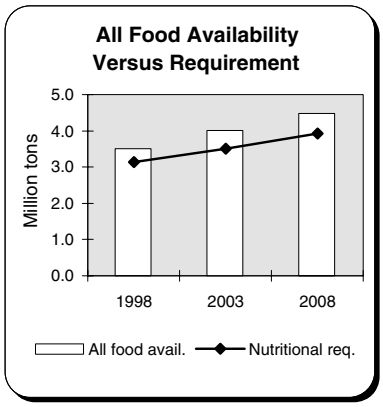
Production would need to grow 3.3 percent per year to close the nutritional food gap. This is nearly 1 percentage point higher than the projected growth rate. Consumption in each income group is projected to fall short of the minimum nutritional requirements in 2008.



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

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grains)		Aggregate availability of all food (grain equiv.)
			---1,000 tons ---			
1989	1,012	1,449	543	26		3,383
1990	972	1,486	495	59		3,349
1991	1,031	1,579	572	36		3,559
1992	962	1,619	492	41		3,468
1993	1,009	1,629	597	45		3,568
1994	1,042	1,669	433	56		3,425
1995	1,092	1,244	678	30		3,403
1996	1,160	1,270	502	47		3,373
1997	1,140	1,270	463	52		3,318
Projections				**Food gap**		
				SQ	NR	(w/o food aid)
1998	1,120	1,423	614	***56***	***0***	3,505
2003	1,398	1,553	681	***0***	***0***	4,011
2008	1,580	1,695	782	***0***	***0***	4,484

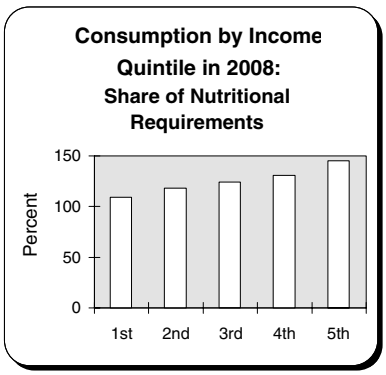
Growth in production and import capacity is projected to be sufficient to meet nutritional requirements through 2008. For the country as a whole, consumption is projected to average 114 percent of the nutritional target in 2008.



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 (grain equiv.)
			---1,000 tons ---			
1989	121	2	36	13		243
1990	100	2	77	14		267
1991	108	2	80	10		283
1992	87	2	78	6		267
1993	93	2	66	11		266
1994	101	2	85	2		274
1995	101	2	92	4		285
1996	101	2	95	4		297
1997	83	2	97	7		269
Projections				**Food gap**		
				SQ	NR	(w/o food aid)
1998	94	2	107	***0***	***0***	302
2003	108	2	125	***0***	***0***	347
2008	118	2	152	***0***	***0***	403

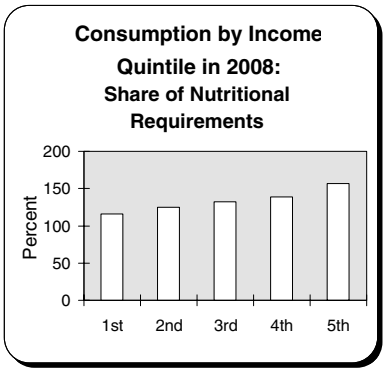
In the long run, per capita consumption will be supported above base levels as production and commercial imports will provide adequate food supplies. Morevover, consumption in even the lowest income group is projected to exceed the minimum nutritional requirement in 2008.



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 (grain equiv.)
			---1,000 tons ---			
1989	1,255	1,553	171	73		3,356
1990	813	1,184	244	76		2,773
1991	1,375	1,690	197	215		3,736
1992	1,198	1,799	323	75		3,866
1993	1,582	1,969	252	126		4,303
1994	1,498	2,382	401	101		4,679
1995	1,737	2,724	318	36		5,054
1996	1,673	2,936	183	40		5,071
1997	1,655	2,819	383	84		5,350
Projections				**Food gap**		
				SQ	NR	(w/o food aid)
1998	1,575	2,851	326	***251***	***0***	5,084
2003	2,206	3,385	333	***0***	***0***	6,286
2008	2,452	4,419	355	***0***	***0***	7,707

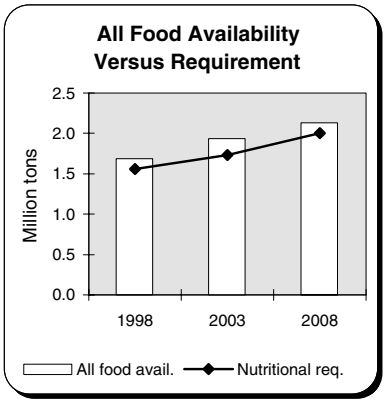
Per capita consumption is projected to be maintained at base levels in the long term. Ghana's food security situation is projected to improve during the next decade as the ratio of consumption to nutritional requirements is projected to rise from 119 to 138 percent between 1998 and 2008.



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 (grain equiv.)
			---1,000 tons ---			
1989	412	175	237	25		1,125
1990	475	198	241	12		1,209
1991	581	232	236	30		1,382
1992	672	255	284	30		1,594
1993	744	277	243	46		1,691
1994	819	284	331	29		1,815
1995	600	298	375	5		1,648
1996	640	312	272	7		1,623
1997	690	331	372	3		1,841
Projections				**Food gap**		
				SQ	NR	(w/o food aid)
1998	600	307	376	***11***	***0***	1,688
2003	771	334	392	***0***	***0***	1,937
2008	864	363	423	***53***	***0***	2,133

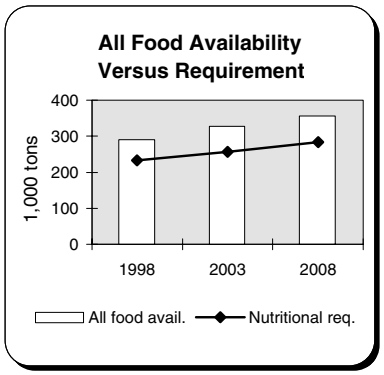
Despite declining per capita grain production and imports, Guinea's nutritional situation is projected to improve during the next deacde. The ratio of consumption to nutritional requirements is projected to reach 109 percent in 2008.



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 (grain equiv.)
			---1,000 tons ---			
1989	154	24	30	21		270
1990	152	23	38	9		266
1991	172	21	42	21		301
1992	125	22	72	9		282
1993	134	22	60	9		271
1994	154	22	64	2		292
1995	152	22	60	2		287
1996	150	20	60	6		285
1997	145	20	80	5		298
Projections				**Food gap**		
				SQ	NR	(w/o food aid)
1998	145	22	72	***11***	***0***	291
2003	178	23	73	***5***	***0***	328
2008	198	24	75	***11***	***0***	357

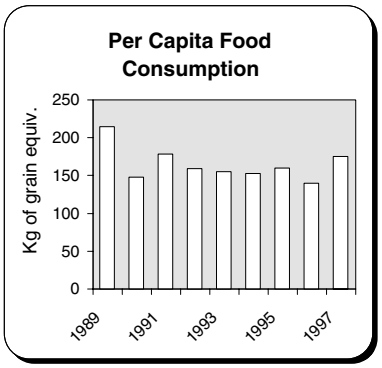
While food supplies are sufficient, on average, to meet nutritional targets, falling per capita production and imports may lead to a small food gap to maintain consumption at the base level. Consumption in only the lowest income group is projected to fall short of the nutritional target.



Statisitcal table 34--Liberia (West Africa)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grains)		Aggregate availability of all food (grain equiv.)
			---1,000 tons ---			
1989	168	214	35	118		553
1990	126	173	2	69		381
1991	120	135	31	143		447
1992	61	141	0	142		376
1993	39	127	1	138		344
1994	30	131	0	119		323
1995	35	127	26	104		340
1996	60	116	0	117		313
1997	60	116	86	130		432
Projections				**Food gap**		
				SQ	NR	(w/o food aid)
1998	60	128	33	***186***	***323***	261
2003	63	137	30	***323***	***504***	270
2008	72	146	29	***393***	***601***	288

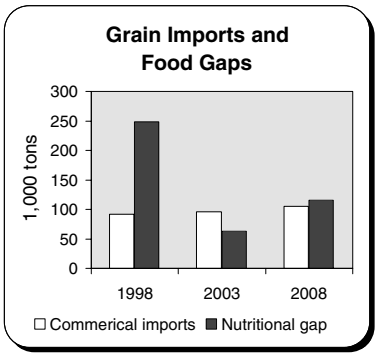
Liberia's declining per capita consumption trend is projected to continue through 2008. In the highest income group, consumption may reach only 40 percent of the nutritional target in 2008. If peace continues, output will rise faster than projected and food gaps would fall considerably.



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 (grain equiv.)
			---1,000 tons ---			
1989	1,760	5	68	57		1,966
1990	1,807	7	29	47		1,987
1991	2,245	8	184	51		2,661
1992	1,714	6	63	35		2,052
1993	1,965	9	53	29		2,184
1994	2,234	7	22	16		2,458
1995	2,050	8	83	11		2,329
1996	1,875	10	73	5		2,153
1997	2,200	8	97	25		2,514
Projections				**Food gap**		
				SQ	NR	(w/o food aid)
1998	2,050	8	92	***125***	***249***	2,308
2003	2,609	9	96	***0***	***63***	2,900
2008	2,974	10	105	***0***	***115***	3,304

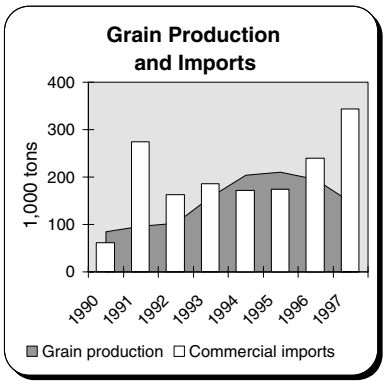
Food production growth of nearly 3 percent per year will be sufficient to maintain per capita consumption at base levels and nearly sufficient to eliminate nutritional food gaps in the long term. However, consumption in only the highest income group is projected to exceed the nutritional target in 2008.



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 (grain equiv.)
			---1,000 tons ---			
1989	152	2	107	89		514
1990	85	2	62	116		434
1991	96	2	274	50		590
1992	103	1	163	45		477
1993	158	1	187	63		581
1994	204	1	172	22		576
1995	210	1	175	25		603
1996	195	1	240	27		650
1997	148	1	344	24		661
Projections				**Food gap**		
				SQ	NR	(w/o food aid)
1998	168	1	280	***29***	***0***	653
2003	226	1	288	***44***	***0***	729
2008	239	1	306	***98***	***0***	774

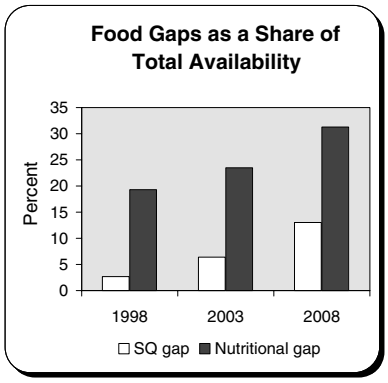
A small long-run food gap to maintain per capita consumption is projected as per capita grain production and imports decline. However, the overall nutritional situation is projected to remain favorable as the ratio of consumption to nutritional requirements is projected at 108 percent in 2008.



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 (grain equiv.)
			---1,000 tons ---			
1989	1,797	106	29	46		2,040
1990	1,596	108	22	91		1,864
1991	2,290	110	88	45		2,591
1992	2,227	111	95	28		2,425
1993	2,119	112	91	31		2,221
1994	2,190	114	92	39		2,624
1995	2,153	114	70	27		2,235
1996	2,296	114	93	6		2,672
1997	2,195	114	248	13		2,726
Projections				**Food gap**		
				SQ	NR	(w/o food aid)
1998	2,320	117	146	***69***	***491***	2,548
2003	2,659	124	144	***185***	***680***	2,891
2008	2,933	133	148	***415***	***993***	3,177

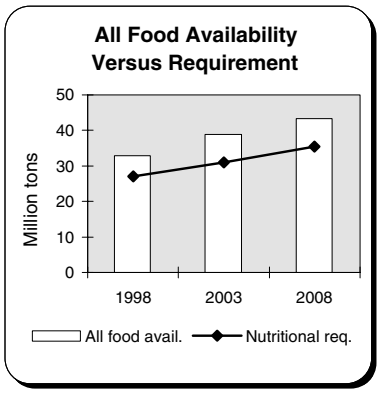
Yields are projected to increase marginally through 2008, staying among the lowest in the world and holding output growth to 2.2 percent per year. To eliminate food gaps, output would need to grow 3.3-3.9 percent. As a result, the nutritional situation is projected to deteriorate.



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 (grain equiv.)
			---1,000 tons ---			
1989	9,800	8,147	515	0		15,407
1990	16,345	9,831	422	0		23,247
1991	17,531	12,885	750	1		26,423
1992	18,248	14,684	976	0		29,198
1993	19,278	15,544	1,572	0		32,543
1994	19,897	16,269	922	0		32,270
1995	20,810	16,436	995	0		33,846
1996	18,885	16,387	1,170	0		32,155
1997	19,270	16,230	1,373	1		32,582
Projections				**Food gap**		
				SQ	NR	(w/o food aid)
1998	19,520	17,180	1,300	***1,441***	***0***	32,871
2003	24,628	18,677	1,380	***502***	***0***	38,904
2008	27,884	20,283	1,522	***1,776***	***0***	43,259

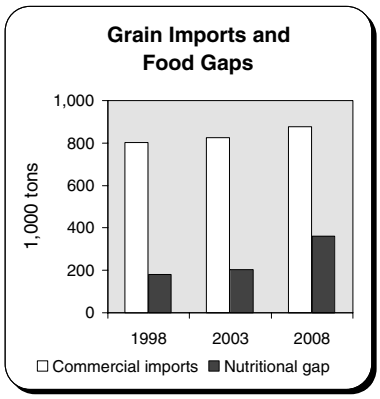
Nigeria's food gap to maintain consumption, although large relative to other countries in the region, is small relative to overall food availability--4 percent in 2008. Therefore, if production grows marginally faster than projected levels of 2.3 percent, the gap would fall to zero.



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 (grain equiv.)
			---1,000 tons ---			
1989	1,015	26	503	71		1,675
1990	912	29	669	47		1,784
1991	900	14	552	65		1,633
1992	817	20	524	71		1,568
1993	1,029	19	558	38		1,759
1994	900	31	564	18		1,744
1995	1,005	24	693	9		1,681
1996	917	22	729	11		1,909
1997	930	23	736	8		1,866
Projections				**Food gap**		
				SQ	NR	(w/o food aid)
1998	840	27	801	***125***	***181***	1,814
2003	1,073	28	826	***138***	***202***	2,074
2008	1,163	28	876	***289***	***362***	2,222

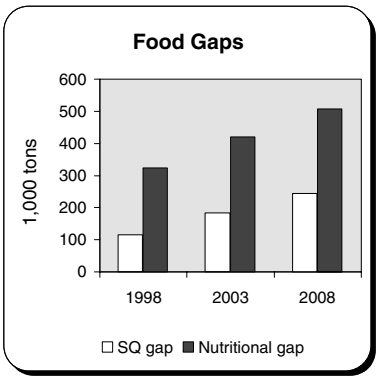
Production growth would need to double from the projected rate of 1.5 percent per year to eliminate food gaps. By 2008, consumption in only the highest income group is projected to exceed the minimum nutritional requirement.



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 (grain equiv.)
			---1,000 tons ---			
1989	345	48	93	43		550
1990	264	50	135	20		493
1991	268	50	115	66		517
1992	315	48	114	29		470
1993	321	44	116	29		511
1994	270	104	238	30		654
1995	193	93	234	46		618
1996	260	118	177	117		715
1997	275	117	139	100		540
Projections				**Food gap**		
				SQ	NR	(w/o food aid)
1998	235	110	198	***115***	***324***	562
2003	258	115	197	***183***	***421***	588
2008	274	120	203	***244***	***508***	614

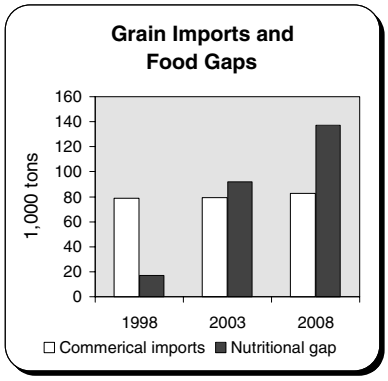
Civil strife continues to hinder agricultural activities. Declining per capita production and imports are projected to cause the nutritional situation to worsen. The ratio of consumption to nutritional requirements is projected to fall from 63 to 55 percent between 1998 and 2008.



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 (grain equiv.)
			---1,000 tons ---			
1989	550	301	117	11		831
1990	389	365	109	16		726
1991	427	327	88	14		694
1992	492	302	155	4		812
1993	611	351	55	11		874
1994	405	289	48	8		571
1995	450	420	68	4		783
1996	600	429	71	4		920
1997	660	447	86	7		1,006
Projections				**Food gap**		
				SQ	NR	(w/o food aid)
1998	660	390	79	***0***	***17***	936
2003	702	433	79	***21***	***92***	995
2008	789	480	83	***56***	***137***	1,102

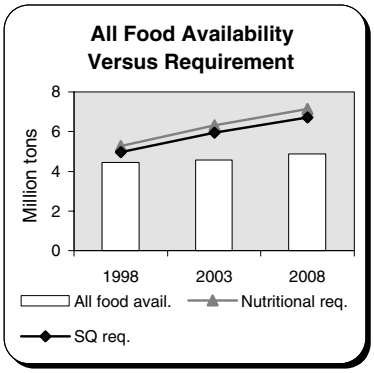
If annual production growth followed the historical trend of 3.1 percent, both food gaps would be eliminated. However, a slowdown in area expansion is projected to hold output growth to 2.4 percent per year. As a result, consumption in 2008 is projected to equal only 89 percent of the nutritional target.



Statistical table 42--Afghanistan (Asia)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grains)		Aggregate availability of all food (grain equiv.)
			---1,000 tons ---			
1989	3,218	78	90	173		4,005
1990	2,980	86	248	41		3,748
1991	2,830	86	82	56		3,406
1992	2,830	86	45	108		3,462
1993	2,930	88	144	71		3,575
1994	3,510	88	0	151		4,062
1995	3,470	90	73	127		4,258
1996	3,600	90	0	194		4,272
1997	3,610	90	640	150		4,944
Projections				**Food gap**		
				SQ	NR	(w/o food aid)
1998	3,700	92	242	***522***	***833***	4,432
2003	3,809	99	245	***1,377***	***1,751***	4,576
2008	4,066	107	255	***1,840***	***2,262***	4,881

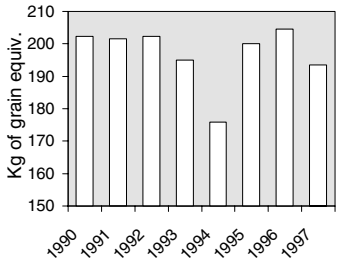
In the absence of food aid, per capita consumption is projected to decline through the next decade due to slow production and import growth. The ratio of consumption to nutritional requirements is projected to fall from 84 to 68 percent, on average, between 1998 and 2008.



Statistical table 43--Bangladesh (Asia)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grains)		Aggregate availability of all food (grain equiv.)
			---1,000 tons ---			
1989	18,797	401	1,001	1,216		22,474
1990	18,903	387	89	1,452		22,206
1991	19,301	422	157	1,469		22,477
1992	19,452	454	777	719		22,898
1993	19,264	446	325	745		22,398
1994	18,011	457	0	858		20,493
1995	18,979	467	1,752	825		23,643
1996	20,299	472	1,003	743		24,568
1997	20,133	476	482	618		23,617
Projections				**Food gap**		
				SQ	NR	(w/o food aid)
1998	20,399	477	1,194	***729***	***1,654***	23,636
2003	22,254	509	1,331	***743***	***1,750***	25,803
2008	24,031	543	1,553	***911***	***2,008***	27,995

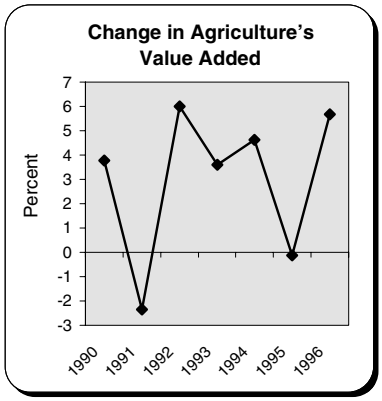
If production growth continued along the historical path of 1.9 percent per year, the food gap to maintain consumption would be eliminated and the nutritional food gap would be negligible. However, output growth is projected to fall to 1.6 percent per year due to slower gains in yields.



Statistical table 44--India (Asia)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grains)		Aggregate availability of all food (grain equiv.)
			---1,000 tons ---			
1989	162,484	5,262	458	456		203,864
1990	156,694	5,268	88	217		202,550
1991	155,744	5,497	0	187		204,776
1992	165,337	5,862	1,262	351		210,557
1993	168,530	5,487	67	336		214,676
1994	170,844	6,186	0	271		216,157
1995	174,870	6,276	0	313		224,548
1996	177,758	6,434	425	257		233,604
1997	183,511	6,142	1,830	208		236,477
Projections				**Food gap**		
				SQ	NR	(w/o food aid)
1998	182,200	6,514	758	***447***	***0***	233,479
2003	201,532	7,045	902	***0***	***0***	255,627
2008	218,788	7,615	1,133	***0***	***0***	277,986

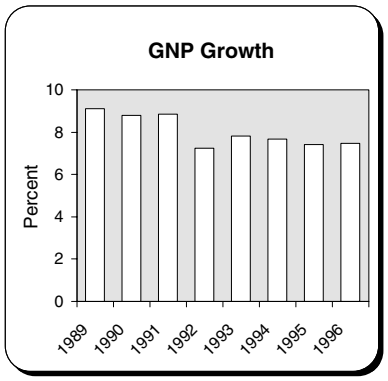
Despite a projected slowdown in production growth relative to the historical trend, food supplies will be more than adequate to prevent food gaps in the long term. Imports are projected to rise at a strong rate of more than 4 percent per year through 2008.



Statistical table 45--Indonesia (Asia)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grains)		Aggregate availability of all food (grain equiv.)
			---1,000 tons ---			
1989	34,366	6,132	2,129	39		46,360
1990	34,042	5,686	1,810	46		45,546
1991	36,750	5,713	2,760	59		47,351
1992	36,968	5,977	3,155	41		49,472
1993	35,715	6,218	3,075	52		49,294
1994	38,433	5,693	5,154	15		49,976
1995	39,215	5,755	8,388	12		55,840
1996	38,034	6,205	6,965	18		55,537
1997	36,600	5,893	7,278	0		52,900
Projections				**Food gap**		
				SQ	NR	(w/o food aid)
1998	39,000	5,972	6,888	***1,292***	***0***	54,816
2003	40,863	6,131	8,385	***1,539***	***0***	58,610
2008	42,798	6,290	10,229	***771***	***0***	62,941

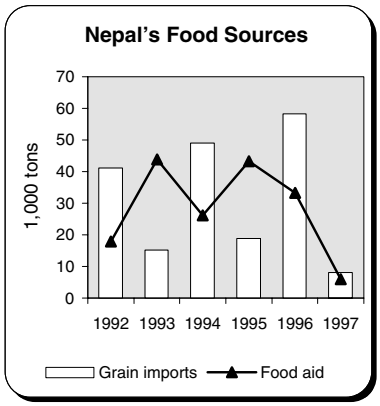
Although food production is projected to grow a slow 1 percent annually, food supplies are projected to be adequate to meet nutritional requirements through 2008. Consumption is projected to exceed the nutritional target in every income group in 2008.



Statistical table 46--Nepal (Asia)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grains)		Aggregate availability of all food (grain equiv.)
			---1,000 tons ---			
1989	4,541	178	11	8		4,641
1990	4,674	185	20	1		4,764
1991	4,437	199	4	8		4,538
1992	4,003	198	41	18		4,155
1993	4,075	199	15	44		4,255
1994	4,427	211	49	26		4,646
1995	4,445	223	19	43		4,645
1996	4,735	237	58	33		4,944
1997	4,785	259	8	6		4,944
Projections				**Food gap**		
				SQ	NR	(w/o food aid)
1998	4,585	230	31	***339***	***194***	4,681
2003	5,224	245	33	***346***	***182***	5,327
2008	5,667	260	37	***590***	***406***	5,778

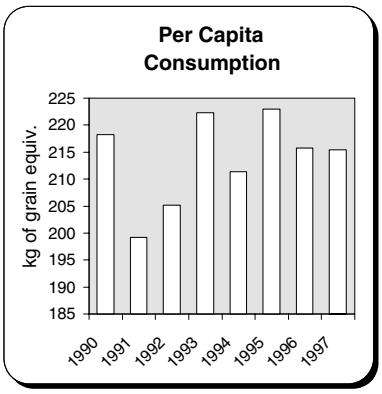
Food production is projected to grow at half the rate of the historical period due to a considerable slowing of area expansion. Consumption is projected to exceed the minimum nutritional requirement in only the top income group in 2008.



Statistical table 47--Pakistan (Asia)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grains)		Aggregate availability of all food (grain equiv.)
			---1,000 tons ---			
1989	19,407	218	1,678	499		24,572
1990	19,445	261	1,673	380		25,998
1991	19,390	248	603	373		24,423
1992	20,458	279	1,813	236		25,838
1993	21,915	301	2,831	67		28,736
1994	20,537	331	1,817	103		28,046
1995	22,788	343	2,679	18		30,377
1996	22,989	336	1,971	15		30,201
1997	22,934	313	3,025	8		30,988
Projections				**Food gap**		
				SQ	NR	(w/o food aid)
1998	24,750	348	2,801	***0***	***0***	32,263
2003	26,858	375	3,122	***918***	***0***	35,185
2008	29,973	405	3,666	***1,470***	***0***	39,447

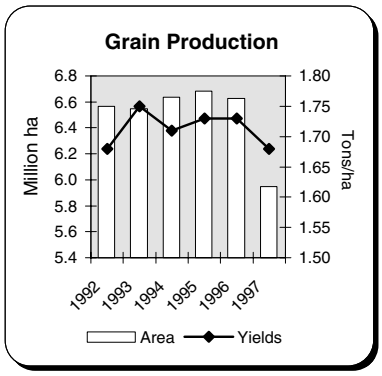
While the projected growth in food production of 2.3 percent per year is sufficient to meet nutritional requirements through 2008, it is not enough to prevent in per capita consumption from slipping below base levels.



Statistical table 48--Philippines (Asia)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grains)		Aggregate availability of all food (grain equiv.)
			---1,000 tons ---			
1989	10,197	902	1,763	59		13,070
1990	11,527	913	2,625	109		14,324
1991	10,426	902	1,642	48		13,937
1992	11,000	901	1,956	53		13,551
1993	11,480	924	2,140	52		14,678
1994	11,343	907	2,380	44		15,092
1995	11,587	925	2,786	17		14,650
1996	11,480	912	2,398	11		15,554
1997	10,000	912	3,441	40		15,584
Projections				**Food gap**		
				SQ	NR	(w/o food aid)
1998	11,350	929	3,207	***0***	***0***	15,980
2003	11,947	964	3,755	***322***	***0***	17,156
2008	12,613	1,000	4,684	***91***	***0***	18,904

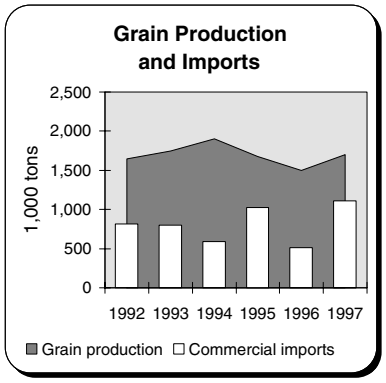
Projections for strong import growth of nearly 4 percent per year through 2008 compensate for weak growth in food production. Yield gains are projected to slow markedly relative to the historical period, lowering annual output growth to 1.3 percent.



Statistical table 49--Sri Lanka (Asia)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grains)	Aggregate availability of all food (grain equiv.)
			---1,000 tons ---		
1989	1,625	188	928	231	4,029
1990	1,678	173	700	201	3,753
1991	1,691	162	421	439	3,847
1992	1,649	140	813	249	3,962
1993	1,748	141	803	338	4,084
1994	1,905	140	590	346	4,228
1995	1,679	138	1,022	120	4,235
1996	1,502	143	513	57	3,426
1997	1,697	143	1,114	83	4,341
Projections				**Food gap** SQ / NR	(w/o food aid)
1998	1,615	142	961	***50*** / ***0***	3,925
2003	1,687	146	1,012	***90*** / ***0***	4,097
2008	1,734	151	1,106	***116*** / ***0***	4,307

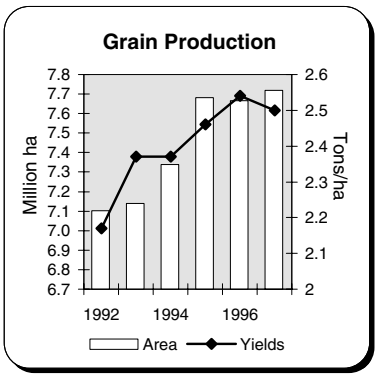
Food production stagnated during the historical period. While output is projected to grow only 0.7 pecent per year during the projection period it will be sufficient to meet minimum nutritional requirements. However, without food aid, per capita consumption is projected to fall from base levels.



Statistical table 50--Vietnam (Asia)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grains)	Aggregate availability of all food (grain equiv.)
			---1,000 tons ---		
1989	13,609	1,472	123	75	14,114
1990	13,064	1,394	99	75	13,995
1991	15,310	1,488	190	80	15,578
1992	15,389	1,654	156	84	15,998
1993	16,931	1,561	293	87	17,094
1994	17,390	1,400	242	64	17,482
1995	18,867	1,281	464	21	18,183
1996	19,500	1,240	425	0	18,773
1997	19,300	1,240	355	0	18,129
Projections				**Food gap** SQ / NR	(w/o food aid)
1998	19,500	1,344	475	***376*** / ***0***	18,478
2003	21,736	1,456	585	***0*** / ***0***	20,705
2008	23,504	1,576	764	***0*** / ***0***	22,587

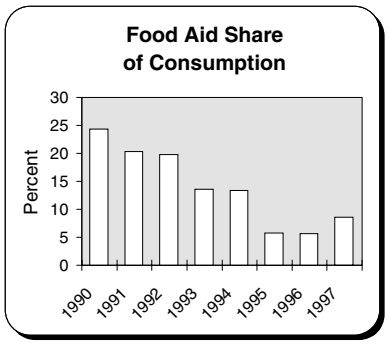
High growth rates in irrigated area and fertilizer use raised grain yields more than 3 percent per year during the historical period. Although the growth in food output is projected to slow relative to the historical period, the nutritional situation is projected to improve.



Statistical table 51--Bolivia (Latin America and the Caribbean)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grains)		Aggregate availability of all food (grain equiv.)
			---1,000 tons ---			
1989	703	312	178	96		1,419
1990	692	288	0	235		1,406
1991	760	309	143	238		1,570
1992	780	291	130	243		1,575
1993	1,055	318	89	205		1,695
1994	875	268	155	176		1,531
1995	825	272	274	67		1,576
1996	965	295	160	75		1,593
1997	1,090	338	204	130		1,923
Projections				**Food gap**		
				SQ	NR	(w/o food aid)
1998	1,015	287	232	***78***	***66***	1,628
2003	1,115	305	249	***147***	***134***	1,760
2008	1,228	325	278	***188***	***173***	1,923

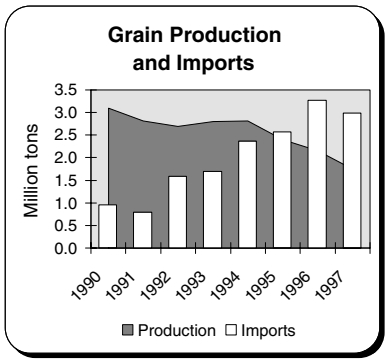
Bolivia experienced it's 11th year of economic growth and low inflation in 1997. Nevertheless, food insecurity is far from being eliminated. The adverse weather conditions caused by El Niño slowed progress. One million out of 8 million people are estimated to have been affected by either drought or flooding.



Statistical table 52--Colombia (Latin America and the Caribbean)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grains)		Aggregate availability of all food (grain equiv.)
			---1,000 tons ---			
1989	3,164	1,117	771	7		7,783
1990	3,093	1,150	952	1		8,229
1991	2,816	1,053	791	8		7,675
1992	2,688	1,037	1,590	17		8,502
1993	2,806	1,250	1,694	31		8,229
1994	2,811	1,257	2,373	15		8,600
1995	2,394	1,236	2,572	0		8,910
1996	2,159	1,176	3,272	0		9,881
1997	1,754	1,279	2,986	0		8,493
Projections				**Food gap**		
				SQ	NR	(w/o food aid)
1998	2,119	1,254	3,296	***0***	***0***	9,739
2003	2,253	1,314	3,780	***0***	***0***	10,768
2008	2,373	1,376	4,528	***0***	***0***	12,265

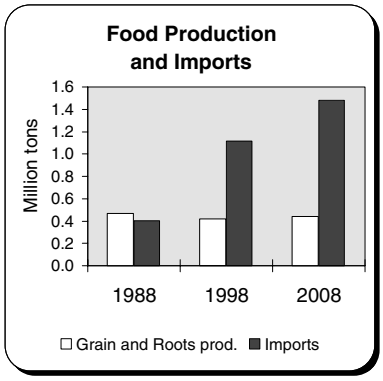
El Niño is to blame for last year's drastic decline in corn output. Grain production has declined 30 percent during the last 10 years, which is mainly due to a sharp decrease in sorghum production. A decline in average crop yield and harvested area has reduced sorghum output to less than one-sixth of its 1989/90 high.



Statistical table 53--Dominican Republic (Latin America and the Caribbean)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grains)		Aggregate availability of all food (grain equiv.)
			---1,000 tons ---			
1989	357	80	622	9		1,603
1990	323	73	682	6		1,608
1991	343	76	731	14		1,506
1992	390	84	785	7		1,508
1993	350	57	972	7		1,749
1994	329	63	924	3		1,678
1995	316	85	1,018	1		1,758
1996	360	78	975	0		1,660
1997	306	78	1,040	2		1,572
Projections				**Food gap**		
				SQ	NR	(w/o food aid)
1998	340	77	1,116	***0***	***0***	1,916
2003	335	79	1,261	***0***	***0***	2,121
2008	344	82	1,485	***0***	***0***	2,493

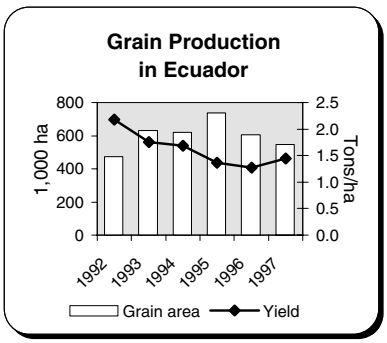
Like most countries in Central America, the Dominican Republic had just started to recover from the 1997 drought when hurricane Georges destroyed lives, infrastructure, and crops. An estimated 90 percent of food and export crops were affected to a varying extent.



Statistical table 54--Ecuador (Latin America and the Caribbean)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grains)		Aggregate availability of all food (grain equiv.)
			---1,000 tons ---			
1989	747	111	432	38		2,438
1990	865	116	365	98		2,422
1991	956	104	416	45		2,576
1992	1,028	128	346	14		2,528
1993	1,104	113	271	12		2,433
1994	1,050	137	321	32		2,631
1995	1,009	123	377	1		2,487
1996	767	120	433	8		2,586
1997	786	128	622	17		2,824
Projections				**Food gap**		
				SQ	NR	(w/o food aid)
1998	966	124	539	***0***	***0***	2,902
2003	1,005	129	665	***0***	***0***	3,267
2008	1,055	135	861	***0***	***0***	3,774

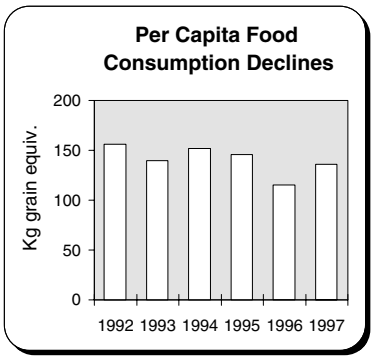
Ecuador's economy has been greatly affected by El Niño in 1998. Crop production declined considerably and transportation has been rendered difficult due to flood damage to roads and bridges. This natural shock adds to financial problems such as high inflation of close to 40 percent and a large fiscal deficit.



Statistical table 55--El Salvador (Latin America and the Caribbean)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grains)		Aggregate availability of all food (grain equiv.)
			---1,000 tons ---			
1989	772	10	0	249		1,123
1990	795	10	72	84		1,124
1991	699	11	368	86		1,388
1992	953	15	141	131		1,290
1993	858	14	212	79		1,239
1994	690	32	467	7		1,366
1995	873	27	415	13		1,353
1996	841	26	402	0		1,217
1997	860	26	412	0		1,379
Projections				**Food gap**		
				SQ	NR	(w/o food aid)
1998	830	29	462	***28***	***0***	1,354
2003	922	31	534	***14***	***0***	1,515
2008	960	33	655	***0***	***0***	1,693

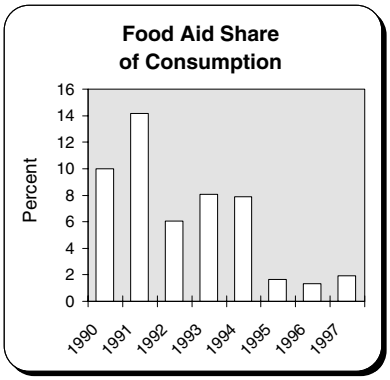
Exports of goods and services have become a driving force of economic growth. El Salvador has successfully increased its share of non-traditional exports. However, traditional exports such as coffee and sugar still earn the bulk of foreign exchange. Hurricane Mitch destroyed most of the corn and other grain crops.



Statistical table 56--Guatemala (Latin America and the Caribbean)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grains)		Aggregate availability of all food (grain equiv.)
			---1,000 tons ---			
1989	1,342	13	35	163		1,771
1990	1,398	16	185	171		1,961
1991	1,355	14	176	252		2,060
1992	1,454	16	280	109		2,087
1993	1,400	17	275	151		2,067
1994	1,343	17	430	144		2,171
1995	1,423	17	462	30		2,153
1996	1,436	17	611	25		2,132
1997	1,258	17	739	40		2,164
Projections				**Food gap**		
				SQ	NR	(w/o food aid)
1998	1,255	18	785	***152***	***111***	2,235
2003	1,584	20	907	***37***	***0***	2,700
2008	1,760	22	1,106	***0***	***0***	3,121

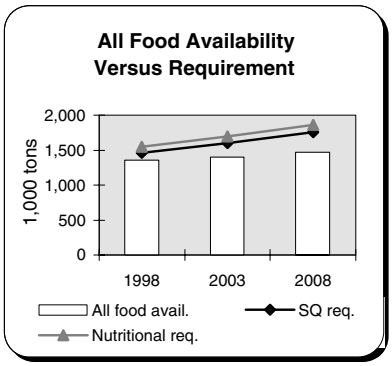
Since the conclusion of Guatemala's 36-year internal conflict with the signing of the Peace Accords in late 1996, the outlook for agricultural expansion and general economic growth is favorable. In 1997 and 1998, however, losses due to El Niño prevented increases in crop production.



Statistical table 57--Haiti (Latin America and the Caribbean)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grains)		Aggregate availability of all food (grain equiv.)
			---1,000 tons ---			
1989	350	223	43	195		1,099
1990	350	224	254	42		1,221
1991	330	225	218	55		1,188
1992	320	231	268	75		1,278
1993	340	223	217	114		1,244
1994	330	224	159	117		1,197
1995	345	224	328	81		1,413
1996	345	224	312	86		1,409
1997	355	224	326	104		1,476
Projections				**Food gap**		
				SQ	NR	(w/o food aid)
1998	355	228	344	***98***	***190***	1,360
2003	372	242	344	***194***	***295***	1,404
2008	395	257	354	***285***	***395***	1,470

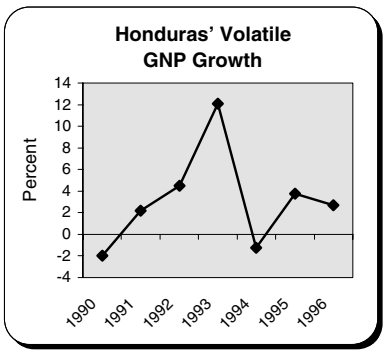
Just as Haiti appeared to recover from the 1997 drought, hurricane Georges caused flooding and mudslides that destroyed crops such as sorghum, millet, and roots. Many banana plantations--important for earning foreign exchange--were also devastated. Foreign aid will be crucial to feed the population.



Statistical table 58--Honduras (Latin America and the Caribbean)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grains)		Aggregate availability of all food (grain equiv.)
			---1,000 tons ---			
1989	619	7	31	134		953
1990	684	8	88	84		948
1991	693	7	100	160		977
1992	710	8	73	64		950
1993	690	8	66	149		1,012
1994	617	7	250	73		1,069
1995	780	7	233	42		1,079
1996	679	8	190	58		1,154
1997	730	8	369	32		1,339
Projections				**Food gap**		
				SQ	NR	(w/o food aid)
1998	735	8	287	***74***	***0***	1,169
2003	847	8	298	***141***	***20***	1,275
2008	929	9	319	***220***	***84***	1,370

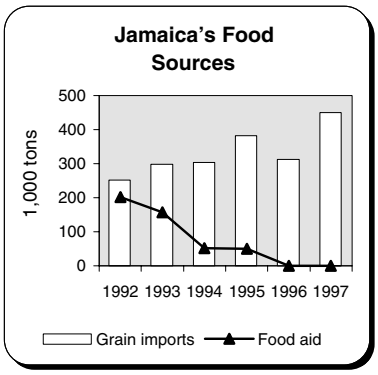
The recent devastation of much of Honduras by hurricane Mitch erased the basis for our food gap projections. Besides killing thousands of people, the storm may have destroyed as much as 70 percent of Honduras' key crops--including bananas, rice, beans, and corn. The country's infrastructure has been crippled. It will take years to recover.



Statistical table 59--Jamaica (Latin America and the Caribbean)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grains)	Aggregate availability of all food (grain equiv.)
			---1,000 tons ---		
1989	4	58	200	165	551
1990	2	68	172	163	524
1991	3	72	131	323	655
1992	4	84	251	201	636
1993	5	92	298	157	687
1994	5	97	303	53	556
1995	5	102	383	49	602
1996	5	108	312	0	515
1997	5	108	450	0	644
Projections				**Food gap** SQ / NR	(w/o food aid)
1998	5	106	422	***0*** / ***0***	634
2003	5	112	468	***0*** / ***0***	705
2008	5	118	533	***0*** / ***0***	805

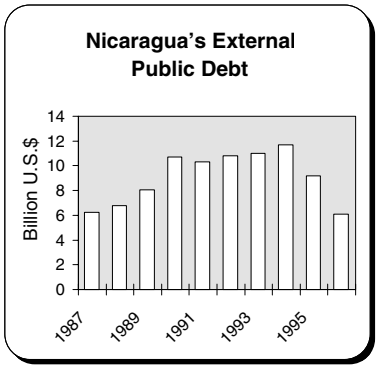
A prolonged drought attributed to El Niño reduced Jamaica's domestic crops by one-third in the third quarter of 1997. Consumption of roots and tubers such as yams and potatoes decreased as a result while rice, imported and sold at more affordable prices, will be in higher demand.



Statistical table 60--Nicaragua (Latin America and the Caribbean)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grains)	Aggregate availability of all food (grain equiv.)
			---1,000 tons ---		
1989	430	20	84	57	746
1990	357	20	33	141	745
1991	409	20	1	145	750
1992	427	20	61	97	761
1993	485	21	85	55	780
1994	290	21	156	34	763
1995	409	21	155	43	853
1996	557	21	184	43	1,014
1997	494	21	174	35	908
Projections				**Food gap** SQ / NR	(w/o food aid)
1998	545	22	186	***6*** / ***0***	975
2003	529	23	212	***109*** / ***36***	1,001
2008	551	24	257	***152*** / ***71***	1,092

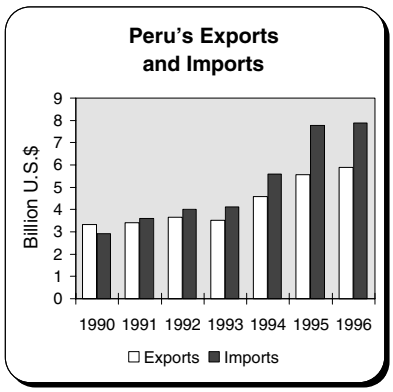
Nicaragua, the second poorest country in the Western Hemisphere, suffered a severe setback when hurricane Mitch devasted much of its north-western parts. Huge crop losses and destruction of homes, roads, and bridges are sure to threaten food security. The country may take years to recover.



Statistical table 61--Peru (Latin America and the Caribbean)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grains)	Aggregate availability of all food (grain equiv.)
			---1,000 tons ---		
1989	1,937	647	971	209	4,023
1990	1,388	521	1,202	398	3,766
1991	1,250	575	1,339	492	3,790
1992	1,669	455	1,684	377	4,084
1993	1,972	607	1,549	410	4,134
1994	1,821	686	2,021	348	4,595
1995	1,634	850	2,396	108	5,190
1996	1,827	877	2,447	0	5,108
1997	1,943	935	2,446	0	5,213
Projections				**Food gap** SQ	**Food gap** NR	(w/o food aid)
1998	2,005	821	2,636	***0***	***0***	5,209
2003	1,943	856	2,935	***0***	***0***	5,457
2008	2,033	893	3,423	***0***	***0***	6,112

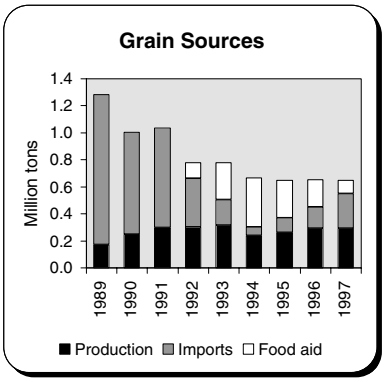
Peru's economy has resumed its fast growth and is expected to continue increasing its commercial import capacity at a fast pace. The El Niño phenomenon and the Asian crisis are expected to slow growth in the short run and increase the current account deficit.



Statistical table 62--Armenia (New Independent States)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grains)	Aggregate availability of all food (grain equiv.)
			---1,000 tons ---		
1989	169	---	1,114	---	---
1990	246	---	758	---	---
1991	295	---	741	---	---
1992	302	62	360	117	624
1993	313	72	189	277	716
1994	238	77	64	366	712
1995	263	87	106	279	875
1996	293	82	159	200	772
1997	293	89	255	101	776
Projections				**Food gap** SQ	**Food gap** NR	(w/o food aid)
1998	418	87	263	***0***	***0***	805
2003	360	93	292	***0***	***0***	798
2008	385	100	350	***0***	***0***	906

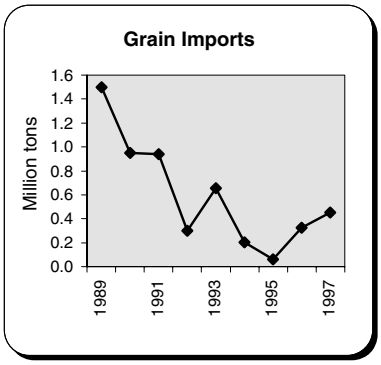
A good wheat harvest ensures that there will be no food gap this year. Grain production is projected to meet consumption needs over the next decade.



Statistical table 63--Azerbaijan (New Independent States)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grains)		Aggregate availability of all food (grain equiv.)
			---1,000 tons ---			
1989	822	---	1,500	---		---
1990	1,349	---	950	---		---
1991	1,327	---	940	---		---
1992	1,269	30	298	6		1,196
1993	1,084	29	653	58		1,351
1994	1,004	29	204	424		1,450
1995	1,075	30	63	180		1,130
1996	1,084	41	324	187		1,543
1997	1,144	42	452	33		1,678
Projections				**Food gap**		
				SQ	NR	(w/o food aid)
1998	1,124	45	315	***83***	***268***	1,370
2003	1,282	49	368	***0***	***95***	1,603
2008	1,368	52	458	***0***	***0***	1,806

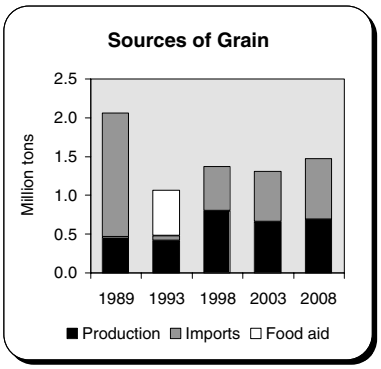
Azerbaijan may have a small food deficit in 1998, but by 2008 the country's oil exports should allow it to eliminate its food gaps at a national level. However, the lowest income groups still will not have the necessary incomes to meet nutritional requirements.



Statistical table 64--Georgia (New Independent States)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grains)		Aggregate availability of all food (grain equiv.)
			---1,000 tons ---			
1989	464	---	1,600	---		---
1990	658	---	1,400	---		---
1991	567	---	970	---		---
1992	493	41	340	194		1,086
1993	412	49	69	585		964
1994	482	58	152	569		1,185
1995	522	69	398	281		1,354
1996	532	70	113	381		1,057
1997	822	74	538	92		1,570
Projections				**Food gap**		
				SQ	NR	(w/o food aid)
1998	802	78	571	***0***	***0***	1,371
2003	658	82	652	***0***	***0***	1,337
2008	688	86	788	***0***	***0***	1,543

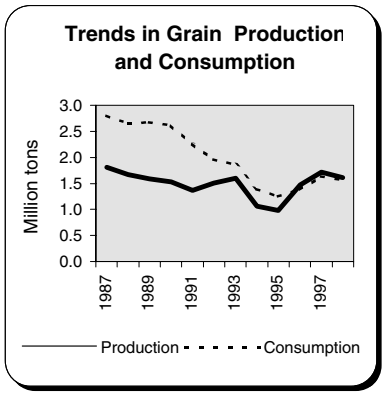
An above average harvest means that food supplies will be adequate in 1998. Recent high real economic growth is projected to continue and should safeguard against any future food gaps.



Statistical table 65--Kyrgyzstan (New Independent States)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grains)	Aggregate availability of all food (grain equiv.)
			---1,000 tons ---		
1989	1,593	---	1,075	---	---
1990	1,535	---	1,080	---	---
1991	1,369	---	880	---	---
1992	1,510	70	1,017	91	1,844
1993	1,600	59	694	156	1,686
1994	1,059	60	45	61	937
1995	983	83	0	165	1,111
1996	1,468	108	0	154	1,286
1997	1,713	107	96	19	1,571
Projections				**Food gap**	
				SQ NR	(w/o food aid)
1998	1,613	107	15	***0*** ***0***	1,431
2003	1,552	118	18	***0*** ***0***	1,385
2008	1,675	130	22	***0*** ***0***	1,516

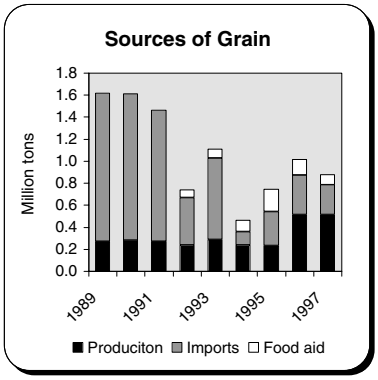
Another good harvest means that Kyrgyzstan should be able to export a small surplus for the second year in a row.



Statistical table 66--Tajikistan (New Independent States)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grains)	Aggregate availability of all food (grain equiv.)
			---1,000 tons ---		
1989	270	---	1,350	---	---
1990	282	---	1,330	---	---
1991	269	---	1,195	---	---
1992	237	32	433	71	548
1993	285	28	740	82	1,130
1994	240	27	118	104	583
1995	234	21	308	206	848
1996	511	22	364	139	1,055
1997	511	22	271	97	928
Projections				**Food gap**	
				SQ NR	(w/o food aid)
1998	511	28	333	***48*** ***431***	903
2003	480	31	368	***135*** ***555***	911
2008	513	35	430	***137*** ***600***	1,014

The switching of some area from cotton to wheat has boosted food supplies in the short run. However, widespread poverty will remain a problem for the foreseeable future leading to chronically low food consumption for nearly all income groups.



Appendix 1--Country list

Country	Country
Asia	**East Africa**
Afghanistan	Burundi
Bangladesh	Eritrea
India	Ethiopia
Indonesia	Kenya
Nepal	Rwanda
Pakistan	Somalia
Philippines	Sudan
Sri Lanka	Tanzania
Vietnam	Uganda
Latin America	**Southern Africa**
Bolivia	Angola
Colombia	Lesotho
Dominican Rep.	Madagascar
Ecuador	Malawi
El Salvador	Mozambique
Guatemala	Swaziland
Haiti	Zambia
Honduras	Zimbabwe
Jamaica	
Nicaragua	
Peru	
Former Soviet Union	**West Africa**
Armenia	Benin
Azerbaijan	Burkina Faso
Georgia	Cape Verde
Kyrgyzstan	Chad
Tajikistan	Cote d'Ivoire
	Gambia
	Ghana
North Africa	Guinea
Algeria	Guinea-Bissau
Egypt	Liberia
Morocco	Mali
Tunisia	Mauritania
	Niger
Central Africa	Nigeria
Cameroon	Senegal
Central Afr. Rep.	Sierra Leone
Zaire	Togo

Appendix 2--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 66 low-income countries through 2008. The reference to food includes grains, root crops, and—for the first time—a category called "other," which includes livestock and dairy products. All of these commodities are expressed in grain equivalent and, in total, account for as much as 98 percent of all calories consumed in the study countries.

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. Since the model is based on historical data, it implicitly assumes that the historical trend in key variables will continue in the future.

Food gaps are projected using two consumption criteria:

1) *Status quo target*, where the objective is to maintain average per capita consumption of the recent past. The most recent 3-year average (1995-97) is used for the per capita consumption target in order 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 66 lower income countries. The country models are synthetic, meaning that the parameters that are used are either cross country estimates or are estimated by other studies. Each country model includes three commodity groups, grains, root crops and "other." The production side of the grain and root crops are divided into yield and area response. Crop area is a function of 1-year lag return (real price times yield), while yield responds to input use. Commercial imports are assumed to be a function of domestic price, world commodity price, and foreign exchange availability. 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 is simply based on a trend that follows the projected growth in supply of the food crops (grains plus root crops). Although this is a very simplistic approach, it represents an improvement from the previous assessments where the contribution 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:

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

where *AR* is area, *YL* is yield, *LB* is rural labor, *FR* is fertilizer use, *CU* is capital 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. An attempt was made to fill this information gap by using an indirect method of projecting calorie consumption by different income groups based on income distribution data.[1] It should be noted that this approach ignores the consumption substitution of different food groups by income class. The procedure uses the concept of the income/consumption relationship and allocates the total projected amount of available food among different income groups in each country (income distributions are assumed constant during the projection period).

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

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

where *C* and *Y* are known average per capita food consumption (all commodities in grain equivalent) and per capita income (all quintiles), *Co* 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 (66 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 1980-97 for most variables are from a USDA database. Data for grain production in 1998 for most countries are based on a USDA database as of October 1998. 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 1995-97, except export earnings that are 1994-96.

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

Exogenous variables:

Population—data are medium UN population projections.
World prices—data are USDA/baseline projections.
Stocks—USDA data, assumed constant during the projection period.
Seed use—USDA data, projections are based on area projections using constant base seed/area ratio.
Food exports—USDA data, projections are either based on the population growth rate or extrapolation of historical trends.
Inputs—fertilizer and capital projections are, in general, an extrapolation of historical growth data from FAO.
Agricultural labor—projections are based on 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.
Merchandise and service imports and exports—World Bank data.
Net foreign credit—is assumed constant during the projection period.

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

Value of exports—projections are based on World Bank data. *(Global Economic Prospects and the Developing Countries*, various issues), IMF data (*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 3--Country indicators

Region and country	Population 1998	Population growth rate 1997/98	Grain production: Annual growth 1980-97	Grain production: Coefficient of variation 1981-95	Root production annual growth 1980-97	Projected annual growth in supply 1998-2008	Macroeconomic indicators: Per capita GNP 1996	Macroeconomic indicators: Per capita GNP growth 1995/96	Macroeconomic indicators: GDP growth 1995/96	Export earnings growth 1996	Months of import coverage in reserves 1996	Debt service ratio 1996
	1,000		------Percent------				U.S. dollars		------ Percent-----		Number	Percent
North Africa												
Algeria	30,481	2.2	-0.8	43.9	5.3	2.1	1,520	1.8	3.8	9.6	--	9.7
Egypt	66,009	1.9	5.2	5.3	4.2	1.5	1,080	3.5	5.0	8.4	10.8	3.4
Morocco	31,004	2.0	1.7	51.1	4.9	2.4	1,290	10.4	11.5	6.3	3.9	8.9
Tunisia	9,326	1.6	2.1	63.2	5.0	2.6	1,930	-0.4	7.0	0.5	--	8.0
Central Africa												
Cameroon	14,762	3.0	1.6	8.0	2.1	1.6	610	4.5	5.0	6.3	0.0	6.3
Central African Rep.	3,399	1.8	0.7	16.7	-0.5	0.8	310	-5.0	-2.8	-1.4	--	1.2
Zaire	48,371	3.1	3.8	8.3	2.4	1.8	130	-0.1	1.3	29.9	--	0.8
West Africa												
Benin	6,101	3.4	4.3	10.6	5.3	2.5	350	3.2	5.8	20.0	--	2.0
Burkina Faso	11,295	2.6	6.0	13.7	-5.6	2.3	230	3.3	6.1	1.8	--	1.9
Cape Verde	476	2.9	8.7	89.1	1.2	0.9	1,010	-24.6	4.7	25.0	--	1.4
Chad	5,961	2.2	3.3	18.8	1.3	2.4	160	0.5	2.8	7.5	--	2.7
Cote dílvoire	16,320	3.3	3.0	7.4	0.9	2.4	660	4.6	5.9	24.1	1.5	13.8
Gambia	1,085	3.1	1.9	16.9	0.0	3.0	--	--	--	--	4.0	--
Ghana	19,439	3.0	7.8	22.2	7.9	3.6	360	2.3	5.0	19.8	4.4	7.6
Guinea	7,036	2.4	4.7	9.8	2.2	2.1	560	1.8	4.5	-3.2	1.0	3.0
Guinea-Bissau	1,206	2.4	5.9	16.1	2.4	1.8	250	3.7	5.2	8.9	--	4.2
Liberia	3,392	3.3	-9.2	40.7	-1.1	1.0	--	--	--	--	--	--
Mali	10,185	2.8	5.1	13.9	0.4	2.9	240	1.2	4.0	6.4	--	4.5
Mauritania	2,478	3.0	10.8	47.1	-0.7	1.7	470	1.8	4.5	7.4	--	11.6
Niger	10,205	3.0	2.5	16.0	1.6	2.1	200	-0.1	3.3	--	--	2.9
Nigeria	111,081	3.0	6.5	18.2	9.9	2.6	240	1.9	3.5	15.9	4.1	8.1
Senegal	9,894	3.2	2.1	20.1	2.9	1.7	570	3.2	5.6	4.8	--	5.4
Sierra Leone	5,143	2.7	-2.5	11.3	5.3	0.9	200	7.6	4.8	6.5	--	6.4
Togo	4,897	3.4	4.8	16.1	1.7	2.3	300	4.3	6.2	-0.9	--	4.0
East Africa												
Burundi	6,669	2.1	-2.4	19.6	1.7	1.7	170	-11.1	-8.8	-49.3	--	2.7
Eritrea	4,270	3.1	-0.8	--	0.0	1.3	--	--	--	--	--	--
Ethiopia	60,310	2.7	3.6	11.0	1.7	3.0	100	7.2	10.3	4.9	5.1	5.8
Kenya	30,975	2.6	0.7	14.8	2.5	2.0	320	3.1	4.3	13.3	2.5	9.4
Rwanda	9,280	2.5	-3.4	14.6	-1.5	2.2	190	7.8	11.4	40.5	4.9	1.4
Somalia	8,596	3.3	-3.1	37.1	0.6	1.1	--	--	--	--	--	--
Sudan	33,060	3.3	3.8	39.0	-4.6	1.8	--	--	--	--	0.9	--
Tanzania	30,481	2.2	2.4	12.6	0.0	2.2	170	--	--	--	2.3	4.5
Uganda	21,042	2.1	2.6	6.0	0.5	2.6	300	6.2	9.1	19.2	3.8	2.5

See note at end of table.

Continued--

Appendix 3--Country indicators--continued

Region and country	Population 1998	Population growth rate 1997/98	Grain production: Annual growth 1980-97	Grain production: Coefficient of variation 1981-95	Root production annual growth 1980-97	Projected annual growth in supply 1998-2008	Macroeconomic indicators: Per capita GNP 1996	Macroeconomic indicators: Per capita GNP growth 1995/96	Macroeconomic indicators: GDP growth 1995/96	Export earnings growth 1996	Months of import coverage in reserves 1996	Debt service ratio 1996
	1,000		------Percent------				U.S. dollars		------ Percent-----		Number	Percent
Southern Africa												
Angola	10,913	2.7	0.2	19.3	4.5	1.7	270	-1.7	7.0	12.8	--	20.1
Lesotho	2,088	2.4	-0.1	30.2	10.5	1.7	660	6.7	11.9	9.0	--	2.9
Madagascar	15,243	3.2	1.5	3.1	1.9	1.6	250	0.5	2.0	9.7	2.5	1.9
Malawi	11,018	2.4	0.9	21.7	0.5	2.3	180	13.0	14.5	1.5	--	4.1
Mozambique	19,728	2.9	4.8	24.7	1.0	2.4	80	5.0	6.1	14.5	--	11.3
Swaziland	1,066	3.3	0.8	30.8	-1.1	2.4	1,210	-0.3	2.5	3.3	2.4	3.2
Zambia	10,178	2.4	0.8	31.7	4.3	1.7	360	3.4	4.9	-3.5	--	9.8
Zimbabwe	12,084	2.2	-1.0	37.4	5.4	1.1	610	5.8	7.3	12.2	--	9.2
Asia												
Afghanistan	26,519	6.1	2.2	7.9	1.7	1.2	--	--	--	--	--	--
Bangladesh	137,240	2.3	2.0	4.0	0.3	1.6	260	3.8	5.3	10.6	2.9	2.2
India	985,921	1.7	5.1	5.2	-2.0	1.7	380	5.1	7.5	7.5	5.1	3.6
Indonesia	213,133	1.5	-1.9	3.3	-1.1	1.2	1,080	5.8	7.6	6.3	--	9.9
Nepal	23,202	2.5	1.9	8.3	0.5	1.6	210	1.8	5.3	0.5	4.5	1.9
Pakistan	141,030	2.6	2.8	4.8	2.8	2.3	480	0.3	4.6	2.0	0.9	5.1
Philippines	78,229	2.2	2.9	4.5	7.3	2.1	1,160	4.5	5.7	20.3	--	6.6
Sri Lanka	18,969	1.1	2.4	9.1	5.7	1.0	740	0.5	3.8	3.9	3.7	3.1
Vietnam	78,147	1.6	0.5	5.0	-4.3	1.7	290	--	9.3	--	--	1.5
Latin America												
Bolivia	8,435	2.2	3.1	15.2	0.8	2.0	830	2.6	--	--	7.8	6.5
Colombia	38,014	1.6	-1.2	6.2	1.6	2.5	2,140	-0.5	2.0	4.4	5.6	6.6
Dominican Republic	8,366	1.7	-0.8	9.7	2.2	2.6	1,600	5.7	7.4	13.3	0.8	3.5
Ecuador	11,915	1.9	2.2		8.7	2.0	1,500	1.2	1.9	3.6	4.1	7.4
El Salvador	6,226	1.9	1.2	10.4	1.7	2.7	1,700	0.0	2.5	7.4	--	3.0
Guatemala	11,841	2.4	-1.1	4.3	0.4	1.0	1,470	8.6	3.0	6.1	3.0	2.3
Haiti	6,807	1.4	2.7	8.3	4.2	1.8	310	0.0	2.0	20.7	1.7	1.0
Honduras	5,737	2.6	-4.5	12.0	3.4	2.4	660	-0.3	3.1	15.0	--	14.1
Jamaica	2,609	0.7	1.3	60.2	3.8	1.7	1,600	-1.9	-1.7	1.0	--	15.9
Nicaragua	4,537	2.5	4.6	16.1	-0.6	2.7	380	4.2	4.7	37.9	1.5	13.2
Peru	25,393	1.7	2.3	13.9	1.5	2.0	2,420	0.0	2.8	10.1	10.9	4.9
New Independent States												
Armenia	3,469	0.1	1.6	53.6	6.7	2.1	630	7.4	--	--	2.2	3.0
Azerbaijan	7,793	0.7	-0.4	52.7	8.3	2.1	480	-1.3	1.2	--	--	0.3
Georgia	5,145	-0.6	-0.2	52.6	12.8	1.8	850	12.7	--	--	--	0.3
Kyrgystan	4,566	0.6	-2.5	51.8	13.1	1.5	550	4.1	5.6	--	60.5	3.1
Tajikistan	6,124	1.8	3.0	51.2	-8.0	1.9	340	-8.4	-4.4	--	--	0.0

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

Source: Population=Census data.

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