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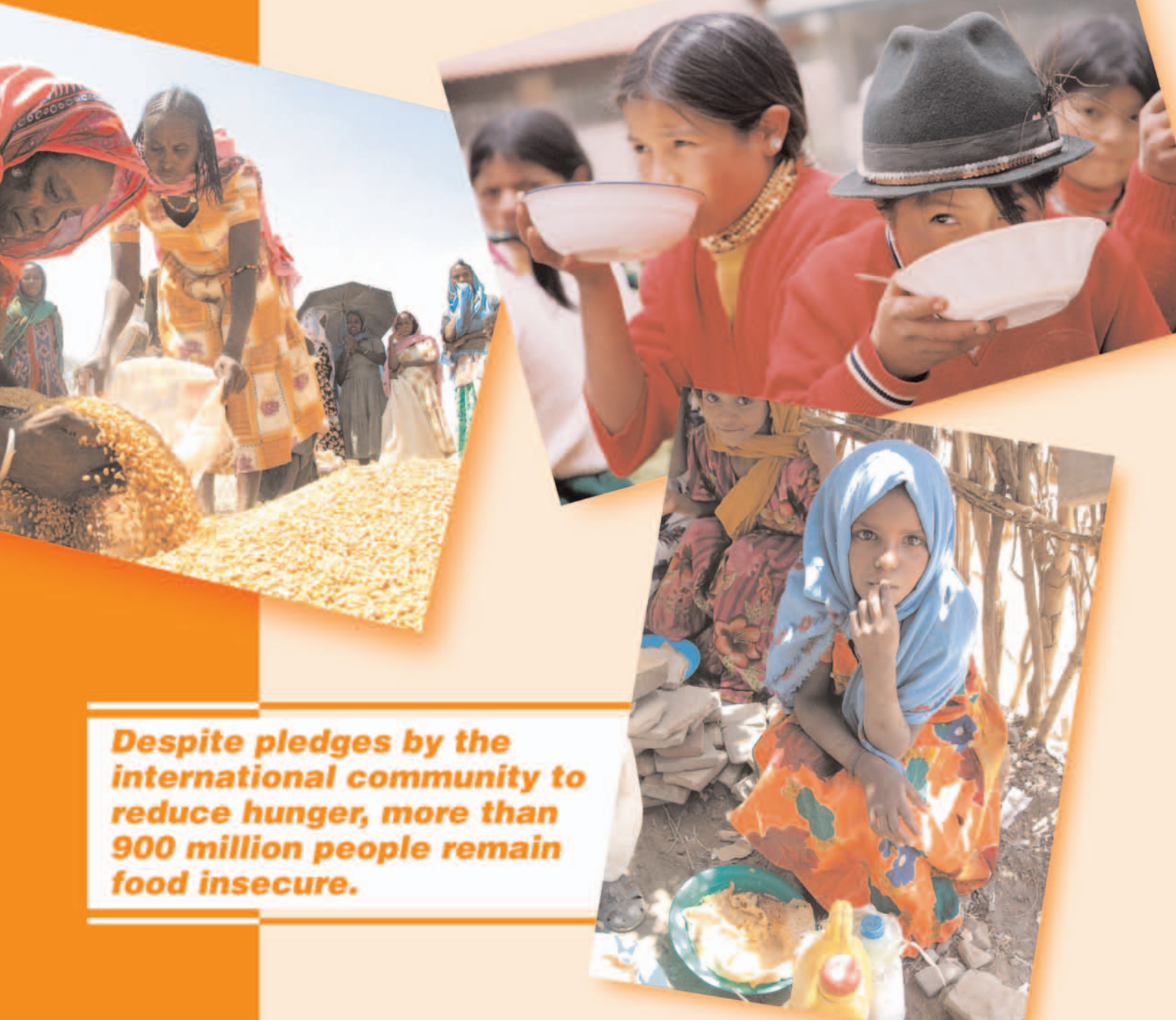


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FOOD SECURITY ASSESSMENT



Despite pledges by the international community to reduce hunger, more than 900 million people remain food insecure.

Food Security Assessment. Shahla Shapouri and Stacey Rosen, coordinators.
Market and Trade Economics Division, Economic Research Service,
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Abstract

Just over 900 million people in the 70 low-income countries studied in this report are estimated to have consumed less than the recommended nutritional requirements in 2003. This marks a decline from more than 1 billion in 2002. Although food security is expected to improve in all regions over the coming decade, this improvement will vary. Food security is projected to improve most significantly in Asia, followed by Latin America and the Caribbean. Although some improvement is also expected in Sub-Saharan Africa, the deep poverty at the root of hunger problems in the lower income population will remain unchanged. Food aid has been and continues to be an important tool used by the international community to fight hunger in low-income countries, and the United States is the dominant food-donor country. However, the effectiveness of food aid could be improved by increased coordination between donor groups, more transparent eligibility criteria, and fewer fluctuations in year-to-year aid levels.

Preface

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

Acknowledgments

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Cover Photos: World Food Program (Back, left to right: Brenda Barton; Daniel Pepper. Front, clockwise from left: Brenda Barton; A.K Brodeur; Daniel Pepper).

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Summary

Food security, as measured by the number of hungry people, improved slightly in 2003 compared with 2002 in the 70 low-income countries studied in this report. Overall, the estimated number of people in these countries consuming less than recommended nutritional requirements dropped from more than 1 billion in 2002 to just over 900 million in 2003.

Although food security is expected to improve in all regions over the coming decade, this improvement will vary. Food security is projected to improve most significantly in Asia, followed by Latin America and the Caribbean. Although some improvement is also expected in Sub-Saharan Africa, the deep poverty at the root of hunger problems in the lower income population will remain unchanged.

North Africa

In North Africa, per capita food consumption is comparable to levels in many developed countries, and is not expected to change in the next decade. However, food security is expected to remain a problem for the lowest income group in Algeria, Egypt, and Morocco.

Sub-Saharan Africa

Although the number of hungry people in Sub-Saharan Africa is expected to rise from 381 million in 2003 to 490 million in 2013, the share of hungry people as a part of the entire population is expected to stay at 59 percent over the same period.

Asia

Increased grain production rates and slowing population growth are expected to help improve food security in Asia over the next decade. Afghanistan, despite its recovering agricultural sector, will remain the most vulnerable country in the region.

Latin America and the Caribbean

A favorable economic outlook should improve food security in most nations in the region, with the exception of Haiti and Nicaragua. Food aid is expected to continue to play a vital role in the food security outlook in these two nations. Efforts to reduce hunger in Brazil would benefit from investments in education and other long-term strategies aimed at reducing income inequality.

Commonwealth of Independent States

Positive grain harvests in 2003 have helped to close food gaps in this region. Only Tajikistan is expected to experience food gaps over the coming decade. In Russia, access to food is a problem for a minority of the population with low income, large households, and no garden plot on which to grow food-stuffs. Overweight and obesity affect about half the population.

Food aid has been and continues to be an important tool for the international community to fight hunger in low-income countries, and the United States is the dominant food-donor country. However, the effectiveness of food aid could be improved by increased coordination between donor groups, more transparent eligibility criteria, and fewer fluctuations in year-to-year aid levels.

Global Food Security: Prospects and the Role of Food Aid

All ERS food security indicators show weather-related improvement in food availability in 2003 relative to 2002. Food aid continues to play an important role in alleviating hunger and famine across the world. In light of the 50-year anniversary of the U.S. food aid program in 2004, this section (in addition to reviewing food security in the 70 countries) evaluates the recent accomplishments and future challenges facing food aid programs. [Shahla Shapouri and Stacey Rosen]

Some Improvement In Food Security Is Projected, But ...

According to the estimated indicators, the food security situation improved slightly in 2003 relative to 2002 in the 70 study countries with respect to the number of hungry people. Nevertheless, food consumption in some countries declined relative to the recent past (2000-02 average), leading to status quo food gaps of about 7.2 million tons, exceeding the gaps estimated for 2002 (table 1).

The nutritional food gap (national level) increased nearly 2 million tons to more than 18 million tons in 2003 relative to 2002. The other indicator of nutritional well-being, the distribution gap, shows a slight improvement in 2003 as this gap declined by more than 3 million tons to 32.5 million tons relative to 2002. This improvement in food availability at the disaggregated level translates into improved food access for roughly 120 million people, as the estimate of the number of people consuming less than the nutritionally required level fell from more than 1 billion in 2002 to a little more than 900 million in 2003. Reviewing the same indicator over the past 15 years indicates large swings in the annual estimate of the number of food insecure people¹—ranging from an increase of 150 million to a decrease of 220 million. This variability is important since it reflects the profound impact of transitory or short-term food insecurity. In fact, because of the frequent incidence of transitory hunger,² we could not identify a clear trend at the aggregate level in the number of food insecure people in the study countries. This is not to say that there are no

clear trends in specific regions or countries, but aggregate level trends are harder to discern because improvements in hunger in one country may be offset by deterioration in another. This pattern constitutes a clear challenge to meeting the stated goal of the World Food Summit—cutting the global number of hungry people in half by 2015.

What is the long-term implication of transitory food insecurity and volatility in hunger? The answer lies between the potential for improving food security in these countries and the grim reality of the past. The fundamental forces that influence food security of the study countries are all moving in a positive direction. These include domestic food production potential, available technology, and trade growth potential. There is significant potential to expand food production even in the most vulnerable countries of Sub-Saharan Africa (SSA) and Latin America. Both regions have arable land that can be brought into production, although at some cost. In regions and countries with limited arable land, more intensive agricultural production under newly available technologies provides possibilities for increased food production. Trade also can enhance countries' food availability, since these countries' share of global trade is very small and therefore has potential to expand. Declining global food prices should reduce pressure on food import bills. This positive outlook is supported by the Food and Agriculture Organization (FAO), which monitors food security of a much larger set of countries than included in this report.

The reality of the past, however, dampens the optimism. Data show that during the last two decades many countries, rather than moving along the growth path, slipped downward. Our projections show slight improvements in food security of the countries at the aggregate level for the 70 countries. The projected improvements in terms of the decline in the nutritional food gaps and number of hungry people may not be enough to withstand major short-term shocks. The

¹ A person is considered food insecure if average food availability or access to food falls below Food and Agriculture Organization recommended average calorie intake levels of approximately 2,100 calories per day, depending on the region.

² Transitory or short-term hunger as opposed to chronic hunger afflicts parts of populations usually as a result of extraordinary events, such as drought, war, or other emergencies.

Table 1—Food availability and food gaps for 70 countries

Year	Grain production	Root production (grain equiv.)	Commercial imports (grain)	Food aid receipts (grain equiv.)	Aggregate availability of all food
			1,000 tons		
1994	407,850	59,936	53,132	8,320	637,332
1995	410,833	60,742	56,731	8,301	665,744
1996	431,022	61,975	53,840	6,011	673,684
1997	429,233	63,587	57,878	6,009	680,706
1998	434,260	63,588	62,840	6,553	689,949
1999	455,748	69,138	67,449	8,790	721,964
2000	454,916	71,312	64,578	6,620	715,974
2001	466,605	72,655	62,584	8,422	738,886
2002	451,474	74,025	65,417	8,249	761,921
Projections					
				Food gap*	
				SQ NR	
2003	472,085	75,391	64,128	7,237 18,418	756,233
2008	538,321	82,211	76,645	4,675 13,695	859,723
2013	598,880	89,550	90,554	10,867 14,291	950,132

*SQ stands for status quo and describes the amount of grain equivalent needed to support 2000-2002 levels of per capita consumption. NR stands for nutritional requirements and describes the amount needed to support nutritional standards.

estimated reduction in the number of hungry people is roughly 40 million from 2003 to 2013, meaning that any economic instability could nearly offset the gain.

The problem lies in the growing number of shocks, both natural and manmade, which have surfaced during the last decade and have consumed large shares of resources, both internal and external. The impacts of these shocks on the social and economic structures of these countries with limited or no safety nets are severe, thereby creating anti-government sentiment. The situation in Sub-Saharan Africa is a clear example. The region has been devastated by years of political unrest and regional conflicts, and now is faced with the devastating effects of HIV/AIDS, which are almost impossible to quantify. Therefore, as indicated in previous reports, in the absence of a major effort to buffer the impact of shocks, resources that could otherwise be invested to stimulate long-term growth and food security will be used to respond to individual crises.

Food aid is limited relative to needs, but it has reduced suffering and prevented many deaths. However, it also has been controversial in terms of its effectiveness in improving global food security. The

following section provides an overview of food aid's role and its impact on food security in the study countries since 1990.

What Is In This Report?

All historical and projected data are updated relative to the 2002 Food Security Assessment (FSA) report. The food production estimates for 2003 are based on USDA data as of October 2003 with supplemental data from the FAO and the World Food Program (WFP). The financial and macroeconomic data are updated based on the latest World Bank data. The projected macroeconomic variables are either extrapolated based on calculated growth rates for the 1990s or are World Bank projections/estimations. There are 70 countries covered in this report. The projections/estimates of food availability include food aid, with the assumption that each country will receive the 2000-2002 average level of food aid throughout the next decade.

In light of the 50-year anniversary of U.S. food aid programs in 2004, we focus on evaluating the recent accomplishments and future challenges facing food aid programs. We calibrated the FSA model to estimate

historical indicators of food security including estimations of food gaps and the number of hungry people. This allowed us to evaluate the effectiveness of food aid in improving food security of the study countries since 1990.

This report includes two special articles. “Brazil’s Food Security and Food Assistance Programs to Reduce Poverty” claims that due to chronic food insecurity of the poorest segments of the population, successive Brazilian governments have implemented a range of food assistance, anti-poverty and well-being programs and policies over the past 50 years. The article examines policy alternatives and concludes that improved targeting, combined with greater operational efficiency and size, could significantly enhance the effectiveness of Brazil’s food safety net programs.

“Food Security in Russia: Economic Growth and Rising Incomes are Reducing Insecurity” argues that despite adequate availability of food at the country level, access to food remains a problem. However, Russia’s improved macroeconomic performance since 1999, with GDP growing at an average annual rate of about 6 percent, has substantially reduced poverty, and thereby reduced the number of food-insecure households.

Food Security: Regional and Country Perspectives

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

The 2003 data indicate improvements in per capita consumption relative to the base year average (2000-02) in all countries of North Africa, LAC, and the Commonwealth of Independent States (CIS). Therefore, status quo food gaps in those countries are zero. This is not the case in SSA and Asia. Per capita consumption in 25 of the 47 countries in these regions is estimated to decline relative to average consumption in 2000-02. The four countries with the largest volume of status quo food gaps in 2003 are in Sub-Saharan

Africa: Ethiopia followed by Zimbabwe, the Democratic Republic of Congo and Uganda.

The indicator of national per capita consumption relative to the nutritional requirement showed that all countries in the regions of North Africa, Asia, and CIS had nutritionally adequate food in 2003. However, in 24 countries in SSA and LAC, average consumption falls short of the nutritional requirement. Nineteen of these countries are in SSA and 5 are in LAC. Similar to the case with the status quo gaps, the countries with the largest nutritional gaps are in SSA—Ethiopia, the Democratic Republic of Congo, Zimbabwe, Tanzania, and Somalia.

When income inequality is taken into account, the number of countries as well as the size of food gaps increase dramatically. In 2003, the distribution gap was estimated at 77 percent greater than the average national nutritional gap. In 49 of the 70 countries, more than 10 percent of the population was vulnerable to the threat of hunger. North African countries, however, are the least vulnerable to food insecurity compared with the other countries. The average calorie consumption in these countries is comparable to countries in Europe with much higher incomes. In fact, food consumption in the lowest 10-percent income quintile is estimated to be about 13 percent above the requirement. This means there is a very low level of hunger in this region even when the skewed distribution of purchasing power is taken into account.

For the Asian countries, the estimated distribution gap is more than 5.9 million tons in 2003 (note that they showed no nutritional food gap, on average, at the national level). In the LAC countries, highly skewed income distribution is the reason for a distribution gap 2.5 times larger than the average national nutritional food gap in 2003. In the CIS countries, with no average nutritional food gap, skewed purchasing power results in inadequate consumption for 20-60 percent of the population in four countries: Armenia, Georgia, Tajikistan, and Uzbekistan. In SSA, the difference between nutritional food gaps at the national average level and disaggregated level (which reflects purchasing power) is not very large, 17 million tons versus 23 million tons. The reason for these results is the deep poverty that encompasses the majority of the population in the region. Average food consumption of the region exceeds nutritional requirements by only less than 2 percent (2,135 versus 2,100 calories per day in 2003), and while the

skewed purchasing power adds to the problem, it does not alter the picture significantly.

The largest distribution gaps in 2003 are in Ethiopia, followed by the Democratic Republic of Congo, India, Bangladesh, Zimbabwe, and Tanzania. Note that a large gap in a country does not necessarily mean a deep level of nutritional vulnerability. In most cases, a large nutritional food gap in a country in volume terms is correlated with population size. For example, food consumption in the lowest (20-percent) income quintile in Burundi is estimated to be 54 percent lower than the same group in Bangladesh, but Burundi's nutritional food gap is ranked seventeenth while Bangladesh's is fourth.

Despite the low level of food availability and the deep poverty in SSA, Asia has the most hungry people. The estimate for 2003 is 440 million in Asia versus 381 million in SSA. The picture is projected to be reversed in the next decade, when there are expected to be 490 million hungry people in SSA and 308 million in Asia in 2013. This change is due to a projected high economic growth rate in Asia, while SSA economies are projected to improve slightly, but not enough to prevent growing hunger. In LAC, food security is expected to improve during the next decade, cutting the number of hungry people by more than half, but the improvement is not expected to be uniform across countries. The number of hungry people is projected to increase for the CIS countries. In North Africa, only the lowest income groups in Algeria, Egypt, and Morocco could face food insecurity.

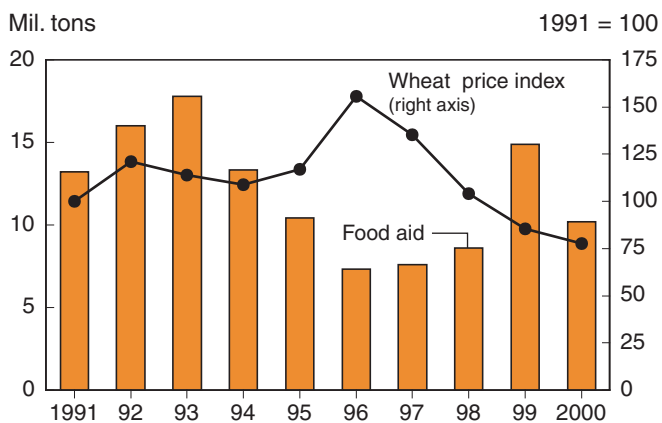
Food security estimates, as mentioned earlier, are based on the assumption of food aid flows continuing at the same level and allocation as the 2000-02 average. Based on this assumption, the food gaps are estimated to be 4.5-5 million tons smaller in 2003 than they would have been without food aid. As a result of food aid, consumption for 91 million people rises above the nutritionally required level. In Asia, food aid is expected to raise consumption above the target level for 64 million people—in the absence of food aid, these people would have been considered hungry. In SSA, food aid had a similar impact for 17 million people, and in LAC, 9 million people. Food aid is not expected to change food security of the North Africa and CIS regions in part because of their declining share of total food aid received (see the following section) and because their diets are already higher than the nutritionally required levels.

Food Aid Donations Are Declining

Food aid has been a major tool used by the international community to improve food access and to reduce suffering from emergency conditions in low-income countries. In many cases, it has significantly reduced loss of life during food emergencies, and the goal of many different projects has been to enhance long-term food security. The quantities of food aid and their distribution to recipient countries vary annually depending on donors' budgets and policies as well as emergency needs. Fourteen million tons of food aid (in grain equivalent) (see box, "How Food Security is Assessed") was shipped to the study countries in 1988. This declined to 8.7 million tons in 2002. The high level of food aid in 1999 featured a significant increase in food aid shipments to Indonesia in response to the Asian financial crisis. In addition, since the late 1980s, food aid to North African countries, which had been among the major recipients, declined sharply from more than 2 million tons in 1988 to about 74,000 tons in 2002. Another development during the 1990s was related to the CIS countries that gained independence and subsequently joined the list of food aid recipients. Food aid received by CIS countries peaked in the mid 1990s at nearly 2 million tons, but has declined since then to about half a million tons as their economies improved.

Cereal food aid shipments to the study countries varied annually with a declining trend during the last 15 years. The variation was counter cyclical (i.e., when food prices were up and food aid demand was high, the quantities declined; fig.1). Cereal aid was about 14 million tons in 1988, then declined to its lowest level of 5.5

Figure 1
Volume of food aid is inversely related to price trends



Source: USDA Baseline, ERS calculations.

How Food Security is Assessed: Methods and Definitions

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

Food consumption and food access are projected in 70 lower income developing countries—37 in Sub-Saharan Africa, 4 in North Africa, 11 in Latin America and the Caribbean, 10 in Asia, and 8 in the Commonwealth of Independent States (see Appendix 1 for a detailed description of the methodology and definitions of terms and Appendix 2 for a list of countries). The projections are based on 2000-2002 data. The periods covered are 2003 (current), 2008 (5-year forecast), and 2013 (10-year forecast). Projections of food gaps for the study countries through 2013 are based on differences between consumption targets and estimates of food availability, which is domestic supply (production plus commercial and food aid imports) minus nonfood use. The estimated gaps are used to evaluate food security of the study countries.

The **food gaps** are calculated using two **consumption targets**: 1) maintaining base per capita consumption or status quo (SQ), which is the amount of food needed to support 2000-2002 levels of per capita

consumption; and 2) meeting nutritional requirements (NR), which is the gap between available food and food needed to support a minimum per capita nutritional standard (for definitions of terms used see Appendix 1). Comparison of the two measures, either for countries, regions, or the aggregate, indicates the two different aspects of food security: consumption stability and meeting the nutritional standard.

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

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

million tons in 1996, before increasing to about 8 million tons during the 2000s. Most food aid is in the form of cereals, but the share of non-cereal food aid is on the rise. The share of non-cereal food items was in the range of 13-19 percent during the 1990s, but increased to 23 percent in 2002. The commodity mix of non-cereal foods varies annually and includes vegetable oils, pulses, fresh vegetables, and meat and fish products. Processed products include commodities such as cheese, butter, and pasta. Among the commodity groups in 2002, vegetable oils (more than 800,000 tons) and pulses (more than 350,000 tons) had the largest shares.

It should be noted that not all of the available food aid is sent to the study countries. During 1988-2002, the share of food aid sent to these countries was in the range of 58

to 90 percent. Russia was the largest single recipient of food aid in 1993 (3.5 million tons) and in 1999 (4.3 million tons).

Food aid is used for a variety of purposes and goals, but its principal mission is to fight hunger. The main food aid categories in terms of distribution and mission are program, project, and emergency aid. Program food aid is distributed bilaterally, i.e., as government-to-government donations, often responding to economic problems of the recipients. Multilateral and bilateral organizations donate project and emergency food aid, but most projects are operated by nongovernmental organizations. The goal of project food aid, with the exception of food for work, is similar to that of financial development aid projects and has no specific boundary in terms of the scope

of activities. During 2000-02, about 25 percent of food aid was program aid, 25 percent was project aid, and the remainder was used for emergencies. During the same period, about 40 percent of food aid was sold in the recipients' markets (i.e., sold for cash) to finance projects.

U.S. food aid programs began under the Agricultural Trade Development and Assistance Act of 1954 commonly referred to as Public Law (P.L.) 480 (see box, "How P.L. 480 Helps Supplement Food Supplies"). At that time, food aid was a feasible option for the disposal of rising U.S. agricultural commodity surpluses. Through time, however, the focus of U.S. policy has changed, responding to domestic and international conditions. The emphasis shifted from among several objectives, relative to the strength of domestic and international pressures at a given time: surplus disposal, humanitarian goals, market development, and foreign political support.

The United States Remains the Dominant Donor

Since 1954, U.S. food aid efforts reflected the interaction between domestic agricultural interests and foreign policy interests. In the early years, the objective of the food aid program was to dispose of surplus domestic production and raise prices. At that time, food aid accounted for more than half of U.S. grain exports, and at its peak equaled about 17 million tons (1965-66). The quantity of U.S. food aid has remained stable in recent years (5-6 million tons). The decline in U.S. food aid, however, has been partially offset by an increase in donations by other countries. In the early 1990s, the major donors of food aid were the United States, Europe, Canada, and Japan, with shares of 59 percent, 29 percent, 7 percent, and 3.5 percent, respectively (fig. 2). During 2000-02, the U.S. share increased to more than 62 percent while Europe's share declined to less than 17 percent and Canada's share to less than 3 percent. The U.S. share of global cereal aid was 60 percent, while the share of non-cereal aid was 75 percent.

Food Aid: Who Receives the Most?

Regionally, SSA and Asian countries have been by far the largest recipients of food aid, receiving about 60-80 percent of the volume of food aid going to the study regions during the last 15 years. Depending on the economic and political developments in their

How P.L. 480 Helps Supplement Food Supplies

The U.S. provides food aid under three programs: P.L. 480, Section 416(b), and Food for Progress (FFP). The Section 416(b) program provides for donations to developing countries of surplus commodities owned by the Commodity Credit Corporation (CCC). The FFP program authorizes the sale or donation of U.S. agricultural commodities to support developing countries or emerging democracies. FFP can be funded through CCC or P.L. 480 Title I. To date, all food aid provided under this program has been by donation. The P.L. 480 food aid program is the principal vehicle for U.S. food aid and it is comprised of three titles:

- **Title I** consists of government-to-government commodity sales and sales to private entities under long-term, low-interest credit arrangements (also includes Title I FFP grants).
- **Title II** provides for donations of commodities to meet humanitarian and economic development needs.
- **Title III** provides for government-to-government grants to support economic development for the least developed countries.

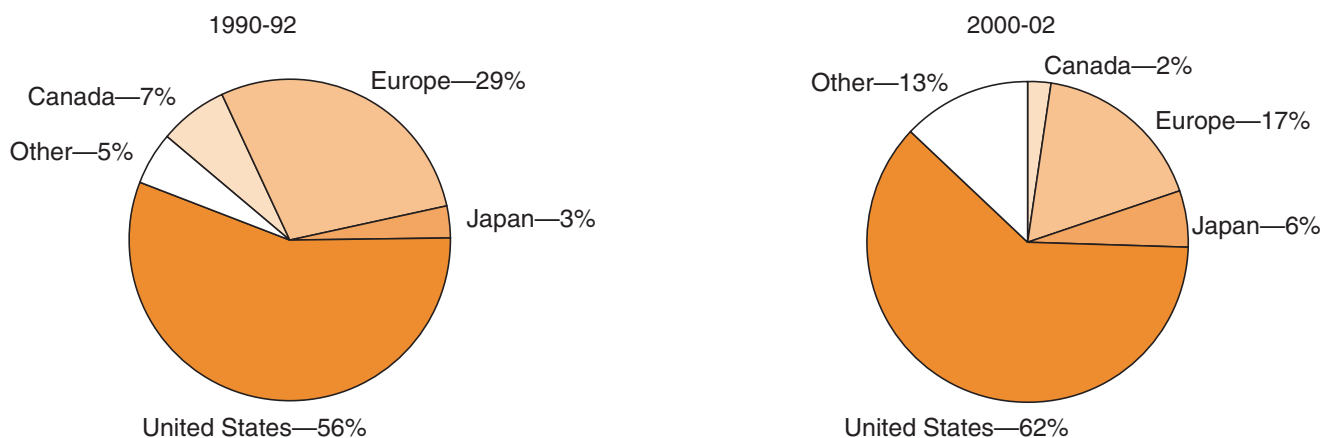
Through the 1990s, changes in appropriations for the P.L. 480 programs reflect the emphasis toward humanitarian rather than market development goals. In fiscal year 2001, 86 percent of the value of U.S. food aid appropriations fell under the Title II program, compared with 50 percent in the early 1990s.

On the other hand, the allocation levels of Title I fell steadily during the 1990s, averaging over \$400 million per year early in the decade to roughly \$140 million in 2001. Title II varied marginally during the same time period, exceeding \$800 million in most years. Title III was always significantly smaller than the other two programs, and since 2001 has received no funding.

respective countries, the food aid share of the two regions has changed over time. Severe droughts in the early 1990s and 2000s resulted in higher food aid shipments to SSA, while political, financial, and natural disasters in the late 1990s shifted donations to Asia. On a per capita basis, however, the SSA share is much

Figure 2

U.S. share of global food aid rose during last decade



Source: World Food Program, ERS calculations.

higher than Asia’s because of the differences in population size: SSA countries have less than 40 percent the population of the Asian study countries.

Latin American countries’ share of food aid peaked in 1990 at about 20 percent of the total, but since then has ranged from 10-14 percent. The CIS countries had their highest food aid share in 1995 (21 percent), but this share has declined to 3-6 percent in recent years. Improvements in the economies and food supplies of the two regions explain part of this trend. These declines in shares are not as sharp when expressed in dollar terms as opposed to quantity because of the non-cereal food aid component of food aid. The reason is simply because non-cereal commodities have a greater per unit value than cereals and account for a significant share of the food aid received by the two regions. During 1998-2000, the share of non-cereal food aid to total food aid received by the CIS countries was in the range of 32-72 percent, and in LAC it was 27-42 percent. To demonstrate the importance of non-cereal aid as a share of the total value of food aid, one can simply compare the caloric content and prices of wheat and poultry meat. Every 100 grams of wheat has 350 calories, while poultry meat has less than half that. However, a metric ton of poultry meat costs over 10 times more than a metric ton of wheat in the international market. Even when nutritional attributes such as protein content are taken into account, cereals are the most cost effective. The protein content of poultry meat is only three times higher than cereals, not enough to justify the higher cost. The growing share of non-cereals, if not adjusted in donor budgets, will

absorb a large share of food aid outlays, and reduce the caloric availability of food aid to the most vulnerable.

How Effective is Food Aid in Improving Food Security?

Despite a wide-ranging debate on the positive (additional supplies) and negative (production disincentive due to the decline in local prices) effects of food aid, the consensus is that food aid is beneficial for relieving transitory and emergency food insecurity. The question we examine is the degree to which food aid contributed to increasing consumption in food insecure countries and how effectively food aid responded to fluctuations in needs. In other words, has food aid reduced consumption instability over time? Since the quantities of food aid fall short of the aggregate needs of the study countries, the next question is whether food aid has responded effectively to specific country food needs (i.e., is it provided to those that need it the most?).

Food aid contribution to consumption—The overall contribution of food aid to total food consumption in the study countries is small, but the importance of food aid is more pronounced when it is measured at the country level at particular points in time. Food aid, on average, provided less than 4 percent of food consumption (grain equivalent) for the 70 countries in the last decade, but the share varied greatly by country and tended to be significant during emergencies. During the 1992-93 civil war, food aid contributed to about 70 percent of Somalia’s consumption. Also, when Mozambique was

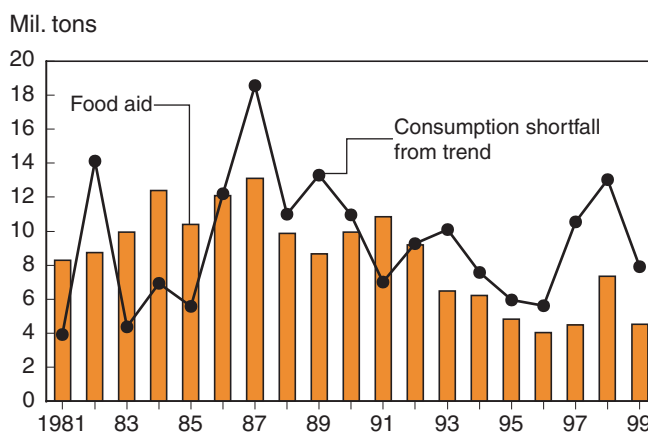
faced with prolonged economic and political difficulties, it often relied on food aid to supplement more than one-third of its food consumption. Similarly, in Rwanda during 1997-99, food aid contributed to more than one-third of food consumption. Since 2000, Eritrea has relied on food aid for about half of its consumption. During 2000-02, the largest recipients of food aid were North Korea (4.2 million tons), Ethiopia (4 million tons), Bangladesh (1.4 million tons), and Afghanistan (1.1 million tons). In North Korea, food aid contributed to about 20 percent of food consumption, and in Ethiopia and Bangladesh less than 10 percent.

Food aid to stabilize consumption—During the last two decades, food aid clearly had a significant role in reducing loss of life during food emergencies in countries such as Ethiopia, Sudan, Somalia, Afghanistan, Rwanda, and Haiti. However, to measure how food aid has responded to short-term food insecurity over time and by country, we examined food consumption (grain only) in 62 of the study countries: 41 in Africa, 10 in Asia, and 11 in Latin America—CIS countries are excluded. We calculated the annual changes in consumption shortfalls in each country, or the amount by which consumption (excluding food aid) fell below the 1981-2000 trend (these shortfalls are often called “transitory food insecurity”). The summation of the shortfalls across countries is the amount of food that was required to stabilize food consumption of the countries.

Comparing these shortfalls with quantities of food aid received showed that food aid covered about 92 percent of the shortfalls, on average (see fig. 3). This means that the cumulative quantity of food aid received during 1981-2000 was equal to 92 percent of all consumption shortfalls. Ideally, the volume of food aid would have matched the magnitude of the transitory food insecurity. In practice, however, food aid followed a declining trend while consumption shortfalls varied annually. For example, in 1981 and 1983, food aid was double the amount of consumption shortfalls, while in 1997 it was less than half of the shortfalls. The overall level of food aid trended downward after 1991 and covered less than 60 percent of the consumption shortfalls from 1991-2000. In sum, in 6 of the 20 years covered, food aid exceeded the consumption shortfalls; in 12 of the years, it was less than the shortfalls; and only in 2 years (1986 and 1992) did the quantities match closely. The comparisons are much more uneven at the country level.

Food Aid Responding to Needs—Food aid clearly falls short of needs, especially given the broad goals of

Figure 3
Imbalances between food aid supplies and short-term consumption shortfalls



Source: World Food Program, ERS calculations.

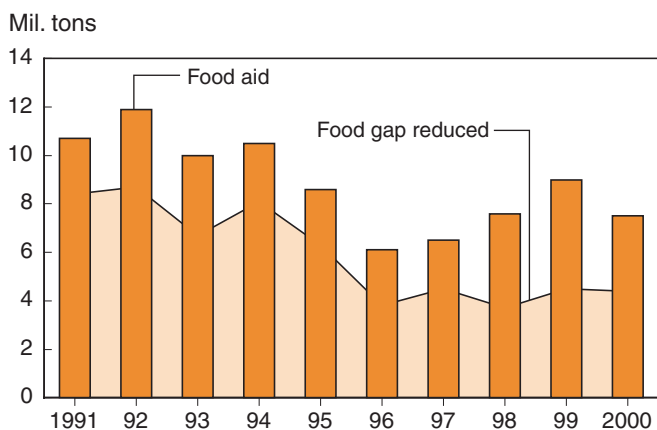
donors, including both humanitarian (relief of chronic and transitory hunger) and development aims. In this section, we examine the efficiency of food aid by exploring whether it is provided to those that need it most. The distribution gap represents the amount of food needed to raise food consumption for each income group within a country to the level that meets nutritional requirements. This indicator captures the impact of unequal purchasing power on food access. We used the food security model to estimate food gaps with and without food aid during 1991-2002 and compared those estimates with the actual food aid received by the countries.

The results show that during 1991-95, food aid reduced food gaps by 30-41 percent, and during 1996-2000, 16-23 percent. This result, in part, is due to a nearly 30-percent decline in food aid between the two periods. However, there was also a decline in the efficiency of food aid that stems from distribution of food aid among countries. Food aid efficiency is measured on a scale of 0 to 100 percent. Food aid efficiency is 0 percent when food aid is given to a country with no needs, and 100 percent when food aid reduces a country’s food gap by its full amount (i.e. a one-to-one relationship). It is important to note that this measure is based on actual consumption as related to purchasing power within the countries at the national level, and may not capture micro-level specific programs such as food for work that could be location specific.

The results of our exercise show that in 1991, the 11 million tons of food aid received by the study countries reduced their food gaps by 8.4 million tons (78-percent efficiency) (fig. 4). In contrast, in 2000, 7.5 million tons

Figure 4

Impact of food aid: Food aid reduces nutritional food gaps but falls short of full effect



Source: World Food Program, ERS calculations.

of food aid reduced their food gap by 4.4 million tons (59-percent efficiency). During 1991-2000, the average efficiency of food aid was 66 percent, meaning that 34 percent of food aid was given to countries that either did not have food needs or given in excess of their needs based on our food gap criteria. Regionally, food aid delivery in SSA and Latin America was highly effective in reducing food gaps, averaging about 80 percent during 1991-2000. In Asia and the CIS countries, the impact of food aid in reducing food gaps was low and had declining trends. Food aid efficiency in Asia and the CIS countries averaged 40 and 46 percent, respectively, during 1991-2002.

The efficiency of food aid in meeting nutritional needs is highly dependent on how food aid is utilized. The largest nutritional gain is when food aid is targeted to the lowest income group, thus indirectly increasing their purchasing power—in either emergency situations or in support of supplementary feeding programs such as food stamps. This, in fact, will change the income distribution indirectly because it allows the lower income group to consume more than what is expected given their income level. In 2000, about half of food aid was used for emergencies, which can be categorized as a targeted program. As for the other half, it is not clear how much is targeted. With the exception of targeted direct feeding, the leakage rate³ in project and program food aid is estimated to be high and therefore those programs have a small nutritional impact. For example, when food aid is used to reduce financial constraints and to expand import capac-

³ The leakage rate refers to the share of food aid deliveries that do not reach a person living in food insecurity.

ity of a country, food is sold on the local market and is more affordable (cheaper food). But, these benefits are spread across the entire population, and do not necessarily accrue to the most food insecure people. The same situation holds when food aid is sold in the local market to finance development activities.

The growing share of non-cereal food aid products is also problematic because these commodities are not likely to reach the poorest segment of the population. The case of Georgia is a good example. In 2000, non-cereals accounted for two-thirds of Georgia's food aid package (67,739 tons in grain equivalent). The long list of commodities in this food aid package include vegetable oil, pasta, dried potatoes, dried fish, pulses, sugar, and fresh vegetables. The high cost of these commodities makes them less likely to be consumed by the poor. In addition, the large number of donors and projects adds to the uncertainty of food security and nutritional accomplishments of food aid in these circumstances. In 2002, 12 national donors supplied food aid to Georgia in support of 45 projects, all with different objectives and goals.

Improving Effectiveness of Food Aid

There are many unresolved issues as to how to improve effectiveness of food aid, and how activities are undertaken and administered by donors and recipient countries. For example, it is not known which programs work and under what circumstances. Also, eligibility criteria are not clearly defined. The question remains as to when a country is eligible and when an activity stops and why. There are countries that receive food aid for reasons that are not clear. The example is China, which in 2000-02 received wheat as food aid for development projects, but donated food (wheat, rice, maize, oils) to North Korea and several African countries during the same period.

It is not known how activities shift from the use of food aid for development purposes to emergency relief (or vice versa) and how these changes influence (positively or negatively) coordination and management of food aid between donors and recipients. Also, it is unclear how markets react when food aid commodities are sold in the recipient markets to finance development projects. In each case, it is difficult to measure which potential goals are met (cost effectiveness, meeting recipient needs) and to what extent. Compounding the problem are the dramatic changes in annual availability of food aid. The question remains as to whether a program with this type

of characteristic can provide a reliable food safety net, let alone a reliable source of development.

Managing the U.S. food aid program has become complicated by the growing range of objectives—and in some cases, overlapping and/or inconsistent goals—and the growing number of institutions and players. Many donors have attempted to streamline their operations, but with mixed results. For example, the Food Aid Consultative Group meets regularly (semi-annually) to improve the effectiveness of the Title II program (a subset of the U.S. food aid program) to make the program interactive and less isolated operationally. The group includes U.S. government representatives (USDA and USAID), private volunteer organizations (PVOs), and commodity producer groups. However, the overall coordination and transparency of policies are still uneven and not streamlined. Problems arise from intersecting sets of goals and an increasing number of players, thereby raising the transaction costs of the operation. According to USAID, 46 PVOs oversee food aid program (P.L. 480) activities. In addition, there are more than 500 national PVOs registered to collaborate with USAID, and these PVOs work with hundreds of private international organizations. The goals of PVOs are not uniform and not all of their activities are focused on nutritional improvement. The problem is not limited to USAID; other donors and their operating PVO associates also have diverse interests. In 2000, at the global level, there were 944 food aid projects in 74 countries with resources equal to 2.7 million tons of grain equivalent. Again, these projects are in addition to emergency projects and program food aid (government to government food aid donations). While these projects are useful and necessary, conflicting interests and goals can degrade nutritional effectiveness and accountability.

Improving the management of these programs could be expensive, both for donors and recipients. In Madagascar, food aid equaled about 59,500 tons in 2000, almost doubled in 2001, and then declined by half in 2002. In 2001, when the donation level was highest, food aid was used in 46 activities carried out by 10 donors implemented by unknown numbers of PVOs. The commodities included in each activity varied and included 4 tons of sugar, 11 tons of cheese, and 21,000 tons of vegetable oils (the largest quantity of food aid in one activity, which was sold on the local market to finance a project). Large variations in the

annual amount of food aid and fragmented projects that are managed by different donors can distort the market, raise transaction costs, lower the effectiveness, and raise questions about the impact and sustainability of such efforts. It should be noted that these problems are not unique, as financial aid is faced with similar and perhaps even additional problems, according to a 2003 World Bank Development Report. The report argues that donors with small projects tend to focus on positive results of their project rather than overall improvements of the situation of the aid recipient country. They often bypass local institutions and instead run their own project implementation units for which they hire the best qualified staff, which can undermine the institutional capacity of recipient countries' governments. Another important challenge is the sustainability of projects without a centralized system involved. High project fragmentation is more problematic for the lower income countries with weak institutional capacity. According to the World Bank report, Tanzania's government must prepare about 2,000 reports for donors on an annual basis and receive more than 1,000 donor delegations.

The United States plays a pivotal role within the international food aid system, and its actions have a profound effect on the actions of other donors and the system as a whole. The U.S. Action Plan on Food Security, released in March 1999, outlines policies and actions aimed at alleviating hunger at home and abroad. In order to improve the effectiveness of the international food assistance program, the Action Plan places priority focus on the most food insecure countries. The 50th anniversary of the U.S. food aid program in 2004 is a timely point at which to pause and offer a retrospective of past issues and reexamine plans for future.

There are lessons from the past that could be useful for the future. For example, there is adequate historical evidence that emergency food aid has been successful in saving lives. There are also fewer disputes on the use of food aid in post-emergency situations. Other uses of food aid, however, have had mixed results. One important concern is the "program food aid"—that is, government-to-government donations—commonly sold in the recipient markets. Developing countries are moving toward privatization and any injection of commodities can disrupt markets. Overall, any step towards transparent criteria for food aid eligibility, length of the program, and type of program should enhance its effectiveness and pave the road to improved coordination among donors.

Iraq

Prior to the Persian Gulf War in 1991, daily per capita calorie consumption in Iraq was comparable to that in industrialized countries—averaging 3,400 calories in 1988-1990. Immediately following the war, calorie consumption dipped significantly and has not recovered. In 2000, per capita consumption was 2,197 calories per day. This intake level is roughly equal to that of Sub-Saharan Africa, the poorest region in the world. The Iraqi diet is also similar in composition to low-income, developing countries. Grains comprise nearly two-thirds of the diet, while meat accounts for less than 2 percent.

Prior to the 1991 war, Iraq's agricultural imports averaged more than \$2 billion annually. In 1991, these imports fell by more than half as a result of sanctions imposed (in August 1990) by the United Nations (UN) Security Council. In May 1996, in response to the country's humanitarian crisis, the Iraqi government and the UN reached an agreement on an oil-for-food program. The program was designed to reverse the economic downturn by providing food and allowing for strategic imports. The first shipment of oil under the program was exported in December 1996 and the first shipments of food were received in March 1997. In the early stages of the agreement, a limit was imposed on the amount of oil Iraq could export within a certain time period. However, at the end of 1999, this ceiling was removed.

The program continued after the U.S.-led invasion of March 2003, and as of May 2003, roughly \$28 billion of humanitarian supplies and equipment were delivered to Iraq under the program. The program expanded beyond its original emphasis on food and medicines to include infrastructure rehabilitation. Reports have indicated that the overall socioeconomic condition of the population improved as a result of this program. Real gross domestic product rose 28 percent in 1997, 35 percent in 1998, 40 percent in 1999, and 15 percent in 2000.

In addition, malnutrition rates among young children have dropped significantly; incidents of diseases such as cholera, malaria, and measles have declined; and the road and transportation network has improved. The program was suspended in November 2003. Furthermore, as mentioned above, overall calorie consumption remains more than a third below pre-

1991 levels. This means that much of the population remains in a precarious nutritional situation.

Recent cereal production has averaged about half the pre-Gulf War level. Output has been constrained by lack of investment, input shortages, and deteriorating irrigation infrastructure. Drought from 1999 to 2001 also limited output. The food supply situation was boosted by the UN oil-for-food program as imports, once again, played a significant role in Iraq's food supplies. For staple foods, imports account for almost two-thirds of consumption. Cereal imports ranged from 4-4.5 million tons per year in 2000-2002. As for other major consumables, Iraq is almost entirely dependent on imports for its sugar consumption, and for more than 90 percent of vegetable oils. Imports of other essential food items such as dairy products and meat are quite small—contributing to 6 percent of dairy and 2 percent of meat consumption.

USDA estimates a 12.5-percent increase in grain production for 2003 due to good rains in the northern part of the country and an adequate supply of inputs for the irrigated grain sector. The effects of the 2003 war were less than expected. Agriculture in the northern part of the country was uninterrupted, while planting in other areas was completed prior to the war. The war ended before harvesting had begun. Summer crop production, however, was adversely affected. Reduced power supplies for irrigation and insufficient supplies of fertilizers constrained output.

Improved production, coupled with the lifting of economic sanctions, has certainly augmented food supplies. However, high rates of unemployment—estimated at 60 percent by the UN Food and Agriculture Organization—limit economic access to food and perpetuate a dependence upon the public distribution system. The system was operated under the oil-for-food program and provided food for the entire population. However, food rations available under the system lacked nutritional diversity and had insufficient proteins and micronutrients. An improvement in the nutritional situation of the country will depend upon the rehabilitation of the agricultural sector, improved domestic security and stability, and a general economic recovery to enhance the purchasing power of the poorer segments of the population.

North Africa

Per capita consumption in North Africa averages more than 3,000 calories per day. Therefore, there are no nutritional needs at the national level. Tunisia is the only country in the region where no food security concerns are projected at the disaggregated level through 2013. [Stacey Rosen]

North Africa is and will continue to be a food secure region, at the national level. Per capita calorie consumption in the region averages well above 3,000 calories per day, which is comparable to most developed countries. The region's per capita consumption is projected to decline slightly during the next decade, compared with a 0.6-percent annual increase from 1980 to the present. This slight decline is a reflection of slow production growth—from 2.9 percent per year during the last two decades to just over 1 percent for the projection period. This trend, in turn, mirrors trends in Egypt, the region's largest producer. Egypt's grain yields are by far the highest in the region—and among the highest in the world—and therefore, growth is not expected to match that of the historical period.

As a result of these trends, Egypt is the only country in the region with aggregate-level food gaps. By 2013, status quo food gaps are projected at nearly 2 million tons. This means that the slowdown in production will prevent the country from maintaining consumption levels of the 2000-02 period. The country will, however, be able to meet nutritional food needs in 2013, except for the lowest 10 percent of the population where consumption is projected to fall below the nutritional target.

While Algeria and Morocco are projected to have sufficient food at the national level, there are gaps at the disaggregate level for 2013. The analysis indicates that in Morocco, the lowest 10 percent of the population will not be able to meet the nutritional target. In Algeria, the lowest income quintile is projected to consume below the nutritional target, meaning that roughly 20 percent of the population will be hungry. For Tunisia, however, this is not the case as consumption across all income groups is projected to exceed the target.

Food aid does not play much of a role in imports in the region. In the early 1990s, grain food aid accounted for roughly 10 percent of grain imports. In more recent years, this figure fell to less than 1 percent. Generally speaking, these countries are able to compensate for production shortfalls by increasing commercial imports. Imports have, however, played an increasingly important part in supplementing domestic food supplies. In the early 1990s, imports accounted for 40 percent of grain consumption. More recently, this share rose to about 50 percent. Therefore, the region's food security is dependent upon the health of national economies and the continued ability to fund these imports.

Recently, these countries have been adversely affected by the security concerns in the aftermath of September 11 and the ensuing slowdown in tourism. In addition, weak demand by the European Union—the principal trading partner of the region—has adversely affected the region's export earnings, particularly in the manufacturing sector. Despite economic reforms begun in the late 1980s aimed at promoting the private sector, the public sectors' shares of the economies in this region are the highest in the world. Moreover, basic infrastructure and services necessary for private sector growth are often inadequate.

On a positive note, central banks in Morocco and Tunisia have lowered interest rates to boost domestic demand. This, coupled with a recovery in the tourist sectors and a revived European economy, could stimulate these economies. In addition, countries in the region have made strides in the area of trade liberalization (i.e., lowering tariff and non-tariff barriers) as shown in trade agreements with European countries and World Trade Organization membership (all but Algeria). Continuation of these policies is essential for growth.

Table 2—Food availability and food gaps for North Africa

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grain equiv.)	Aggregate availability of all food
			1,000 tons		
1994	24,645	945	19,527	466	42,470
1995	19,881	1,353	20,182	250	47,219
1996	33,267	1,465	16,578	193	44,159
1997	22,439	1,192	20,691	137	46,123
1998	26,699	1,261	20,959	74	44,940
1999	24,476	1,202	22,191	100	47,371
2000	21,312	1,224	25,067	309	46,753
2001	25,442	1,239	23,838	133	47,158
2002	23,992	1,295	24,755	74	50,071
Projections				Food gap	
				SQ	NR
2003	31,458	1,310	19,392	0	0
2008	28,838	1,429	23,158	0	0
2013	30,897	1,555	26,252	1,964	0

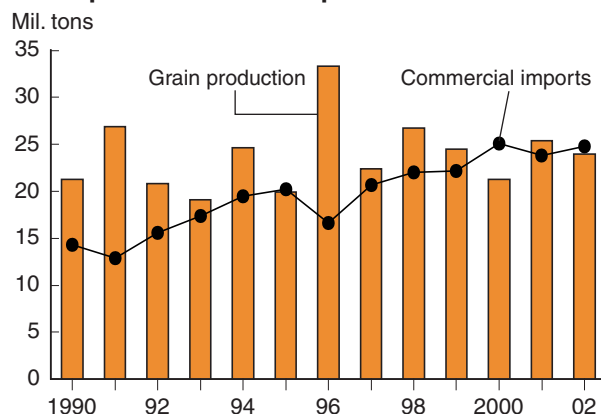
North Africa (147 million people in 2003)

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

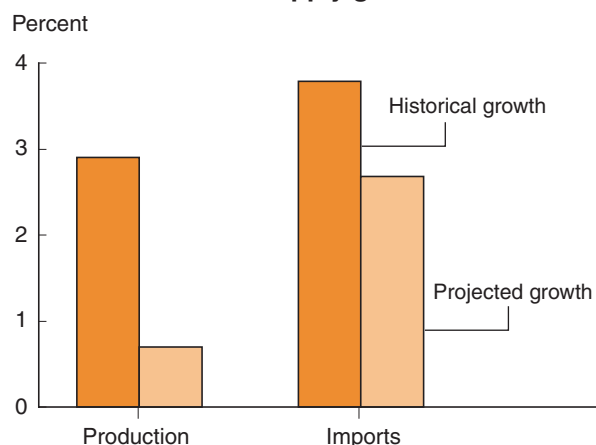
Although production growth is projected to slow relative to the historical period, food supplies will be adequate to meet nutritional requirements through the next decade.

Imports contribute about 50 percent of food supplies, therefore the state of the economies of these countries and export potential play a key role in the food security outlook.

North Africa: Grain production and imports



North Africa's food supply growth rates



North Africa: Food aid

	Total food aid received 1988-2002		Food aid per capita 1989-91 1999-2001		Highest food aid amount received		Food aid as % of supply 1989-91 1999-2001	
	1,000 tons		Kg		1,000 tons	Year	Percent	
North Africa	12,381		20.3	1.3			5.4	0.4
Algeria	447		1.3	1.1	56	2002	0.4	0.4
Egypt	7,902		27.7	0.6	1,772	1991	7.8	0.1
Morocco	2,411		13.7	3.5	403	1988	3.5	1.2
Tunisia	1,621		38.3	0.1	430	1988	9.9	0.0

Source: FAOSTAT, ERS calculations.

Sub-Saharan Africa (SSA)

The food security situation is not expected to change significantly during the next decade. The number of hungry people is projected to rise, reaching 490 million by 2013, but the share of hungry people is projected to plateau at 59 percent through the next decade. [Stacey Rosen]

Sub-Saharan Africa's per capita consumption is projected to remain stagnant through 2013. Production growth is projected at 2.5 percent for the next decade, fairly close to the population growth rate. As a result, the number of hungry people (those who cannot meet the nutritional target) in the region is projected to increase from an estimated 381 million in 2003 to 490 million in 2013. This rate of increase basically matches the region's population growth rate, meaning that the share of hungry people in the region will remain the same over the next decade—59 percent. While the situation is not deteriorating, this number is still alarmingly high—with more than half the population undernourished. Reviewing the results at a more disaggregated level reveals the countries that are most vulnerable. Ten of the 37 countries included in this region are estimated to have consumption falling below the nutritional target across all income quintiles in 2003. A common factor among these countries is that they have recently been involved in some kind of internal conflict. Among the countries in this group are the Democratic Republic of Congo, Burundi, Somalia, Liberia, and Sierra Leone.

While food aid's role in the region's import picture has diminished over time, it is still significant. In the early 1990s, the food aid share of grain imports averaged about 35 percent per year. In more recent years, this average has declined to around 16 percent. To examine the impact of food aid on the region's food security, we ran the Food Security Assessment model under the assumption of zero food aid. In the case of the late 1990s, the distribution gap—the amount of food needed to raise consumption in each income group to the nutritional target—averaged more than 14 million tons per year. In the base scenario (with food aid) this gap averaged just over 12 million tons. In other words, the gap was about 2.2 million tons lower (on an annual basis) than it would have been without the food aid. While this is a positive finding, it does raise questions about the allocation of food aid. During these years under review, food aid averaged nearly 3 million tons annually. This means that nearly 700,000 tons of food aid was directed at countries without distribution gaps. In other words, more targeted allocations could have resulted in an even

larger food aid impact. However, food aid is still found to be effective. For example, during the 1992 southern African drought, food aid receipts jumped to more than 6 million tons, resulting in a 30-percent drop in the distribution gap and a nearly 12-percent drop in the number of hungry people (compared with a zero food aid scenario).

Adverse weather conditions and civil strife have hindered agricultural output in many countries throughout the region and are expected to continue. Given the importance of agriculture in these economies, overall economic growth is expected to be minimal. Tourism, an important foreign exchange earner in several countries, has been adversely affected by slow income growth in Europe and security concerns. Travel to the region fell 25 percent between March 2002 and March 2003. Low savings and investment rates, poor infrastructure, and the continuing burden of HIV/AIDS also limit economic growth. On a more positive note, prices for non-energy commodities (important exports for this region) are up from their historically low levels of the late 1990s. Since 2000, the price of copper has risen 13 percent, cotton is up 24 percent, and cocoa has doubled. Also, the continued strength of organizations such as the African Union, the New Partnership for Africa's Development, and the East African Community provides hope. Another impressive development is the growth of nontraditional exports under the U.S. African Growth and Opportunity Act, which provides preferential access to U.S. markets for eligible products from designated countries. This Act was signed into law in May 2000. While most of the benefits have been concentrated in only a few countries—Nigeria, South Africa, Gabon, Lesotho, and Kenya—and the prominent export has been oil, there have been some noteworthy gains. Textiles and apparel exports more than doubled, while exports of transportation equipment rose 80 percent and exports of agricultural products increased 38 percent between 2001 and 2002. Therefore, continued efforts to resolve conflicts and encourage investment will raise productivity and growth and ultimately improve food security.

Table 3—Food availability and food gaps for Sub-Saharan Africa (SSA)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grain equiv.)	Aggregate availability of all food
			1,000 tons		
1994	60,862	39,687	10,211	2,564	130,317
1995	65,049	40,111	8,862	3,180	135,274
1996	65,825	40,441	8,052	2,531	136,944
1997	68,978	41,434	9,440	2,073	141,036
1998	64,653	42,877	10,333	1,788	141,014
1999	67,860	45,454	12,598	2,546	147,821
2000	68,838	47,134	11,206	2,169	151,025
2001	68,416	48,238	12,800	2,697	156,090
2002	72,706	48,608	15,628	2,642	166,025
Projections				Food gap	
				SQ NR	
2003	68,395	49,820	14,296	6,582 17,001	156,415
2008	85,912	54,372	15,617	3,883 11,760	184,489
2013	97,897	59,273	17,293	8,276 12,467	206,388

Sub-Saharan Africa (663 million people in 2003)

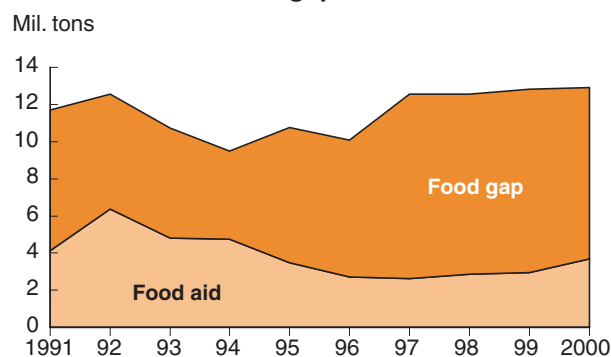
At the regional level, per capita consumption is projected to virtually hold steady through the next decade; however, it will decline in 21 of the 37 countries.

Growth in food crop production will nearly match that of population.

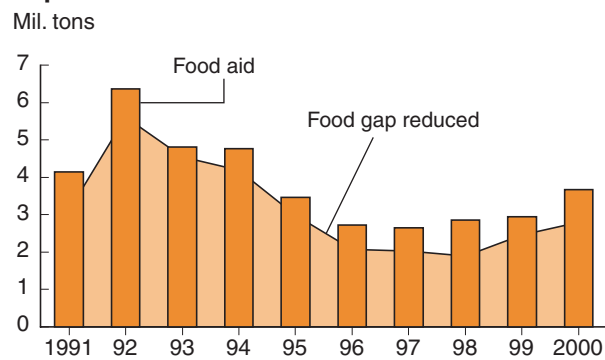
Imports will continue to play a minor role in total food supplies.

The number of hungry people in the region is projected to rise during the next decade. However, the share of total population that is hungry will stay constant.

Sub-Saharan Africa: Food aid versus food gap



Sub-Saharan Africa: Impact of food aid



Sub-Saharan Africa: Food aid

	Total food aid received 1988-2002	Food aid per capita		Highest food aid amount received		Food aid as % of supply	
	1,000 tons	1989-91	1999-2001	1,000 tons	Year	1989-91	1999-2001
		Kg				Percent	
SSA	56,468	14.5	10.5			5.5	5.0
Ethiopia	12,616	16.2	18.3	1554	2000	13.6	11.6
Mauritania	673	34.3	10.8	93	1991	13.7	4.3
Rwanda	2,803	2.0	25.8	542	1996	1.3	14.3
Sierra Leone	755	9.5	9.6	94	2002	6.6	8.2
Zambia	1,554	5.5	3.7	504	1992	2.5	2.4

Source: FAOSTAT, ERS calculations.

Asia

Steady growth in grain production coupled with slower population growth rates portend improved food security for the region during the next decade. Afghanistan will remain the region's most vulnerable country. Despite continued recovery in the agricultural sector, two decades of conflict have left the population with severely limited access to food. [Stacey Rosen]

The Asian region is projected to become more food secure as the decade progresses as population growth slows and the production growth rate is maintained. Population growth, which averaged 2 percent per year during the 1980s and 1990s, is projected to fall to 1.5 percent per year. Production is projected to nearly match its historical rate of 2.2 percent per year. The improvements are reflected in the decline in the number and share of hungry people in the region. In 2003, it is estimated that 440 million people—or 24 percent of the population—are hungry. By 2013, this number is projected to fall to 308 million—or 15 percent. This success is principally driven by an improving situation in India, but also in Bangladesh, Nepal, and Pakistan. The region's most food secure country is Vietnam, where per capita consumption is projected to rise 1.5 percent per year through 2013 as a result of near 4-percent annual growth in production and low population growth. By 2013, even the poorest 10 percent of the population could be consuming 14 percent above the nutritional target.

Afghanistan will remain the region's most vulnerable country, although agricultural output is recovering for the second consecutive year. The recovery is due principally to good precipitation, as well as expansion of area planted and increased use of fertilizer and improved seeds. In fact, area planted to cereals is estimated to have risen more than 25 percent relative to 2002 levels. Grain production for 2003 is estimated at record levels and about 50 percent above last year. Prices for wheat, the staple crop, have fallen sharply as a result of this increase. These lower prices, coupled with expanded employment opportunities, should improve food access. However, more than 20 years of conflict and 3 years of drought leave a large part of the population vulnerable to food insecurity. In 2013, only the top income group is projected to consume above the nutritional target. In other words, without a major increase in

external aid, up to 80 percent of the population are projected to be hungry.

North Korea is the region's second most vulnerable country, although in this case, consumption in the top three income groups is projected to exceed the nutritional target in 2013. This means that about 40 percent of the population will be hungry. However, these results are highly dependent upon the continuation of large shipments of food aid. In our analysis, we assume food aid to be constant through the projection period at the base (2000-2002) level. In the case of Korea, these shipments were quite large, averaging 1.4 million tons per year. If food aid reverts to levels of the mid-1990s (less than half of recent levels) the food security situation would deteriorate significantly and the country's share of population hungry would be closer to that of Afghanistan.

The role of food aid has changed little in the region during the last decade. In the early 1990s, food aid accounted for roughly 20 percent of the region's grain imports. In more recent years, this share fell to 15 percent. Food aid does make a difference when examining its role in reducing food gaps and the number of hungry people in the region. During the 1990s, food aid to this region averaged roughly 2 million tons per year, and distribution gaps were nearly 13 percent below what they would have been in the absence of food aid. The number of hungry people fell about 3 percent, on average. In 1999, the region experienced a large inflow of aid in response to the Indonesian financial crisis and the North Korean famine. Food aid exceeded 4.4 million tons that year—a 46-percent jump from the previous year. As a result, the number of hungry people was 12 percent below what it would have been in the absence of food aid, and the distribution gap fell more than 14 percent.

Near-term economic growth in the region is dependent upon agricultural output, global demand for the region's exports, political stability, and regional secu-

Table 4—Food availability and food gaps for Asia

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grain equiv.)	Aggregate availability of all food
			1,000 tons		
1994	289,873	15,706	10,674	2,463	412,956
1995	299,293	15,574	17,342	2,170	431,740
1996	303,164	16,288	16,577	1,834	439,864
1997	307,074	17,199	15,279	2,591	440,303
1998	317,031	15,684	18,565	3,223	449,469
1999	328,635	18,247	20,414	4,633	468,563
2000	333,088	18,586	15,918	2,952	464,451
2001	335,405	18,680	12,522	4,022	477,543
2002	314,363	19,398	12,266	3,772	483,992
Projections				Food gap	
				SQ	NR
2003	333,654	19,540	16,216	655	0
2008	384,087	21,256	18,568	792	1,058
2013	428,100	23,102	20,703	574	880

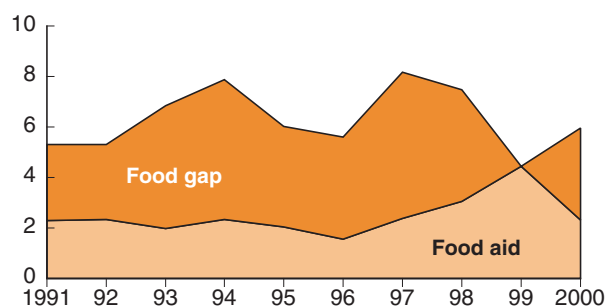
Asia (1,779 million people in 2003)

Afghanistan has experienced a second year of recovery in output after two consecutive droughts. North Korea also is experiencing a good harvest this year. However, food supplies will still fall short of needs, despite expected food aid deliveries of about 1.4 million tons.

The number of hungry people in Asia is projected to decline from 440 million people in 2003 to 308 million people in 2013. Most of the decrease is projected to come from improvements in the lowest income groups in Bangladesh, India, Nepal, and Pakistan.

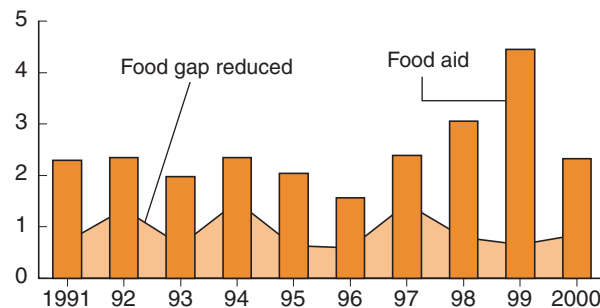
Asia: Food aid versus food gap

Mil. tons



Asia: Impact of food aid

Mil. tons



Asia: Food aid

	Total food aid received 1988-2002	Food aid per capita		Highest food aid amount received		Food aid as % of supply	
	1,000 tons	1989-91	1999-2001	1,000 tons	Year	1989-91	1999-2001
		Kg				Percent	
Asia	45,536	4.4	7.8			2.2	3.9
Afghanistan	2,701	10.3	9.5	620	2002	4.2	6.7
Bangladesh	12,642	10.0	6.1	1453	1999	5.2	2.9
India	6,051	0.5	0.3	910	1988	0.3	0.1
Indonesia	3,465	0.4	2.4	927	1998	0.2	1.0
Korea, Dem. Rep.	8,245	0.0	51.9	1622	2001	0.0	24.6
Pakistan	5,924	5.7	1.9	1442	1988	2.9	1.0

Source: FAOSTAT, ERS calculations.

ity. Growth in India, which dominates the region, will be strongly linked to expansion of the services sector in information technologies. The 2005 phaseout of the Multi-Fiber Arrangement will increase competition for the region's textile exporters. This could adversely affect the economies of Bangladesh, Sri Lanka, and Nepal, where textile exports account for 75, 50, and 25 percent of total export earnings, respectively.

However, if the cease-fire continues to hold in Sri Lanka, positive economic growth is expected. Many countries in the region have made reforms in trade, banking, and privatization. These changes, coupled with improved human capital (higher education levels, declining infant mortality rates), should boost productivity.

Latin America and the Caribbean (LAC)

Food security in the region is projected to continue to improve thanks to an optimistic economic outlook for most countries. The prospect for Haiti and Nicaragua, the poorest countries in the region, continues to be dim and no improvements of their food security situation are projected over the next decade. Food aid is expected to play an important role in these two countries as well as in weather-induced or other emergency situations throughout the region. [Birgit Meade]

Food security prospects in the Latin American and Caribbean region⁴ remain similar to last year's assessment. The region as a whole is steadily increasing per capita food supplies. All 11 countries in the region are estimated to improve their food availability during the next decade. This increase in food supplies comes from rapidly growing food imports. The average annual growth rate for food imports was above 9 percent for the period between 1990 and 2001. Food production growth is slightly less than projected population growth of about 2 percent. Only Haiti and Nicaragua are expected to have growing national level nutritional food gaps during the next decade. Ecuador, Honduras, and Guatemala are estimated to have a nutritional food gap in 2003, but over the next few years these are expected to be eliminated.

A lack of nutritional gaps on the national level does not mean that there are no food insecure people. The distribution gap, which takes into account skewed income distribution by measuring the food needed to raise food consumption of each income quintile to the nutritional requirement, reveals that food insecurity exists in all countries in the region. In 2003, between 20 and 40 percent of the population are estimated to be unable to achieve nutritional requirements in Bolivia, Columbia, the Dominican Republic, El Salvador, Jamaica, and Peru. The most severely affected countries are Guatemala, Haiti, Honduras, and Nicaragua, with more than 80 percent of their population deemed food insecure.

Projections for 2013 indicate that—except for Haiti and Nicaragua, where food insecurity will remain unchanged or grow worse—food security in the

region is expected to improve, reducing the number of hungry people from 83 million in 2003 to 36 million by 2013. In Haiti, current uncertainty about the government is problematic, but donors are aware of the great need for food assistance in the country. In Nicaragua, agricultural production and economic growth are just enough to keep up with population growth of about 2.5 percent, thus holding per capita food consumption at a constant level over the coming decade. Much faster growth in yields and income will be necessary to raise average consumption to the level of nutritional requirements.

As food supplies have been increasing, food aid shipments have gone down over the last two decades. The region used to be a relatively large recipient of food aid. Between 1989 and 1991, annual food aid receipts of all eleven countries totaled 1.8 million tons. Ten years later, the average was 1 million tons. Per capita food aid receipts in 1989/91 averaged 30.5 kg per year, but fell to about one-third that level 10 years later. Cereal food imports consisted of more than 43 percent of food aid in 1989/91, but that share dropped to less than 12 percent within a decade. This trend can be explained in part by a decline in total food aid availability, and by the fact that other parts of the world are in greater need for food aid. The main reason, however, is that economic growth in the region helped spur a 23-percent increase in per capita food consumption—not including food aid—within 10 years.

Food aid still plays an important role in addressing food insecurity inflicted by unexpected emergencies such as devastation by hurricanes—such as Hurricane Mitch in 1998—frequently recurring flooding and droughts, and the ongoing international coffee crisis. Several Central American countries, especially El Salvador, Guatemala, Honduras, and Nicaragua, have been severely hurt by a sharp decline in international coffee prices, caused by the additional supply of coffee from new producers such as Vietnam and new planta-

⁴ The countries studied include 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.

tions in Brazil. Whole communities that depend on incomes generated in the coffee sector find themselves impoverished to the extent that families are unable to feed themselves. Food aid has been an important safety net, helping to bridge the period of transition and adaptation to new market conditions.

But how well is food aid targeted to those in need? Does all food aid delivered indeed alleviate hunger? Our analysis indicates that in the Latin American and Caribbean region, more than 80 percent of food aid reduced food gaps and thus helped alleviate hunger in the 1990s. The remaining 20 percent went to countries that, according to our analysis, did not have food gaps.

Food aid shipments, however, fell short of food gaps as the total amount received represented approximately 40 percent of calculated gaps.

In the 1990s, food aid reduced the number of hungry people by 12 percent and reduced nutritional food gaps by one-third. In 1999, the year after Hurricane Mitch, food aid was much higher and better targeted than in preceding years, as the number of hungry people was reduced by 20 percent and food gaps were reduced by more than 50 percent. Latin American countries are faced with recurrent natural shocks and food aid remains their main safety net to respond to food insecurity caused by emergencies.

Table 5—Food availability and food gaps for Latin American and the Caribbean

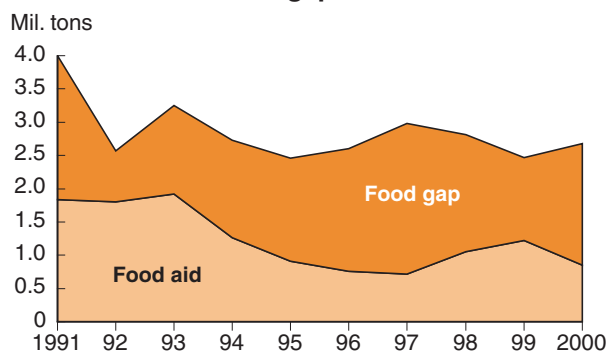
Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grain equiv.)	Aggregate availability of all food
			1,000 tons		
1994	10,008	2,830	7,551	1,214	30,493
1995	10,152	2,992	8,158	876	31,703
1996	9,978	3,046	9,035	722	32,408
1997	9,681	3,000	9,773	658	32,344
1998	10,125	2,984	10,478	1,013	33,992
1999	11,182	3,299	9,752	1,207	34,227
2000	11,322	3,425	9,230	842	34,400
2001	11,475	3,367	11,065	1,066	36,438
2002	11,735	3,532	10,490	1,227	37,049
Projections				Food gap	
				SQ	NR
2003	12,000	3,579	11,506	0	1,417
2008	13,142	3,908	16,345	0	751
2013	14,032	4,263	23,221	52	798

Latin American and the Caribbean (147 million people in 2003)

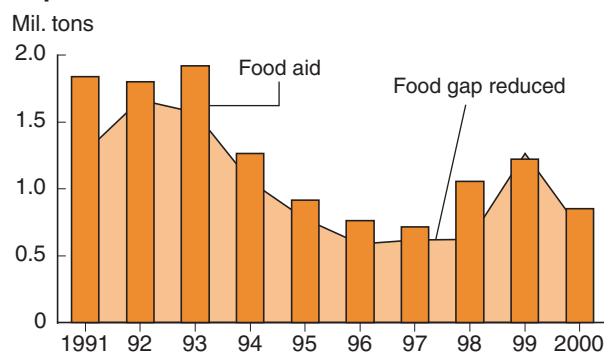
Food security in the region is projected to improve over the next 10 years.

Commercial food imports will increasingly replace domestic production as the main food source. Food aid to the region has decreased drastically over the last two decades. However, Haiti and Nicaragua, the chronically food insecure countries in the region, are likely to continue to require assistance.

Latin America and the Caribbean: Food aid versus food gap



Latin America and the Caribbean: Impact of food aid



Latin American and the Caribbean (LAC): Food aid

	Total food aid received	Food aid per capita		Highest food aid amount received		Food aid as % of supply	
	1988-2002	1989-91	1999-2001	1,000 tons	Year	1989-91	1999-2001
	1,000 tons	Kg		1,000 tons	Year	Percent	
LAC	19,955	3.0	10.7			14.7	5.7
Guatemala	2,088	22.6	9.9	240	1991	10.8	5.4
Haiti	2,010	14.9	16.1	239	2002	11.8	10.9
Honduras	1,499	29.6	15.7	198	1988	14.6	9.3
Nicaragua	1,799	50.7	26.1	285	1990	29.4	14.9
Peru	5,100	15.2	9.8	657	1992	8.7	3.8

Source: World Food Program (WFP), ERS calculations.

Commonwealth of Independent States (CIS)

Generally good harvests in 2003 mean that there are no food gaps this year for 8 CIS countries, but Tajikistan is expected to face nutritional food gaps over the next decade. Food aid has played an important role in several countries in buffering income and food consumption shocks. [Michael Trueblood]

There are no food gaps in 2003 for the 8 CIS countries monitored in this report in terms of meeting recent national average consumption or nutritional targets.⁵ For most countries, grain harvests will be near trend levels. Production is down from last year's highs in Azerbaijan and Kyrgyzstan, but still is close to recent averages. Tajikistan has had an above-average grain harvest for the second year in a row, while neighboring Uzbekistan has set an all-time record with its harvest. Kazakhstan continues to be a significant grain exporter in the region. In the longer run, only Tajikistan will have a nutrition-based food gap over the next decade (about 146,000 tons).

In terms of access to food, about 10 million people are estimated to be hungry in 2003 in the CIS region. The people in the lowest income quintile in Uzbekistan account for half of this total (5 million people). The remaining hungry people come from low-income groups in Armenia, Georgia, and Tajikistan. By 2013, ERS projects that the number of hungry people in the 8 CIS countries will increase to about 18 million people. Two-thirds of these people will be in Uzbekistan and the remainder will be in Tajikistan.

Many CIS countries have experienced a sharp decline in grain consumption over the past decade. For the 8 countries monitored in this report, the average decline in per capita grain utilization was 37 percent between 1990-92 and 1999-2001. For some countries, the decline was as high as 58-60 percent (Armenia and Kazakhstan). Most of this decline is accounted for by a drop in imported grains, which were mostly used as feed for livestock animals. This decrease can be explained largely by the removal of price subsidies for meat and reductions in per capita incomes. Most CIS countries have managed to keep food grain consumption levels relatively constant over this period. One notable exception to this general pattern is Tajikistan, where even food consumption declined by about 11 percent per year. This drop in

consumption is reflected by daily caloric intake, which dropped from about 2,300 calories per capita in 1992-94 to around 1,700 calories per capita in 1999-2001.

Food aid served as an important buffer for the CIS countries experiencing sharp declines in food consumption in the transition period following the dissolution of the Soviet Union, particularly in the early years (1992-95). At their peak, food aid imports accounted for about 71 percent of total grain consumption in Georgia in 1994 and 80 percent in Armenia in 1995. ERS estimates that the number of hungry people in the CIS region in the past decade would have been about 12-15 percent higher in most years than would have occurred had food aid not been available.

Since the mid-1990s, food aid imports as a share of total consumption have tapered off in most CIS countries. Armenia, Georgia, and Tajikistan still rely on food aid imports to a significant degree. Over 1999-2001, the ratio of food aid imports to total food supplies was between 9-13 percent in these three countries. In some recent years when harvests were poor, food aid accounted for as much as 22 percent of food supplies in Tajikistan (2001) and 26 percent in Armenia (2000). In other CIS countries, food aid imports accounted for less than 5 percent of food supplies in recent years.

A larger consideration is how well CIS countries have been able to rebound from the large negative economic shocks that most of them experienced in the early transition years. Food security is enhanced when economic growth is positive since it allows countries to invest in the productivity of their agricultural sector, import food commercially, and have greater access to food at the household level. For most food goods, consumption declines as incomes decline, and conversely, consumption rises as incomes rise. This relationship generally has been shown to be true for the CIS countries over the last decade. Countries like Georgia, Kazakhstan, and Turkmenistan have experienced an economic rebound, but other countries like Kyrgyzstan, Tajikistan, and Uzbekistan have continued to contract over this entire period.

⁵ The 8 CIS countries that are monitored in this report are Armenia, Azerbaijan, Georgia, Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, and Uzbekistan.

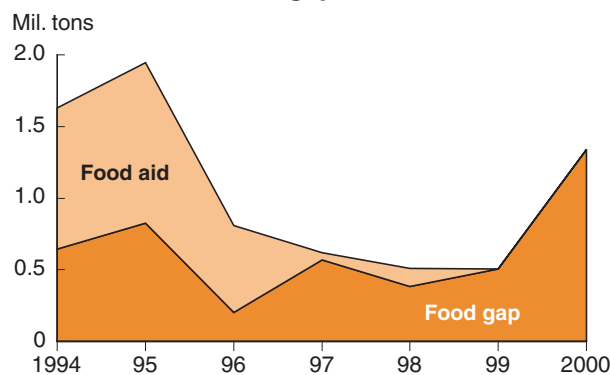
Table 6—Food availability and food gaps for Commonwealth Independent States (CIS)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grain equiv.)	Aggregate availability of all food
			1,000 tons		
1994	22,462	767	5,169	1,613	21,097
1995	16,458	712	2,187	1,825	19,808
1996	18,788	735	3,598	730	20,308
1997	21,061	761	2,694	550	20,898
1998	15,752	782	2,506	454	20,534
1999	23,595	937	2,495	304	23,981
2000	20,356	943	3,157	348	19,345
2001	25,867	1,131	2,358	504	21,656
2002	28,678	1,192	2,277	535	24,784
Projections				Food gap	
				SQ	NR
2003	26,578	1,143	2,717	0	0
2008	26,343	1,246	2,957	0	118
2013	27,953	1,358	3,086	0	146

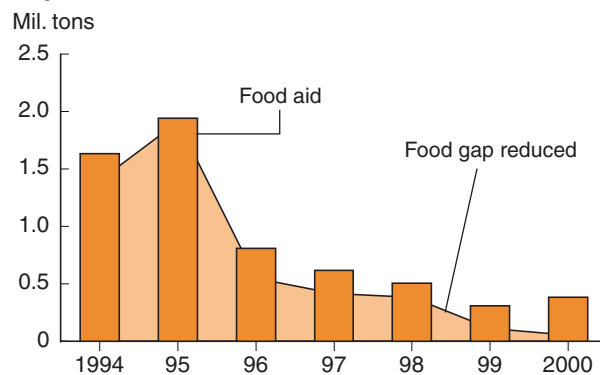
CIS (76 million people in 2003)

In the coming decade, the number of people who do not meet nutritional food requirements is expected to increase from about 10 million to 18 million. Two-thirds of these people will be in Uzbekistan and the remainder will be in Tajikistan.

Commonwealth of Independent States: Food aid versus food gap



Commonwealth of Independent States: Impact of food aid



Commonwealth of Independent States: Food aid

	Total food aid received 1988-2002	Food aid per capita 1989-91 1999-2001	Highest food aid amount received		Food aid as % of supply	
	1,000 tons	Kg	1,000 tons	Year	1989-91	1999-2001
					Percent	
CIS	7,917	10.7			5.7	
Armenia	1,644	13.5	464	1995	6.2	
Azerbaijan	895	3.3	386	1995	1.1	
Georgia	2,752	16.0	828	1994	6.8	
Kyrgyzstan	920	16.0	137	1995	3.8	
Tajikistan	1,305	18.6	226	2001	12.3	

Source: World Food Program (WFP), ERS calculations.

Brazil's Food Security and Food Assistance Programs to Reduce Poverty

Birgit Meade, Constanza Valdes, and Stacey Rosen

Abstract: Hunger in Brazil, according to its government, is caused by the insufficient incomes that limit access to food for more than a quarter of the population. Due to the nutritional deficiencies of this segment of the population, successive Brazilian governments have implemented a range of food assistance, anti-poverty, and well-being programs over the past 50 years. In January 2003, newly elected President Luiz Inácio Lula da Silva launched Brazil's Zero-Hunger Program, which has a goal of supplementing food access to roughly 50 million people within his 4-year term. To determine whether the goal of zero hunger can be met, two types of analysis were employed. With the help of the USDA-ERS Food Security Assessment (FSA) model, food availability and access are evaluated based on food production and imports trends. In this first approach, the general notion of food availability and access focuses on quantity rather than quality of food. In addition, in order to capture a quality aspect of nutritional adequacy—the need for a balanced diet that covers basic food groups—we use the concept of a healthy food basket as a second approach.

Keywords: Brazil, food security, income distribution, hunger, poverty, food assistance programs.

Brazil is a lower middle-income country with a population of 170 million and per capita gross national income of \$3,300 in 2002. Poverty and hunger afflict a large proportion of the population in part because this income is distributed very unevenly. The poorest quintile (20 percent of the population) owned 2.2 percent of the national income while the richest quintile owned more than 64 percent in 1998.^{1, 2}

¹ The data seem to indicate at first glance that income distribution was unchanged from the previous decade, but Ferreira and Paes de Barros found on closer examination that while some groups appeared to have escaped poverty during the 1980s and early 1990s, there was a substantial increase in extreme urban poverty, (Ferreira and de Barros).

² These data on income distribution are taken from the World Bank Indicators 2002 based on a 1998 survey.

ECLAC³ (the United Nations' Economic Commission for Latin America and Caribbean) places Brazil, a country of continental dimensions, in the region's high-poverty country group alongside less developed and much smaller Honduras, Nicaragua, Paraguay, Ecuador, and Bolivia. An estimated 46 million Brazilians are affected by hunger. The government diagnosis is that hunger in Brazil is caused by the insufficient incomes that hamper access to food of close to one-third of the population.⁴

³ ECLAC, Social Panorama of Latin America 2002-2003, Chile, August 2003.

⁴ Poverty is defined as earning less than US\$1 a day and thus failing to obtain basic nutritional requirements (Instituto Cidadania).

In order to design policies to reduce poverty it is crucial to understand where the poor live and what demographic groups are mainly affected. Over 51 percent of the poor are concentrated in urban non-metropolitan areas, 23 percent reside in metropolitan areas, and 26 percent reside in rural areas. In terms of regional distribution, close to 54 percent of the poor households are found in the northeast part of the country, 30 percent are located in the southeast, 10 percent in the south, and 6 percent in the center-west. In terms of gender, more women than men are found to live in poverty as female household heads have less income than men. Forty-five percent of women over 15 years of age earn no income, compared with only 21 percent of men (ECLAC/CELADE; IBGE).

Brazil's Recent Economic Development

Brazil's macroeconomic environment can be broken into two distinct periods: the 1988-1994 debt crisis and the 1995-2003 recovery period. Brazil's debt crisis forced substantial economic changes. The 1980s economic growth model based on state-led import substitution industrialization led to a debt crisis and, subsequently, hyperinflation, which severely penalized the poorest segments of the population (from 1988 until mid-1994, Brazil experienced inflation levels well above 1,000 percent a year, except for 1990). Per family income in the 1990-94 period stood at 250 *Reals*, practically the same level as 1980. The proportion of poor people was around 43 percent in the late 1980s and early 1990s, and fell slightly to 41 percent in 2002.

In an effort to contain the hyperinflation, the Brazilian government launched the *Real Plan*, an economic program for monetary stabilization, fiscal adjustment, trade liberalization, and privatization in 1994. Following the adoption of the *Real Plan*, the number of poor people reached a peak of over 67 million (Faria). The economic deterioration and increases in social spending heightened the paradox of a country with significant social spending—(equivalent to 21 percent of gross domestic product (GDP)—but large inequities in the distribution of household incomes. Government expenditures and investment in social programs, together with direct income transfers, had an insufficient distributive impact: the highly skewed nature of Brazil's income distribution has remained much the same for the past 20 years, with a slight worsening of the situation at the beginning of the 1990s (Faria).

Food Availability in Brazil

The issue of food security has had a prominent place in Brazil's policy agenda for decades. On a national level, food availability in Brazil is more than sufficient for its entire population. Domestic production of food, plus imports, minus exports result in per capita food availability (in grain equivalent) of more than 340 kg per capita per year, about one-third more than per capita nutritional requirements. Brazil's average per capita calorie availability grew steadily over the last three decades at an annual rate of 0.7 percent; it reached 2,985 in 2000 (FAOSTAT). However, due to the skewed income distribution, the lowest income segments are consuming below the nutritional requirement.

Although agriculture accounts for less than 10 percent of GDP, it is an important part of the Brazilian economy. Brazil's agricultural exports are a major source of foreign exchange, and agriculture is a major source of employment in rural areas. During the 1970s and early 1980s, agriculture's share of national output declined in line with the import-substitution industrialization (ISI) policy and the rapid growth of the services sector. ISI was detrimental to agriculture as it channeled state resources into industry, including revenues from domestic and export taxes for basic staples. In the mid-1980s, state agricultural enterprises were privatized, price controls were eliminated, and minimum producer price supports and preferential rural credit were targeted to low-income farmers. The economic liberalization of the early 1990s, and domestic reforms and trade policies implemented between 1995 and 2002, have also significantly benefited the Brazilian agricultural sector, which has grown faster than national GDP every year since 1994 (EIU).

Agricultural production is well defined according to regions, altitude, soil type, and infrastructure availability. The northern part of the country (half of which is the Amazon) is populous and characterized by low incomes and high nutritional poverty. Thus, many social programs target this region. Some grains and staples like mandioca for the domestic consumption are produced here. The center-west is commonly called the Cerrados region and includes the states of Mato Grosso, Mato Grosso do Sul, and Goias. This region constitutes the new agricultural frontier, and reports the highest income levels and largest inequities. The southeast—the heart of agribusiness in Brazil, since it includes the states of Sao Paulo, Rio de Janeiro, Minas Gerais, and Espirito Santo—accounts for 33.3 percent of total agri-

cultural exports and 42.1 percent of total agricultural imports; it also has the country's highest poverty rate for an urban metropolitan area. The traditional agricultural producing regions in the south are Parana, Rio Grande do Sul, and Santa Catarina, which account for one-third of grain production.

Brazil's main agricultural export products are soybeans and soybean products, coffee, meats and meat products, frozen concentrated orange juice, sugar and sugar products, and tobacco. Agricultural exports totaled \$24.8 billion in 2002 and have grown 6 percent per year over the last 2 decades (FNP Notas & Noticias). Export earnings are used in part to finance grain imports such as wheat for which growing conditions are poor, and corn, which is mainly used for feed in the rapidly expanding poultry sector.

Brazil's Experience with Food Security and Hunger Eradication Programs

Due to the nutritional deficiencies of the poorest segments of the population, successive Brazilian governments have implemented a range of food assistance, anti-poverty, and well-being programs and policies over the past 50 years. These programs have concentrated on investment in human resources and social assistance (retirement and pension systems, health, education, housing, and basic sanitation), and programs for combating poverty (social welfare, programs to support peasant agriculture, agrarian reform, rural development, and direct income transfers).

During the 1990s (the "reform decade"⁵) various programs were implemented. From 1996 to 1999, government policies led to the formulation of the Alvorada project for poverty reduction in less developed cities, the development of the Community Solidarity Program, and the incorporation of the *Bolsa-Escola* bursary project in federal programs.

In January 2003, newly elected President Inácio Lula da Silva and his team of economic advisors launched Brazil's Zero-Hunger Program, which constitutes the core of the social agenda of his administration. The program comprises 60 different initiatives with a goal of providing food access to 11.4 million families (or roughly 50 million people) within 5 years.

⁵ The 1990s have been termed "the reform decade" in Brazil because of the significant number of economic and administrative policy changes that took place.

The program is to be supported by agrarian reforms, producer incentives, and the enactment of minimum agricultural income policies. Other initiatives include a Food Coupon Program (inspired by the Food Stamp program in the U.S.), food vouchers to be exchanged at government-licensed food outlets, and food banks to redistribute surplus food from supermarkets and restaurants. Additional initiatives will target low-income workers, while nutrition programs will supply food to pregnant women, new mothers, and babies. The School Meals Program aims to increase the quality of school meals using regional foodstuffs. Existing school meals programs will be expanded to cover siblings of children attending school and potentially be extended over school vacation periods. Other initiatives include food and nutrition campaigns to educate the population about healthy eating to prevent obesity and malnutrition.

In the fall of 2003, the government merged all existing income-transfer programs—until then administered by four different ministries—into one, called *Bolsa Família* (Family Fund). The schemes' combined budget is to reach to \$5.3 billion *Reales* in 2004 (about \$1.5 billion).

USDA/ERS Food Security Analysis

To determine whether President da Silva's goal of zero hunger can be met by 2007, we use two types of analysis developed by USDA's Economic Research Service (ERS). With the help of the USDA-ERS Food Security Assessment (FSA) model, food availability and access is evaluated based on food production and import trends. Also, we calculate the distribution and depth of food insecurity by estimating consumption levels relative to nutritional requirements by income group. The number of hungry people is calculated by identifying those income groups whose consumption falls short of nutritional requirements. After identifying the food insecure income groups within the country (i.e., the proportion of people whose diets are not nutritionally adequate), we estimated the income growth required to eradicate food insecurity.

The general notion of food availability and access focuses on food quantity rather than quality. In order to capture a quality aspect of nutritional adequacy—the need for a balanced diet that covers basic food groups—we use the concept of a healthy food basket. Food security can only be achieved if all households can purchase a sufficient amount of basic healthy food items. Furthermore, it is recognized that other basic necessities (shelter, education, health, etc.) besides food are

required to maintain a basic standard of living. In most countries, the low-income group spends most of its income on food and very little on other essential expenditures. The food purchasing power threshold (FPPT) includes the cost of a healthy food basket plus other essential living expenses. The FPPT approach allows the estimation of the cost of eradicating hunger, and it highlights the impact of food prices on food security.

The next section will describe the FSA model with a focus on income distribution and its impact on food security, and will review the findings for Brazil. In addition, we will discuss the FPPT approach and estimates of the cost of eliminating hunger and income growth necessary for the low-income groups to be able to escape food insecurity.

The Food Security Assessment (FSA) Model

The FSA model used for this analysis is the same as used in this report in estimating food consumption and access in 70 low-income countries for a 10-year projection period. The reference to food includes

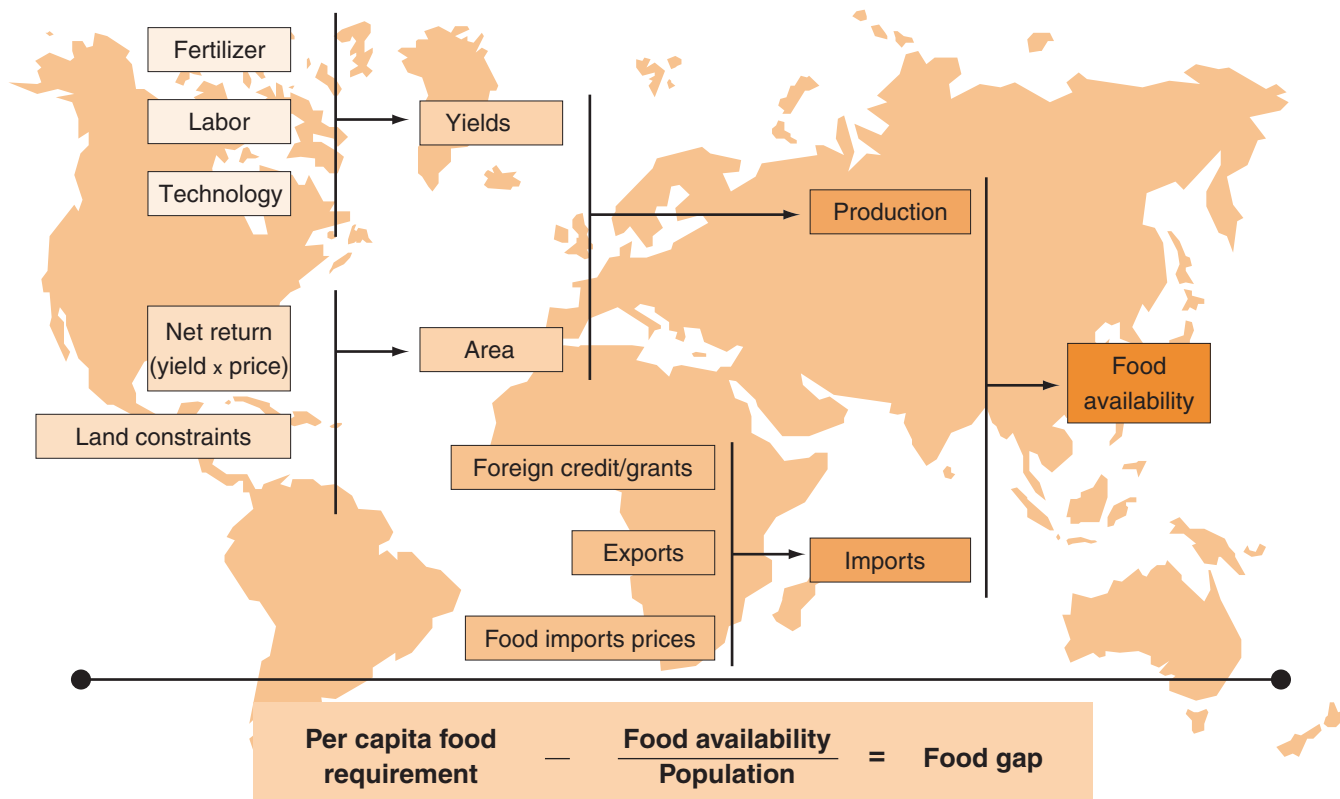
grains, root crops, and a category called “other,” which includes all other commodities consumed, thus covering 100 percent of the diet. All of these commodities are expressed in grain equivalent (see Appendix 1— Food Security Model: Definition and Methodology for a detailed description of the model).

Factors Affecting Food Security

Food availability is the sum of domestically produced food and net imports (fig. A-1). Domestic production is a function of area and yields, and imports are affected by commodity prices and export earnings. The sufficiency of average food availability depends on the number of consumers. Individual households’ access to food depends on their purchasing power, which is a function of income and income distribution as well as of prices of food and other living expenses.

Based on the FSA model and assumptions about price trends, yield growth, area expansion, and export earnings, we project average per capita food availability in Brazil to increase 13 percent by 2007.

Figure A-1
Factors affecting food availability



Source: Economic Research Service, USDA.

Access to Food

National-level estimates represent average food availability and mask the impact of unequal incomes on food security. In order to capture differences in access to food, we estimate food consumption at the disaggregate level, by income group. Food consumption for each income group is compared to the nutritional target which allows for estimating the number of people who live in hunger (i.e., who are unable to purchase sufficient food to fulfill nutritional requirements) and are, therefore, nutritionally vulnerable (fig. A-2). The shortfall between estimated consumption and the nutritional target highlights the intensity of food insecurity.

Initially, Brazil's population was divided into five equal income groups or quintiles. The lowest income group was further disaggregated so that the lowest 5, 10, and 15 percent of the population could be examined. Given Brazil's large population, even 10 percent of the population constitutes a large absolute number of people—more than 17 million in 2002.

Insufficient purchasing power—a function of income and prices—is the most important cause of *chronic*

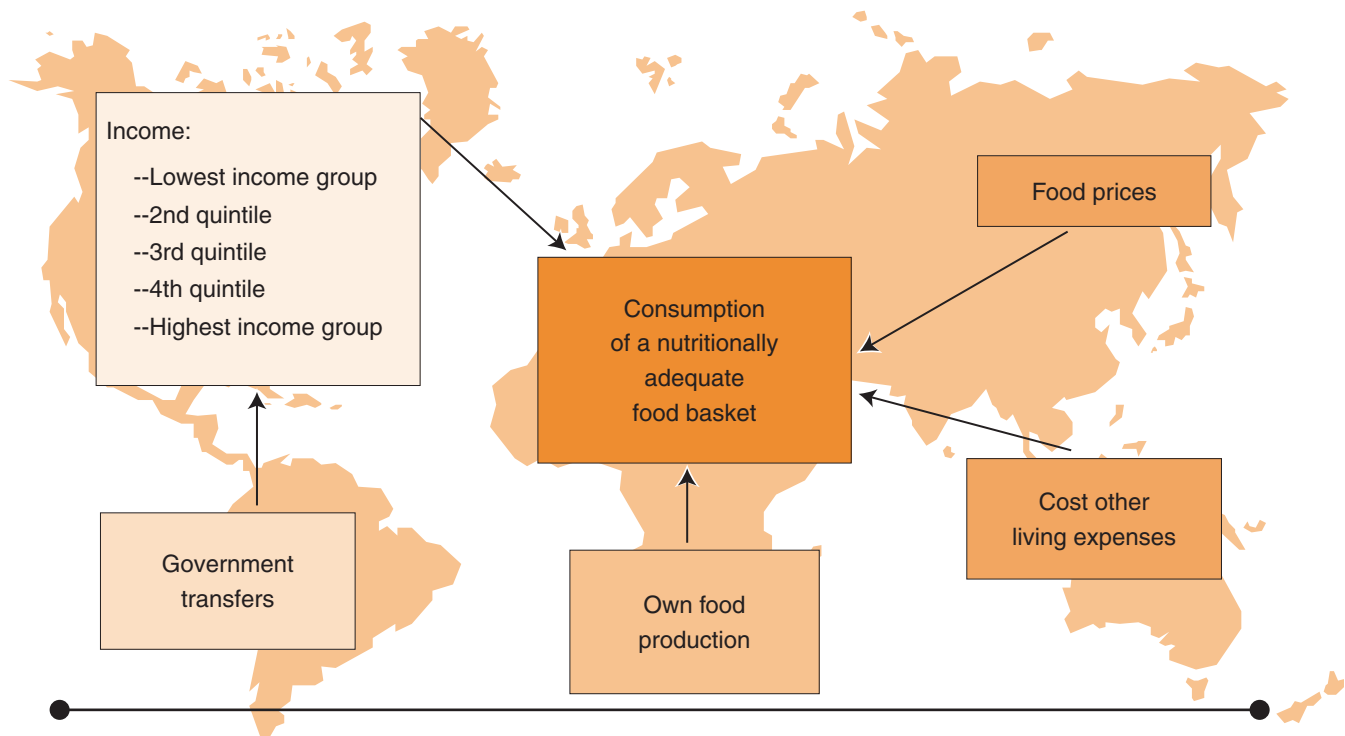
undernutrition among developing countries. We use an indirect method of projecting calorie consumption by different income groups based on income distribution data.⁶ The procedure uses the concept of the income/consumption relationship and allocates the total projected amount of available food among different income groups.

According to the model results, the ratio of consumption to nutritional requirements for the poorest 10 percent of the Brazilian population in 2002 was estimated at 79 percent (i.e., the population in the poorest 10 percent group were estimated to be consuming only 79 percent of the nutritional requirement). The consumption/requirement ratio was estimated at 89 percent for the poorest 20 percent. The second poorest quintile was estimated to have access to 110 percent of requirements—meaning that consumption was 10 percent higher than requirements in this quintile, on average. These results imply that between 20 and 40 percent of the population (i.e., between 34 and 68 million people) in Brazil do not have sufficient incomes

⁶ The method is similar to that used by Shlomo Reutlinger and Marcelo Selowsky in "Malnutrition and Poverty," World Bank, 1978.

Figure A-2

Factors affecting access to food

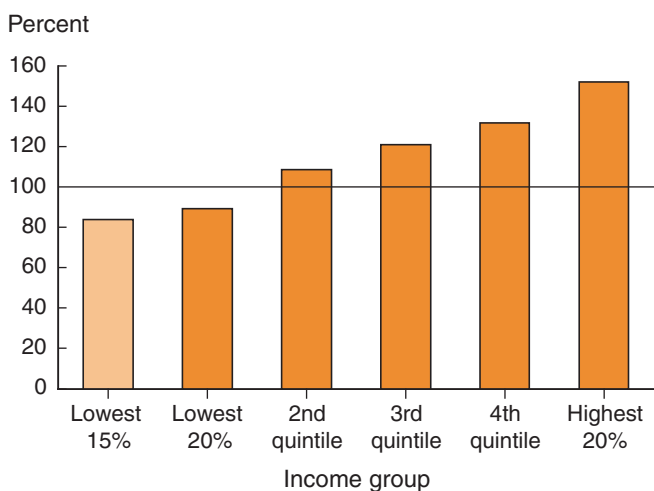


Source: Economic Research Service, USDA.

to purchase enough food to fulfill their nutritional requirements (fig. A-3). However, by 2007, food production increases and GDP growth are projected to increase national food availability by 13 percent. This will help decrease the share of hungry people to between 15 and 20 percent of the population (fig. A-4).

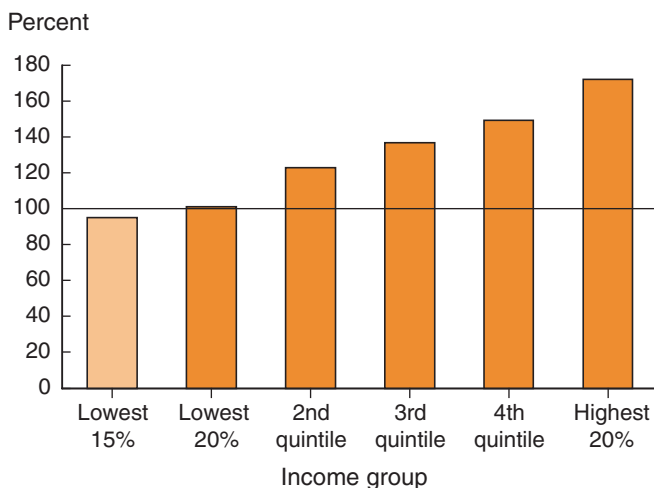
A question arises as to how much income growth would be needed for the poorest income groups to fulfill requirements within 5 years. According to our estimates, incomes of the poorest 10 percent would have to grow 4 percent per year, more than double the historical income growth of 1.8 percent. Incomes of the poorest 15 percent would have to grow nearly 3 percent per year. On the other end of the spectrum, the

Figure A-3
Consumption as a share of requirement in 2002



Source: ERS calculations.

Figure A-4
Consumption as a share of requirement in 2007



Source: ERS calculations.

highest income quintile is estimated to consume 52 percent more than nutritional requirements.

The current number of hungry people—roughly 50 million—equals that of official Brazilian estimates. It should be noted that the rough estimates of hungry people do not account for the fact that poor people may be able to feed themselves or supplement their diets with the help of subsistence farming or garden plots not considered in “income.” There is no doubt that such food production, especially in rural areas, helps the poorest to survive.

Allowing for Nutritional Adequacy

While the FSA model allows for estimates of food availability by income group and the income growth required to eliminate food insecurity, it does not include two key factors: 1) prices of food items and 2) the quality aspect of nutritional adequacy. We estimated the Food Purchasing Power Threshold (FPPT) in order to account for both of these factors, as well as the fact that household expenditures must be allocated between spending on food and on other essential living expenses, such as housing, fuel, and education.

The cost of a food basket can furthermore reflect seasonal and local differences if appropriate price data are available.⁷ In this article we simplify the approach by using national average income data and an average of Sao Paulo and Rio de Janeiro food retail prices.⁸ Provided data were available, the ideal would be to replicate the analysis for several poverty-prone regions based on local income and price data. The FPPT approach to monitoring food insecurity has the flexibility to target vulnerable regions and populations on a timely basis.

The Food Purchasing Power Threshold Approach

The FPPT approach measures food insecurity by calculating the cost of a food basket and the cost of other basic necessities. This FPPT can then be compared to available income. Inadequate purchasing power is generally viewed as the main cause of food insecurity. The

⁷ A food basket approach formed the basis of official Brazilian household surveys. Different poverty lines derived from the cost of a food basket reflecting local eating habits and prices were constructed by Rocha. A description of the areas covered is found in Ferreira and Litchfield.

⁸ The prices are taken from Statistics on Occupational Wages and Hours of Work and on Food Prices, ILO, Geneva, 2001.

cost of a basket of food relative to income is a practical indicator of food security. Any decline in food costs and/or increase in income should improve the food security of a household. This approach also allows an estimation of the number of people who lack the purchasing power to satisfy their basic needs. By evaluating the size of the gap between per capita income and the FPPT, it is possible to more clearly determine the depth of poverty and hunger. Monitoring changes in food costs relative to the purchasing power of consumers can also provide information on the effectiveness of government food security policies and programs, the efficiency of marketing systems, and the investment required to adequately address the food insecurity problems.

To estimate the purchase price of the food basket, we distributed 2,200 calories⁹ among specific food and nutrient groups according to several criteria (see box, "Methodology on Food Basket Cost Calculation"). These criteria included typical Brazilian food consumption patterns, FAO/World Health Organization nutritional guidelines for developing countries, and standards from various U.S. government agencies.¹⁰ The goal was to have roughly 65 percent of daily calories coming from carbohydrates, 20 percent from fat, and 15 percent from protein.

The grains included in the healthy food basket are rice, wheat, and corn; fat is represented by cooking oil and protein consumption is ensured by including meat—mostly beef and poultry—and milk.¹¹

It is unreasonable to assume that even the poorest people will spend their entire income on food. High-income countries spend a relatively small percentage of their income on food. In the United States, for example, the percentage of household expenditures spent on food is roughly 8 percent. High-income countries typically spend a large share of their incomes on items that are not

considered necessities, such as recreation, etc. The poorer a country, the higher the share of income spent on food. However, we must still allow for expenditures on other necessities, such as housing and clothing. The share of food spending can vary considerably, depending on income level and whether the household is in a rural or urban area. Euromonitor International, a private provider of market analysis, reports that Brazil's share of total consumer expenditure spent on food was 17.6 percent in 2000. This is a national average and it is safe to assume that the low-income groups spend a considerably higher share of their total consumption expenditure on food. In this study, we assume two different scenarios: 1) the food cost share is equal to expenditures on other essential items, i.e. 50 percent each (this assumption is supported by data from the UN's 1996 International Comparison Project)¹²; and 2) food spending is 30 percent and other spending is 70 percent of consumption expenditures. These two scenarios are intended to offer a range of results.

Once we have determined the FPPT, we can compare it with available per capita income. The FPPT was compared to income levels in each of Brazil's income groups. Group income levels were calculated based on World Bank data on average 2000 per capita gross national income (GNI) and the most recently available income distribution data.

The ratio of available income to the FPPT is a meaningful indicator of the intensity of food insecurity. A ratio greater than 1 indicates that income levels exceed the FPPT and that people in that particular quintile, on average, are not vulnerable to food insecurity. Any number less than 1 indicates some degree of vulnerability to food insecurity for populations in that income group. The lower the number, the more severe the problem.

The annual cost of the healthy food basket in 2000 was \$235, which brings the FPPT to \$470 under the assumption that food spending is 50 percent of total consumption expenditures. The FPPT is \$780 when assuming that "other" spending is 70 percent of consumption expenditures (fig. A-5). Comparing these amounts to per capita income by income group shows that in both scenarios, between 20 and 40 percent of the population are estimated to be unable to purchase a

⁹ According to the Food Agriculture Organization, average consumption below 2,200 calories per person per day results in undernourishment.

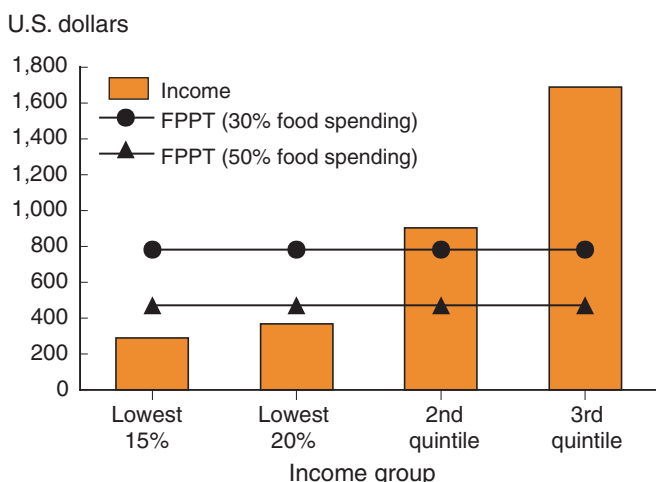
¹⁰ The standard for the percentage of calories from carbohydrates was recommended by the National Research Council's *Diet and Health Report*, 1989; the recommendation for the percentage of calories coming from fat (less than 30 percent) comes from *Nutrition and Your Health: Dietary Guidelines for Americans*, U.S. Department of Agriculture and U.S. Department of Health and Human Services, 2000.

¹¹ Retail prices were available for Sao Paulo and Rio de Janeiro. After calculating the food basket cost for both cities, the average was used for the simplified estimation employed in this paper.

¹² ERS calculations based on UN data for the share of personal consumption expenditures spent on food also support this finding. See as an example table 101 in Putnam and Allshouse.

Figure A-5

Income versus Food Purchasing Power Threshold (FPPT)



Source: World Bank Indicators, ERS calculations.

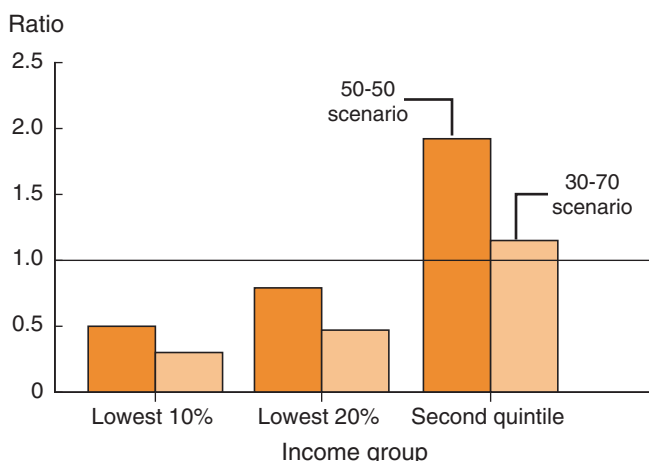
nutritionally adequate food basket—a result closely matching that of the FSA model. However, the ratios of income to FPPT are much lower than the consumption/requirement ratios obtained with the FSA model. Under the 50-50 scenario, the ratio of income to FPPT is estimated at 50 percent for the poorest 10-percent income group and at 79 percent for the lowest 20 percent of the population (fig. A-6). Under the 30-70 scenario, the ratios of income to FPPT are even lower—ranging from 30 percent to 47 percent for the same income groups.

Given that President da Silva’s goal is to eliminate hunger within 4 years, we wanted to measure the income growth required to achieve this goal. Under the 50-50 scenario, incomes for the poorest 10 percent of the population would have to grow at an annual rate of close to 20 percent. For the poorest 20 percent, annual growth would have to be around 6 percent—more than 3 times the historical growth. Under the 30-70 scenario, incomes would have to increase by 35 percent for the poorest 10 percent of the population, and 20 percent for the poorest 20 percent of the population. This level of consistent income growth is highly unlikely. Targeted government programs seem to be a more promising option in meeting the zero-hunger goal.

What is the cost of supplementing income in order for the entire population to reach the food purchasing power threshold? The poorest 20 percent of the population had an average per capita income of \$368, or \$102 short of the lower FPPT. Multiplying this \$102 by the number of people affected yields a cost of \$3.5

Figure A-6

Ratio of income to Food Purchasing Power Threshold (FPPT)



Source: ERS calculations.

billion for just 1 year. This is more than twice the entire budget of the Zero-Hunger program. This means that the same expenditure would be required in subsequent years because these cash transfers lack the long-term benefits that come with investment programs. The Zero-Hunger program is a mix of these transfers—which come with their own set of difficulties in targeting and misuse—and investment, for example in education. The link between improvements in education and poverty reduction is well known,¹³ but the road to zero hunger is likely to take more than the 4 years envisioned by President da Silva.

Concluding Comments

Brazil, a country with a population of more than 170 million, has embarked on a path to eradicate hunger and poverty. The recent policy goal is to cut the number of hungry people to zero in the next 4 years. Poverty and hunger afflict a large proportion of the population in part because of highly skewed income distribution. The poorest income quintile (20 percent of the population) owned 2.2 percent of the national income while the richest quintile owned about two-thirds in 1998.

¹³ In the foreword of the *World Development Report 2000/2001, Attacking Poverty*, James Wolfensohn, president of the World Bank, sums up the report’s recommendation of action in three areas, the first of which is “Promoting opportunities: Expanding economic opportunity for poor people by stimulating overall growth and by building up their assets (such as land and education)(.....)”.

According to our results (based on the FSA model), between 20 and 40 percent of Brazil's population—roughly 50 million people—do not have sufficient incomes to purchase the amount of food necessary to fulfill nutritional requirements. However, by 2007, increases in food production and GDP are projected to raise food availability by 13 percent. This will help decrease the share of hungry people to between 15 and 20 percent of the population or 4-5 percent annually. The FPPT approach, which covers basic nutritional adequacy, shows results that are similar to those from the FSA model, indicating that the number of vulnerable people will remain above 35 million people.

In sum, without policies that target the food insecure portion of the population, we project poverty to decrease, but remain significant through 2007. Cash transfers are valuable in alleviating immediate hardship, but investment in education and other long-term strategies have proven successful in reducing or eliminating poverty and food insecurity. Further ERS research will examine food policy formation, implementation of the food distribution system, and the effects of food policy and consumption on nutrition in Brazil.

Methodology on Food Basket Cost Calculation

The food items in each food group were chosen according to their importance in the Brazilian diet as indicated by the 2000 FAO food balance sheet and the availability of retail food prices. Food prices were mostly taken from the U.N. International Labour Office (ILO).¹ The number of calories consumed per day was used to determine the share of each food item within its group. The cost of each food item was determined using domestic retail food prices as stated by ILO, which were converted into U.S. dollars using International Monetary Fund exchange rates. Next, the cost of each food group was calculated as the weighted average of the cost of individual food items

(the weight being each food item's share as determined by calories consumed per day). This calculation resulted in a price per kilogram of carbohydrates, proteins, or fat.

This cost was multiplied by the number of grams eaten from each food group in order to satisfy nutritional guidelines. The daily target was 2,200 calories per capita, comprised of 65 percent (1,430 calories) carbohydrates, 15 percent (330 calories) protein, and 20 percent (440 calories) fat. In order to convert these calories into grams of food, the food items' respective conversion rates were weighted according to the food items' share in the food group (Schmitt). The daily cost of the three food groups was aggregated and then multiplied by 365 to obtain the annual cost of the food basket.

¹ Statistics on Occupational Wages and Hours of Work and on Food Prices, October Inquiry results, 1999 and 2000, International Labour Office, Geneva, 2001.

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Food Security in Russia: Economic Growth and Rising Incomes are Reducing Insecurity

William Liefert

Abstract: Russia's food security problem is not inadequate availability of food. Although production and consumption of livestock products have dropped substantially during the transition period following the dissolution of the Soviet Union, total caloric availability per capita per day in 1999 was only 3 percent lower than at the start of the reform process in 1992. The main food security problem is inadequate access to food by certain socioeconomic groups, which lack sufficient purchasing power to afford a minimally healthy diet. However, the country's improved macroeconomic performance since 1999, with gross domestic product growing at an average annual rate of about 6 percent, has reduced poverty, and thereby the number of food insecure households. A serious food-related health problem is in fact overweight and obesity, which have increased during transition and currently affect over half the adult population.

Keywords: Russia, food security, access, purchasing power, policy reform, poverty, consumers.

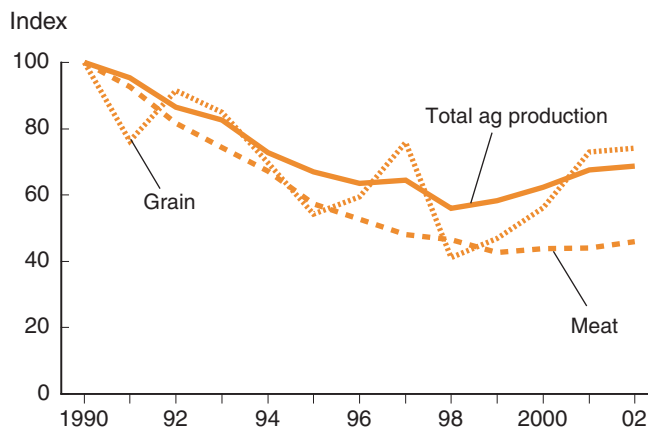
Economic reform in Russia has severely decreased agricultural output. Since the early 1990s, the livestock sector—both animal inventories and production—has contracted by about half, and the corresponding decline in feed demand has resulted in grain output falling by about one-third (averaged over the last 5 years; fig. B-1).

The decline in production and consumption of foodstuffs has raised concerns in Russia that the country has a food security problem. This worry is reinforced by attitudes inherited from the Soviet period which hold that heavy intake of livestock products is necessary for a full and healthy diet. Concern about food security within both Russia and the West motivated substantial food aid to Russia in 1999-2000 from the United States and European Union.

The three main concepts used in analyzing a country's food security are the availability of food, access to food by the population, and nutrition. Throughout the

transition period, Russia's food security problem has not been inadequate availability, or supplies, of food-

Figure B-1
Agricultural output has fallen substantially during transition



Source: Russian Federation State Committee for Statistics-b.

stuffs. Although consumption of high-value livestock products has declined, consumption of staple foods such as bread and potatoes has remained steady or even increased. The drop in consumption of livestock goods is lower than the decrease in domestic output, given that during transition Russia has become a major importer of meat (in particular poultry from the United States).

Russia's main food security problem is inadequate access to food by certain socioeconomic groups. Transition initially resulted in a large share of the population moving into poverty, because of both unemployment and real income-eroding inflation, such that more people had insufficient purchasing power to afford a minimally healthy diet. The most food insecure groups are those with the following traits: low income, large households, and no access to a garden plot on which they can grow food. However, Russia's improving macroeconomic performance over the past few years, involving rising gross domestic product (GDP) and personal income, has substantially reduced the size of the population living below the poverty line, to about 15 percent by 2003. The decline in poverty has consequently decreased the number of food insecure individuals, such that by 2003 the share of the population that is food insecure might be as low as 6 percent.

Russians have a traditional dietary preference for livestock products, such as meat, dairy products, and eggs, which are heavy in fat, protein, and cholesterol. During the Soviet period, state authorities strengthened such preferences by releasing recommended food consumption "norms" heavily favoring livestock products. Despite the fall in intake of these products during transition, overweight and obesity, which affect half the adult population, have been a more serious health problem than underweight or malnutrition. Lifestyle behaviors, such as lack of physical exercise, have probably played a key role in this development.

Availability

Throughout the transition period, Russia's combined domestic production and imports of foodstuffs have been sufficient to maintain adequate food supplies. In 1999, total caloric availability per capita per day was only 3 percent below that in 1992 (2,880 calories compared with 2,940; Sedik et al.). This is well above the FAO/WHO (Food and Agriculture Organization/World Health Organization) guideline for minimum dietary energy requirements for Russia of 1,970 calories.

Although agricultural output, especially of livestock products, has fallen during transition, the decline has been an inevitable part of market reform. Reform has adjusted the production and consumption of high-value foodstuffs to better reflect Russia's real national product and income in a way that should increase consumer welfare over time. Russia's experience in the restructuring of its agricultural production and consumption during transition is in fact representative of that of all the countries of the former Soviet bloc.¹

Beginning in the early 1970s, the Soviet Union (USSR) began expanding its livestock sector, a policy generally copied by its Eastern European satellite countries. The campaign succeeded, and by 1990 livestock herds and meat production in the USSR (as well as East European countries) were about 50 percent higher than in 1970. Because the main reason for expanding the livestock sector was to improve living standards by increasing consumption of high-value livestock products, the government did not want consumers to have to pay the high cost of livestock production. Thus, consumer prices for livestock goods were set far below production costs. ERS research shows that in 1986, consumer prices for livestock goods in the USSR and many East European countries were about half the prices received by livestock producers (Liefert and Swinnen).²

Massive subsidies to both producers and consumers were required to cover the gap. By 1990, state budget subsidies to the agro-food economy in the USSR equaled about 11 percent of GDP (World Bank, p. 138), with the bulk going to the livestock sector. By 1990, per capita consumption of meat and other livestock products in the USSR and other bloc countries was on a par equal to that in most rich Western countries. For example, in 1990, per capita consumption of meat in Russia, Poland, and Romania was about equal to that in Britain (at about 75 kilograms a year), and in

¹ For detailed analysis as to how reform has restructured agricultural production and consumption in not only Russia, but all the transition economies of the former Soviet bloc, see Liefert and Swinnen, and Cochrane et al.

² Because consumer retail prices for foods include costs for processing and distribution as well as the cost of primary agricultural production, the "consumer prices" used to compute this ratio are the prices paid by the immediate purchasers of the primary agricultural products (typically processors). Soviet policy was to apply the subsidies to agriculture specifically at the processing stage, such that processors' purchaser prices were below the prices received by agricultural producers.

Hungary it was higher (FAO). Since per capita GDP and income in these planned economies were at most half that of the developed Western economies, the former were producing and consuming livestock products at a much higher level than one would predict based on their real income (Sedik). Further evidence that these countries were overconsuming livestock products relative to their real income is that in the more successfully reforming transition economies whose real GDP has surpassed the pre-reform level, consumption of livestock products is still below pre-reform volumes. In 2000, real per capita GDP in Poland, Hungary, and the Czech Republic was, respectively, 43, 12, and 10 percent higher than in 1990 (PlanEcon-a), while per capita consumption of meat was 4, 12, and 24 percent lower, respectively (FAO).

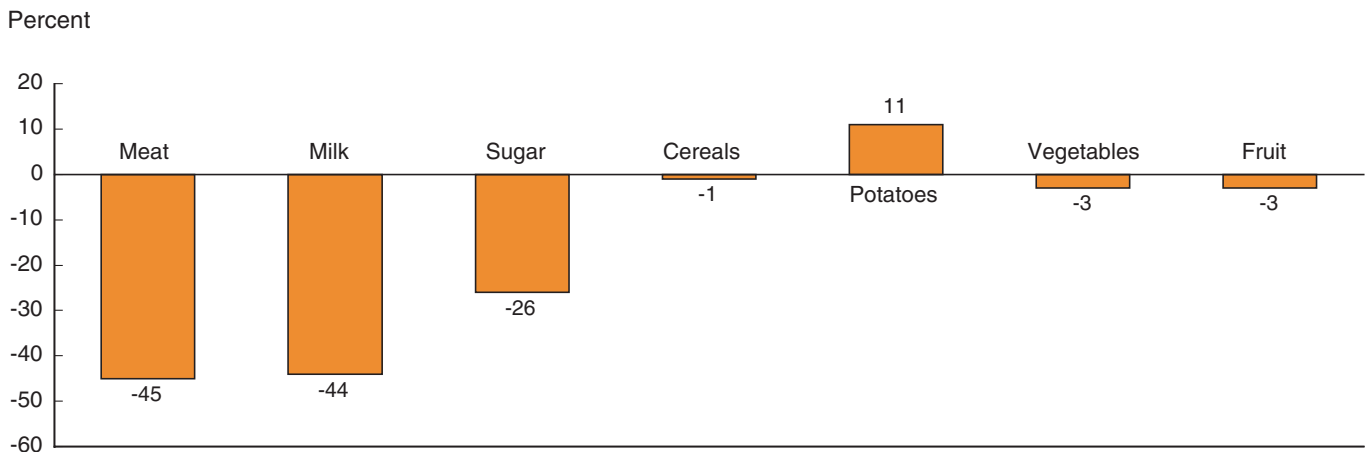
The lead policy of Russia's economic reform begun in 1992 was price liberalization, accompanied by the slashing of subsidies to producers and consumers. The freeing of prices led to huge economywide inflation, which substantially reduced consumers' real incomes as prices rose by a greater percentage than wages and salaries. In 1992 alone, per capita consumer real income in Russia fell 47 percent (PlanEcon-b). Incomes also fell because of a rise in unemployment or underemployment during transition, as old jobs were lost or scaled back faster than new jobs were created. Although in 2002 Russia's official unemployment rate was only 8 percent, this figure probably understates real unemployment. Also, much of the employed labor force is underemployed (and as a

result poorly paid). In 2002, Russian per capita real income was still about 35 percent below that in 1991.

Livestock products have high income elasticity of demand compared to other foodstuffs, which means that demand is fairly responsive to changes in income. Consequently, falling income particularly hurt the livestock sector, as consumers shifted demand away from high-value (and high-cost) foods (fig. B-2). Reform in fact created entirely new goods and, in particular, services (ranging from legal and financial services to car repair and health clubs), which were unavailable under the old regime and to which demand has turned during reform. The demand-driven downsizing of the livestock sector also lowered demand for animal feed (feed grains and oilseeds), which helps explain why Russia's grain output has also plummeted during transition. However, consumer demand in Russia for staple foods, such as bread and potatoes, has remained steady, or even increased (fig. B-2).

The drop in production and consumption of livestock products has therefore been an inevitable part of market reform, as consumers' desires for goods replaced planners' preferences as the dominant force in determining what goods are produced and consumed. The move in consumer demand away from high-value livestock products to other goods and services is part of the economy-wide restructuring of consumer demand that in the long run will increase consumer welfare, as producers respond to what consumers want to purchase at existing prices. It might seem surprising to describe livestock products as goods more favored by planners than consumers. Yet, when the prices of goods began to

Figure B-2
Changes in per capita food consumption: 1990 to 2000



Source: Russian Federation State Committee for Statistics-b.

reflect the full cost of their production, and consumers' real incomes were adjusted to correct for the distorted prices of the pre-reform period, consumers switched from buying high-cost livestock products to other goods and services (see Liefert et al.).

Although production of agricultural goods has fallen during transition, consumption has dropped less than output. By the early 2000s, Russia was a net importer of many foodstuffs, especially of meat and other livestock products. In fact, imports in 2002 accounted for over half of all poultry consumption, with the bulk coming from the United States, and about a quarter of all consumption of beef and pork (mainly from the European Union). Russia's imports of livestock products indicate uncompetitiveness in these products vis-à-vis the world market, which is supported by the fact that when Russia began its reform in the early 1990s, domestic producer prices for most agricultural products were higher than world prices (OECD-a). More specifically, Liefert finds that Russia has a general comparative disadvantage in agricultural outputs compared with agricultural inputs, and a comparative disadvantage in producing meat compared with grain. Although Russia's agricultural uncompetitiveness has contributed to the overall decline in agricultural production during transition, its large food imports have had the effect of raising overall food availability and consumption to levels higher than would exist in the absence of trade. If Russians have the necessary purchasing power, they can obtain through market purchases an adequate supply of food, whether it is produced domestically or imported.³

The only food availability problem of any seriousness during transition has occurred when grain surplus-producing regions within the country banned or restricted grain outflows. The result has been that grain-deficit regions in the north and east have been unable to obtain needed supplies. Although imports could conceivably make up any shortfalls, the affected regions tend to be geographically isolated, such that imports have difficulty penetrating, or only with high transport and transaction costs. Also, because the

³ In 2003, Russia imposed tariff-rate quotas for its imports of beef and pork, and a pure quota for imports of poultry. The annual low-tariff quota for beef (0.42 million metric tons) and pork (0.45 million tons) and quota for poultry (1.05 million tons) were set at about two-thirds of the volume of imports in 2003. Although these trade restrictions should reduce domestic meat consumption, they will not in any way threaten food security.

regional bans can be imposed without much warning, deficit regions might lack the time to acquire substitute foreign supplies. Although the outflow restrictions violate federal law, the federal government has not been able to prevent them.

Controls on grain outflows usually occur when poor harvests raise concerns by local authorities that regional production will not satisfy local requirements. Russia's bumper grain harvests of 2001 and 2002 largely eliminated these measures, but poor harvests could bring them back.

Access

The main food security problem in Russia during transition has been insufficient access to food by certain socioeconomic groups. The transition experience increased poverty in Russia, such that part of the population has insufficient purchasing power to afford a minimally healthy diet. Based on per capita food availability data and assumptions concerning the distribution of caloric consumption throughout the population, FAO estimates that in 1996-98 about 6 percent of Russia's population had inadequate food consumption (defined by FAO and throughout this article as daily caloric intake below the FAO/WHO/UNU minimum daily requirement for Russia of 1,970 calories; Sedik et al.).

The incidence of inadequate food consumption in Russia can also be roughly estimated from the Food Security Survey done for FAO by Russia's Association Agro in 11 Russian oblasts (regions) in December 2000-January 2001 (Sedik et al.). The survey was limited to households (including single-person ones) at or below the official poverty line. The survey found that 41 percent of the poor experienced inadequate food consumption. In 2000, 29 percent of the Russian population had money incomes below the poverty line, and in 2001 the figure fell slightly to 28 percent (Russian Federation State Committee for Statistics-b). If one assumes no individuals or households above the poverty line were food inadequate, one can estimate the share of the country's total population that was food inadequate by multiplying the percentage that was poor (29 percent in 2000) by the percentage of poor who were food inadequate (41 percent). The resulting figure is 12 percent. The most likely reason why this calculation for 2000 finds a greater incidence of food inadequacy than the FAO does for 1996-98 based on food availability is that Russia's severe economic crisis that struck in 1998 reduced GDP and personal incomes, and thereby increased poverty.

The major cause of the growth in poverty during transition has been the decline in real per capita income (as discussed earlier), the two big drops occurring in the first half of the 1990s and in 1998-99 following the economic crisis that hit in August 1998. Not only have incomes dropped, but the move from a planned to a market economy has made the distribution of income more unequal. In 1990, the top 20 percent of income earners received 33 percent of all income and the bottom 20 percent received only 10 percent. By 2000, the share of the top 20 percent had risen to 48 percent, and that of the bottom 20 percent had fallen to 6 percent (Russian Federation State Committee for Statistics-b).

Aggravating the poverty-generating effects of the decline in income, and the growing inequality of income distribution, has been the weakening of the state social welfare system. During transition, both the federal and regional governments have faced severe funding constraints for social welfare expenditure. The state welfare system has been unable to maintain a safety net guaranteeing that all individuals live above the poverty level and have a minimally healthy diet. In 2002, social welfare transfers from the state comprised a larger share of personal income than in 1992—35 percent versus 31 percent (Mroz et al.). Yet, given that real income fell substantially during this period, the value of total social welfare transfers in real terms clearly dropped.

Pensions have continued to be the most important state transfer payment, though they have steadily declined in real terms—from 1994 to 1999 by 52 percent, mainly because nominal payments were not adjusted for inflation (OECD-b). Certain transfer programs of the Soviet period, however, have suffered even larger reductions, one example being universal child allowances. These payments fell in real terms from 1994 to 1999 by 60 percent, and by the late 1990s the bulk of eligible households were receiving no benefit whatsoever (OECD-b). Medical and educational services have deteriorated during the transition period, such that formal or informal charges have become necessary for service. Most social welfare benefits in fact favor households with above-average incomes. In 1998, the top 30 percent of income earners received 48 percent of all benefits, while the bottom 40 percent received only 25 percent (OECD-b). Subsidies favoring the better off include those for housing, fuel, and transport.

A factor that has greatly mitigated the food insecurity risk to the population from falling money income and the weakening of the social welfare system is that most Russians have a farm or garden plot on which to grow foodstuffs. All households on former state and collective farms independently operate a plot of land, averaging about half a hectare in size, used to produce livestock products as well as potatoes, vegetables, and fruit. Seventy-one percent of urban residents also have a garden plot (though only 46 percent in oblast capital cities), usually located at their country dacha, or cottage (Sedik et al.). The garden plots also typically grow potatoes, vegetables, and fruit, thereby providing a valuable supplement to households' food supply obtained from commercial purchase. A garden plot appears to be a sufficient guarantee in Russia against food insecurity.

A recent FAO study found that the most food insecure groups in Russia are those with one or more of the following traits: low income, large households, and no garden plot (Sedik et al.). Table B-1 gives results from the FAO-sponsored survey on food security in Russia by Association Agro, which (as discussed earlier) covers only the poor, not the entire population. Nonetheless, the table shows a clear inverse relationship between income and inadequate food consumption. Fifty-seven percent of individuals in the lowest income decile (among the poor) had inadequate

Table B-1—Food inadequacy among the poor negatively correlated with income

Per capita monthly cash and plot income	Average consumption (Kcal/capita/day)	Food inadequate population Percent
Lowest decile	1,995	57
Second decile	2,176	46
Third decile	1,935	64
Fourth decile	2,273	38
Fifth decile	2,191	46
Sixth decile	2,280	38
Seventh decile	2,223	43
Eighth decile	2,376	41
Ninth decile	2,551	29
Highest decile	3,128	13
All poor households	2,326	41

Note: The table covers only the population living at or below the poverty level.

Source: Sedik, Wiesmann, and Sotnikov.

consumption, compared with only 13 percent in the highest income decile (also among only the poor).

Table B-2, which draws from the same survey, shows a positive relationship between family size and inadequate food consumption. Only 16 percent of 1-adult-only households are food inadequate (daily per capita consumption below 1,970 calories); 28 percent of 2-adult-only households are food inadequate; 50 percent of households with 2 adults, 3 or more children, and no relatives; and 73 percent of households with 1 adult, 3 or more children, and no relatives.

The third main trait of the food insecure is that they have no garden plot on which to grow food (mainly potatoes, vegetables, and fruit). Given that urban dwellers are less likely to have a garden plot than the rural population, they have a higher incidence of food inadequacy.

During the last few years, the macroeconomic situation in Russia has improved substantially, such that poverty is declining (Russian Federation State Committee for Statistics-b). Since 1999 (the year following Russia's serious financial crisis), GDP has grown at an average annual rate of 6 percent. The unemployment rate has dropped from 12 to 8 percent, though much underemployment continues. From 1999 to 2002, real wages rose

by about one-third. GDP growth has increased government revenue, making more funding available for social welfare expenditures. From 1999 to 2002, real government expenditures on welfare increased by about two-thirds. The resulting decline in poverty in all likelihood has reduced the size of the food insecure population.

Most macroeconomic forecasters predict that Russia's GDP will continue to grow throughout the decade at 4-5 percent a year. Such growth should further reduce poverty and food insecurity. Yet, forecasters acknowledge that Russia's macroeconomic improvement is fragile, and could be reversed. Two of the main reasons for Russia's macroeconomic turnaround following the financial crisis of 1998 was the rise in world energy prices and the severe depreciation of the ruble, in both nominal and real terms. Energy exports (mainly oil and natural gas) continue to provide about half of Russia's hard currency export earnings, as well as government tax revenue. A major downturn in world energy prices would severely hurt state finances.

The depreciation of the ruble following the financial crisis substantially improved the price competitiveness of all Russia's tradable goods, providing an engine for GDP growth. However, since 1999 the ruble has been appreciating in real terms, as the inflation rate has exceeded any nominal depreciation in the exchange rate. Macroeconomic forecasters (such as PlanEcon) believe that the ruble is still undervalued in real terms, and that real appreciation should continue in the short to medium term. By harming the competitiveness of Russian industry and agriculture, real appreciation of the currency has the isolated effect of inhibiting GDP and income growth.

Table B-2—Food inadequacy among the poor positively correlated with household size

Household type	Average	Food
	consumption	inadequate
	(Kcal/capita/day)	population
		Percent
All household members	2,326	41
Children	2,259	42
Pensioners	2,537	28
<i>By household type</i>		
1 adult only	3,341	16
1 adult, 1-2 children, no relatives	2,304	34
1 adult, 1-2 children, relatives	1,811	41
1 adult, 3+ children, no relatives	1,665	73
1 adult, no children, relatives	2,099	62
Pensioner family of 1	2,873	19
2 adults only	2,608	28
2 adults, 1-2 children, no relatives	2,142	48
2 adults, 1-2 children, relatives	2,209	45
2 adults, 3+ children, no relatives	2,128	50
2 adults, 3+ children, relatives	2,650	35

Note: The table covers only the population living at or below the poverty level.

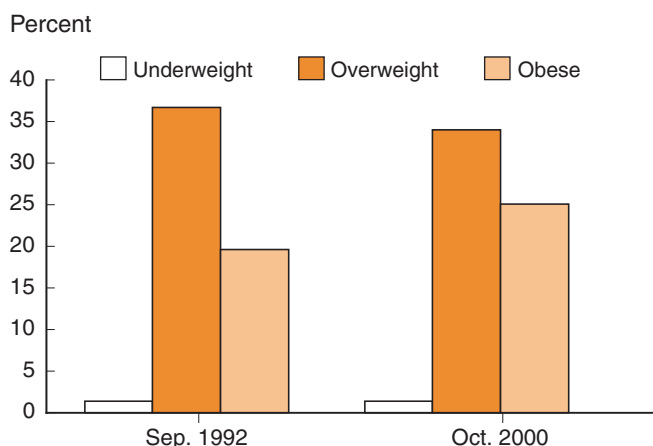
Source: Sedik, Wiesmann, and Sotnikov.

Nutrition

Sedik et al. argue that in Russia overweight and obesity are more serious health problems than underweight or nutritionally deficient diets. More than half of the adult population is overweight or obese (fig. B-3), and for those aged 60 and above the figure is about two-thirds. (In the figure, the obese are not included among the overweight.) This challenges any belief that the elderly in Russia suffer from food insecurity more than other age groups. In even the lowest income groups, overweight and obesity are much more common than underweight, though a correlation exists between overweight and income. Obesity has in fact increased during transition, rising from 23 percent of the population in 1992 to 33 percent in 2000.

Figure B-3

**Overweight and obesity is a serious problem:
Adults 30+**



Source: Zohoori, Gleiter, and Popkin.

One reason for the prevalence of overweight and obesity in Russia is traditional dietary preferences for animal products high in protein and fat, to the relative neglect of vegetables and fruit. The Soviet policy of pushing the production and consumption of livestock goods during the 1970s and 1980s, which included the publication of recommended food consumption “norms,” catered to these preferences. During transition, the per capita consumption of healthier foods such as vegetables and fruit initially dipped, but has since rebounded to close to pre-reform levels. Per capita consumption of sugar has fallen, that of bread products has remained steady, while that of potatoes has risen (fig. B-2).

It seems paradoxical that although consumption of high fat and cholesterol livestock products as well as sugar has fallen substantially during the transition period—along with total per capita caloric consumption—overweight and obesity have increased. Part of the explanation appears to be that overweight and obesity have grown disproportionately among the elderly. The elderly in fact have not economically suffered unduly during transition relative to the overall population, as indicated by an elderly poverty rate in recent years below that of the population as a whole (Russian Federation State Committee for Statistics-a). They have become more overweight while other groups have suffered more from declining food intake.

Another likely cause of overweight and obesity is that society in general has become less physically active and healthy, a plausible response to the psychological tensions experienced by many during transition. The

combination of a high fat and cholesterol diet in Russia and inadequate exercise results in high prevalence of cardiovascular disease, diabetes, and cancer. These diseases have all increased during transition, and therefore have contributed to the disturbing rise in Russian mortality rates and fall in life expectancy during transition (especially for men). Male life expectancy in Russia fell from 64 years in 1990 to 58 years in 2002 (Russian Federation State Committee for Statistics-b).⁴

Although malnutrition is not a serious problem in Russia for either children or adults, the country suffers from some specific micronutrient deficiencies. Most of the Russian population (both children and adults) are deficient in iodine (70 percent), fluoride, and selenium (Sedik et al.). Iodine deficiency is the second most common micronutrient deficiency in the world, suffered by one-third of the earth’s population, and the most common cause of preventable mental retardation.

Conclusion

The two main food-related problems in Russia are inadequate access to food by a minority of the population, and overweight and obesity. Russia’s most food insecure groups have the following traits: low income, large households, and urban residency with no garden plot. Targeted transfers of food or money to such groups could therefore be a cost-effective way to reduce food insecurity.

The agricultural establishment in Russia argues for a different response to the problem, and in fact identifies the problem differently. Agricultural interests contend that the drop in production and consumption of livestock products during transition is evidence by itself of a serious food security problem, and uses the argument to lobby for increased state support and trade protection. Yet, as mentioned before, food consumption measured in per capita caloric intake has dropped only marginally during transition. Although consumption of high-value and high-cost livestock products has fallen substantially, consumption of staple foods such as bread and potatoes has remained steady or even increased. Russia does not suffer from inadequate food

⁴ Other likely reasons for increasing mortality include the surge in alcohol consumption and growing demoralization and depression from the disruptions and pressures of reform, which increase accidents, murders, and suicides.

availability. Raising subsidies and trade protection for Russian agriculture in order to improve food security through increased domestic production of foodstuffs would be an expensive and inefficient response to a misdiagnosed problem.

Russia's improving macroeconomic performance of the past few years has substantially reduced poverty and improved access to food by the poor. The macroeconomic upturn expands the income of the poor by reducing unemployment and increasing real wages. In addition, economic growth raises government revenue, which can be used to strengthen the social welfare system. Projected annual growth rates of GDP and personal income over the coming decade of 4-5 percent provide a basis for believing that Russia's food security will improve rather than worsen. State policies that promote growth and macroeconomic stability would therefore also improve food security.

Although the Soviet practice of pushing heavy consumption of livestock products has been largely discontinued, Russians retain traditional preferences for livestock products heavy in fat, protein, and cholesterol—such as meat, dairy products, and eggs. This contributes to the second major food-related problem—overweight and obesity—which increased during transition. The growth in obesity has probably contributed to the rise in the mortality rate and drop in life expectancy (especially among males) during transition. Public promotion of a diet involving more vegetables and fruit, as well as of behavioral changes such as more exercise, would bring health benefits.

U.S. and Western Food Aid to Russia

In 5 years during the period 1990-2000, food security concerns about Russia motivated the United States and other Western countries, mainly the European Union (EU), to provide food aid to the country. The main reason these years generated aid was poor Russian grain harvests caused largely by bad weather.

The largest aid package was given in 1999-2000, motivated mainly by Russia's lowest grain harvest in 50 years (48 million metric tons). Both the United States and EU provided aid, with some targeted specifically to needy social groups and regions. The U.S. package involved 3.1 million tons of commodities. Of that total, 1.9 million tons of commodities were donated, including 1.7 million tons of wheat from the Commodity Credit Corporation and 0.2 million tons of various commodities from the U.S. Food for Progress Program. The donations were worth \$589 million, broken down into \$409 million for the commodities and \$180 million for transportation. The United States also gave Russia a \$520 million trade credit to purchase 1.3 million tons of commodities such as corn, soybeans, and meat under P.L. 480 Title I. The EU package provided 1.8 million tons of agricultural goods (including 1 million tons of wheat) worth \$470 million (Liefert and Liefert).

EU food aid shipments, as well as much of the U.S. aid, were sold on the market at existing prices, with the revenue going to the state pension fund. However, part of the Food for Progress donation was distributed by private voluntary organizations to the poor, while the remainder was sold, with the revenue supporting seed research institutes and credit facilities.

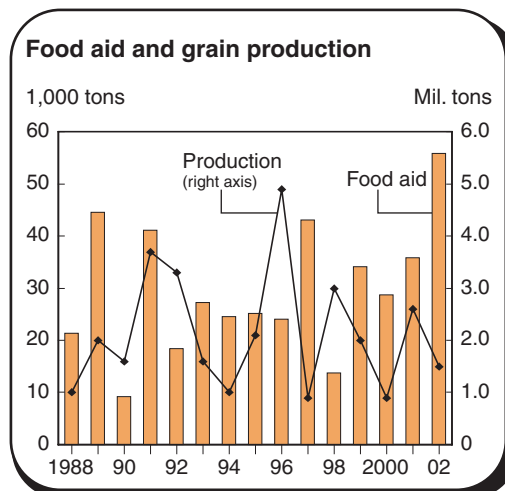
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Statistical table 1—Algeria

(North Africa)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grain equiv.)	Aggregate availability of all food
			1,000 tons		
1994	959	183	7,412	25	9,939
1995	2,137	306	6,122	25	11,938
1996	4,883	294	3,979	24	9,053
1997	883	242	5,959	43	9,267
1998	3,023	281	5,490	14	9,156
1999	2,022	254	6,185	34	9,477
2000	933	308	7,491	29	10,097
2001	2,630	247	6,657	36	10,395
2002	1,515	255	5,916	56	9,238
Projections				Food gap	
				SQ	NR
2003	4,377	291	3,939	0	0
2008	2,551	321	5,025	0	0
2013	2,695	352	5,820	0	0

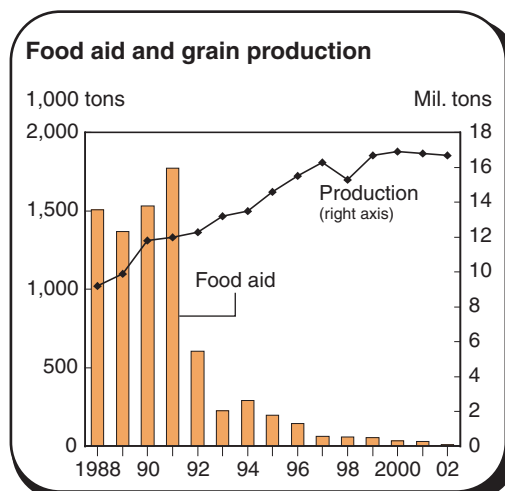


	1989-91	1999-2001
3-year average:		
Total food aid, 1,000 tons	31.6	32.9
Food aid per capita, kg	1.3	1.1
Percent		
Cereal food aid share of imports	0.4	0.3
Total food aid share of supplies	0.4	0.4

Statistical table 2—Egypt

(North Africa)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grain equiv.)	Aggregate availability of all food
			1,000 tons		
1994	13,510	398	8,940	292	20,123
1995	14,578	721	7,795	196	20,788
1996	15,485	731	8,499	144	20,927
1997	16,304	522	10,025	63	22,907
1998	15,289	572	10,428	57	22,543
1999	16,735	528	9,621	55	22,682
2000	16,871	516	10,115	34	22,086
2001	16,785	566	9,217	31	21,341
2002	16,655	565	10,741	11	24,631
Projections				Food gap	
				SQ	NR
2003	16,870	565	10,401	0	0
2008	18,803	605	11,917	0	0
2013	19,981	647	13,282	1,964	0



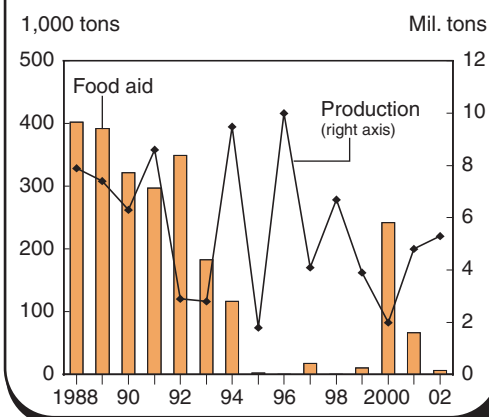
	1989-91	1999-2001
3-year average:		
Total food aid, 1,000 tons	1,558.7	40.0
Food aid per capita, kg	27.7	0.6
Percent		
Cereal food aid share of imports	18.6	0.3
Total food aid share of supplies	7.8	0.1

Statistical table 3—Morocco

(North Africa)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grain equiv.)	Aggregate availability of all food
			1,000 tons		
1994	9,530	312	1,609	117	9,400
1995	1,800	267	3,596	2	10,090
1996	10,037	373	2,890	0	10,646
1997	4,101	357	2,747	18	10,180
1998	6,733	335	3,088	1	9,229
1999	3,913	341	4,369	11	11,040
2000	1,987	327	4,975	242	10,776
2001	4,756	344	5,096	67	11,269
2002	5,311	398	4,698	7	12,127
Projections				Food gap	
				SQ	NR
2003	8,285	374	2,996	0	0
2008	5,877	416	3,708	0	0
2013	6,505	460	4,263	0	0

Food aid and grain production



1989-91 1999-2001

3-year average:

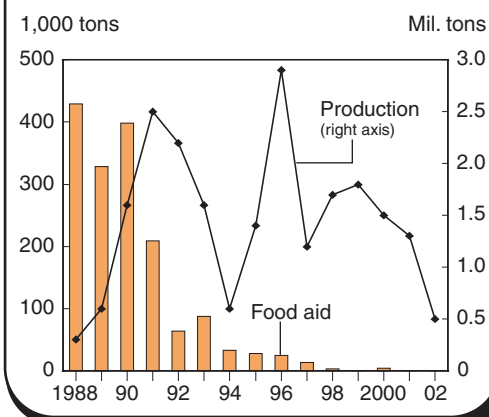
Total food aid, 1,000 tons	337.1	106.6
Food aid per capita, kg	13.7	3.5
Percent		
Cereal food aid share of imports	13.5	2.1
Total food aid share of supplies	3.5	1.2

Statistical table 4—Tunisia

(North Africa)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grain equiv.)	Aggregate availability of all food
			1,000 tons		
11994	646	52	1,566	33	3,009
1995	1,366	58	2,669	28	4,403
1996	2,862	67	1,210	24	3,534
1997	1,151	72	1,960	13	3,769
1998	1,654	73	1,953	3	4,012
1999	1,806	79	2,015	0	4,172
2000	1,521	72	2,487	4	3,794
2001	1,271	82	2,868	0	4,154
2002	511	77	3,400	0	4,074
Projections				Food gap	
				SQ	NR
2003	1,926	80	2,055	0	0
2008	1,606	88	2,507	0	0
2013	1,716	96	2,886	0	0

Food aid and grain production



1989-91 1999-2001

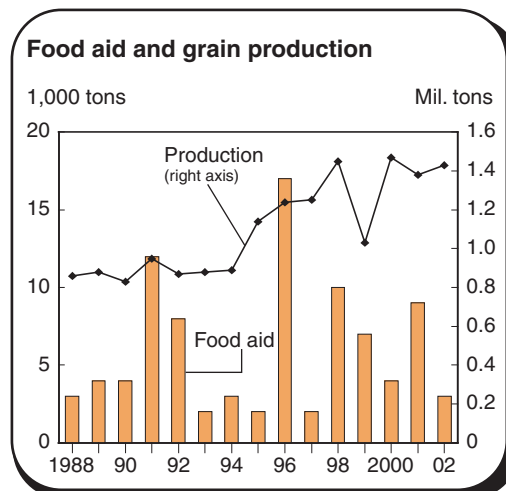
3-year average:

Total food aid, 1,000 tons	312.0	1.3
Food aid per capita, kg	38.3	0.1
Percent		
Cereal food aid share of imports	21.9	0.1
Total food aid share of supplies	9.9	0.0

Statistical table 5—Cameroon

(Central Africa)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grain equiv.)	Aggregate availability of all food
			1,000 tons		
1994	892	946	429	3	3,331
1995	1,140	967	256	2	3,439
1996	1,240	999	68	17	3,444
1997	1,252	1,041	320	2	3,769
1998	1,452	1,100	300	10	3,964
1999	1,025	1,188	396	7	3,806
2000	1,468	1,200	393	4	4,371
2001	1,376	1,045	560	9	4,309
2002	1,426	1,045	227	3	4,123
Projections				Food gap	
				SQ	NR
2003	1,416	1,145	397	166	0
2008	1,736	1,235	408	34	0
2013	2,029	1,332	411	0	0

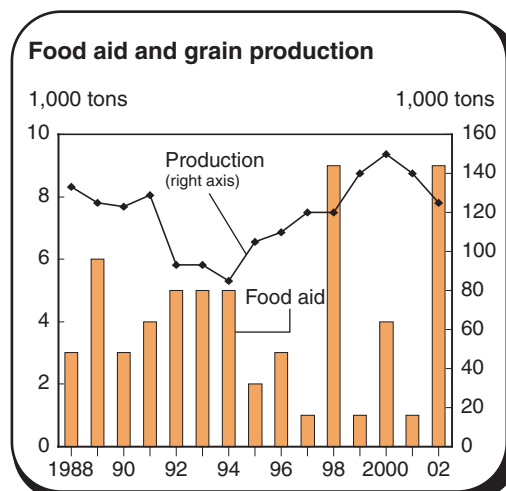


	1989-91	1999-2001
3-year average:		
Total food aid, 1,000 tons	6.6	6.9
Food aid per capita, kg	0.6	0.5
	Percent	
Cereal food aid share of imports	1.5	1.3
Total food aid share of supplies	0.3	0.2

Statistical table 6—Central African Republic

(Central Africa)

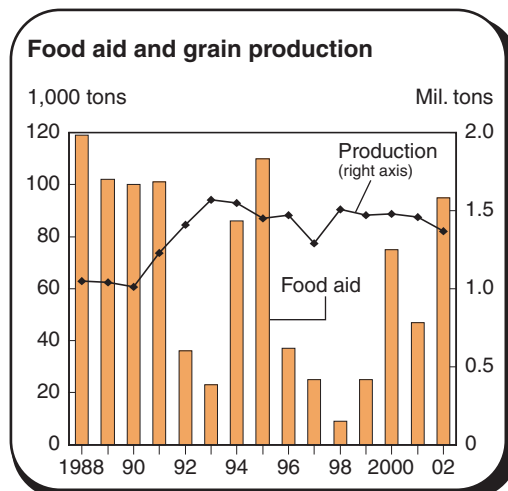
Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grain equiv.)	Aggregate availability of all food
			1,000 tons		
1994	85	271	48	5	722
1995	105	281	30	2	731
1996	110	298	14	3	756
1997	120	315	39	1	811
1998	120	333	33	9	841
1999	140	318	43	1	858
2000	150	326	39	4	881
2001	140	327	53	1	915
2002	125	335	0	9	865
Projections				Food gap	
				SQ	NR
2003	125	335	49	49	73
2008	147	355	57	49	76
2013	155	375	65	89	118



	1989-91	1999-2001
3-year average:		
Total food aid, 1,000 tons	4.1	1.9
Food aid per capita, kg	1.4	0.5
	Percent	
Cereal food aid share of imports	10.2	3.0
Total food aid share of supplies	0.8	0.3

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

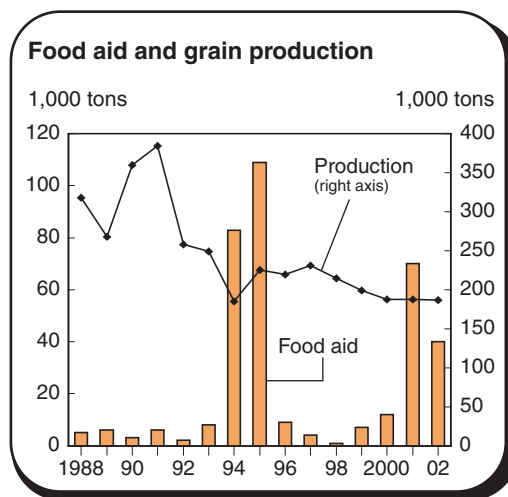
Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grain equiv.)	Aggregate availability of all food
			1,000 tons		
1994	1,545	6,771	240	86	10,742
1995	1,452	6,019	318	110	10,108
1996	1,465	6,018	270	37	9,806
1997	1,288	5,848	573	25	9,676
1998	1,512	6,012	579	9	10,168
1999	1,473	5,817	258	25	9,777
2000	1,484	5,639	216	75	9,736
2001	1,461	5,467	273	47	9,887
2002	1,369	5,294	180	95	9,721
Projections				Food gap	
				SQ	NR
2003	1,352	5,684	273	749	3,968
2008	1,980	6,329	280	982	4,791
2013	2,371	7,038	291	1,771	6,269



	1989-91	1999-2001
3-year average:		
Total food aid, 1,000 tons	100.9	48.8
Food aid per capita, kg	2.7	0.9
Percent		
Cereal food aid share of imports	29.3	13.1
Total food aid share of supplies	1.2	0.7

Statistical table 8—Burundi (East Africa)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grain equiv.)	Aggregate availability of all food
			1,000 tons		
1994	185	339	55	83	1,098
1995	225	356	0	109	1,120
1996	220	366	4	9	1,112
1997	231	389	8	4	1,135
1998	215	355	19	1	1,113
1999	199	397	10	7	1,149
2000	188	392	21	12	1,156
2001	188	434	0	70	1,273
2002	187	434	42	40	1,347
Projections				Food gap	
				SQ	NR
2003	200	434	49	58	411
2008	232	483	50	141	554
2013	299	537	51	170	646



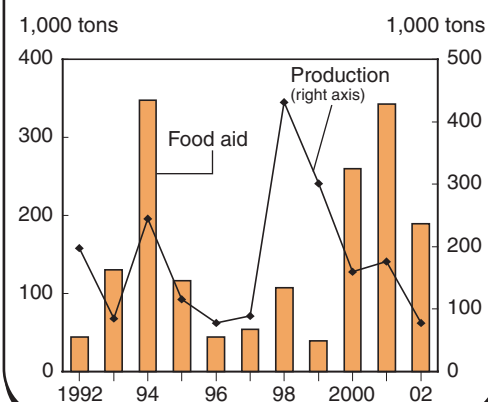
	1989-91	1999-2001
3-year average:		
Total food aid, 1,000 tons	5.0	29.8
Food aid per capita, kg	0.9	4.6
Percent		
Cereal food aid share of imports	15.8	103.3
Total food aid share of supplies	0.6	4.0

Statistical table 9—Eritrea

(East Africa)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grain equiv.)	Aggregate availability of all food
			1,000 tons		
1994	245	26	0	348	644
1995	116	25	57	116	380
1996	78	25	210	44	436
1997	89	26	271	54	537
1998	432	27	197	107	844
1999	301	26	54	39	510
2000	160	26	78	260	597
2001	176	27	32	343	640
2002	78	27	68	189	476
Projections				Food gap	
				SQ	NR
2003	240	28	55	0	300
2008	226	31	58	79	479
2013	250	35	58	145	596

Food aid and grain production



1989-91 1999-2001

3-year average:

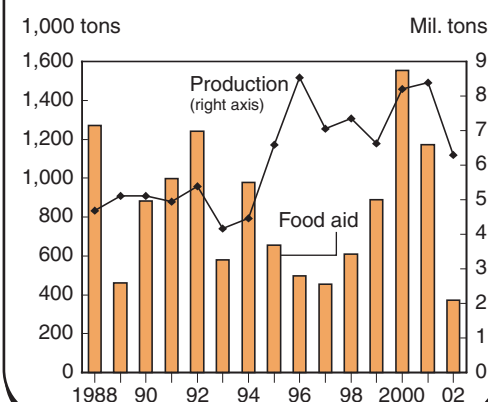
Total food aid, 1,000 tons	--	214.2
Food aid per capita, kg	--	56.1
Percent		
Cereal food aid share of imports	--	76.0
Total food aid share of supplies	--	41.8

Statistical table 10—Ethiopia

(East Africa)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grain equiv.)	Aggregate availability of all food
			1,000 tons		
1994	4,455	1,431	235	978	8,503
1995	6,590	1,510	37	654	10,387
1996	8,540	1,551	0	498	12,222
1997	7,055	1,587	0	455	10,530
1998	7,360	1,592	12	608	11,372
1999	6,630	1,615	0	889	10,846
2000	8,195	1,637	0	1,554	13,040
2001	8,385	1,689	0	1,174	13,232
2002	6,285	1,689	39	373	10,647
Projections				Food gap	
				SQ	NR
2003	6,700	1,744	59	2,030	5,180
2008	11,355	1,948	64	0	1,511
2013	14,173	2,173	72	0	216

Food aid and grain production



1989-91 1999-2001

3-year average:

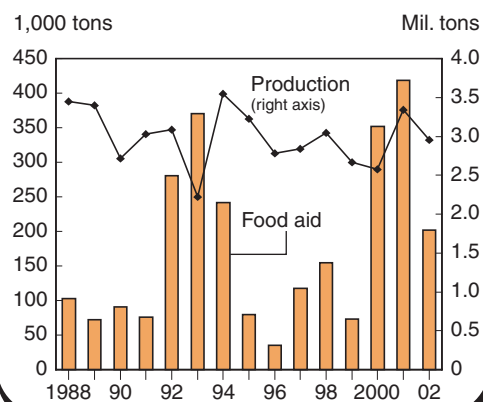
Total food aid, 1,000 tons	779.9	1,205.6
Food aid per capita, kg	16.2	18.3
Percent		
Cereal food aid share of imports	101.3	116.1
Total food aid share of supplies	13.6	11.6

Statistical table 11—Kenya

(East Africa)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grain equiv.)	Aggregate availability of all food
			1,000 tons		
1994	3,554	520	909	242	6,921
1995	3,227	558	277	80	6,317
1996	2,778	571	399	35	5,416
1997	2,836	551	1,486	118	7,379
1998	3,045	651	810	155	6,958
1999	2,668	731	700	73	6,518
2000	2,578	522	909	352	6,602
2001	3,343	733	996	419	7,870
2002	2,960	696	1,084	202	7,426
Projections				Food gap	
				SQ	NR
2003	2,836	739	1,059	124	851
2008	3,547	812	1,211	0	288
2013	4,008	892	1,379	0	31

Food aid and grain production



1989-91 1999-2001

3-year average:

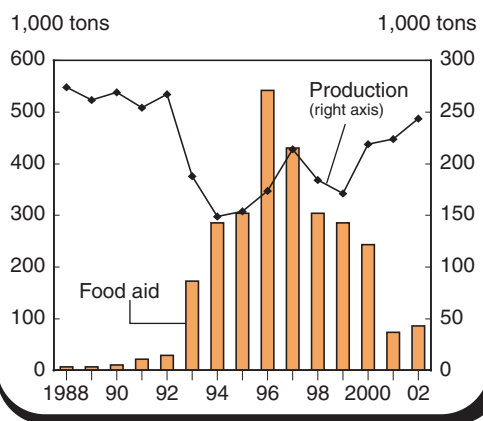
Total food aid, 1,000 tons	79.8	281.5
Food aid per capita, kg	3.4	9.0
	Percent	
Cereal food aid share of imports	27.6	20.6
Total food aid share of supplies	2.0	6.0

Statistical table 12—Rwanda

(East Africa)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grain equiv.)	Aggregate availability of all food
			1,000 tons		
1994	149	475	0	286	1,221
1995	154	347	13	304	1,126
1996	174	450	0	542	1,311
1997	214	490	0	430	1,419
1998	184	474	3	304	1,512
1999	171	569	6	285	1,644
2000	219	1,140	0	243	2,186
2001	224	1,206	16	74	2,249
2002	244	1,369	7	86	2,455
Projections				Food gap	
				SQ	NR
2003	239	1,234	12	80	0
2008	271	1,332	12	159	0
2013	285	1,440	12	287	0

Food aid and grain production



1989-91 1999-2001

3-year average:

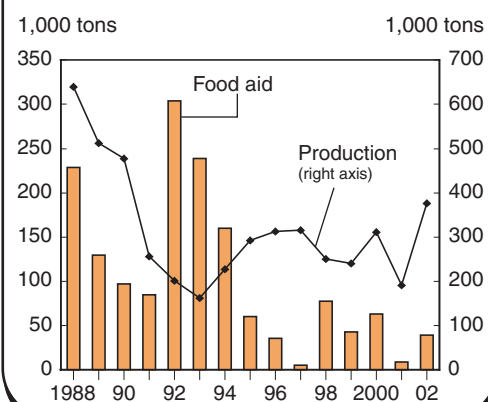
Total food aid, 1,000 tons	13.4	200.5
Food aid per capita, kg	2.0	25.8
	Percent	
Cereal food aid share of imports	25.9	125.2
Total food aid share of supplies	1.3	14.3

Statistical table 13—Somalia

(East Africa)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grain equiv.)	Aggregate availability of all food
			1,000 tons		
1994	228	13	15	160	1,111
1995	293	16	68	60	1,192
1996	313	18	107	36	1,263
1997	316	19	111	5	1,281
1998	251	21	156	78	1,356
1999	241	23	97	43	1,308
2000	311	24	90	63	1,435
2001	191	29	84	9	1,342
2002	376	29	13	39	1,516
Projections				Food gap	
				SQ	NR
2003	328	28	61	80	907
2008	392	31	62	197	1,203
2013	473	35	61	285	1,482

Food aid and grain production



1989-91 1999-2001

3-year average:

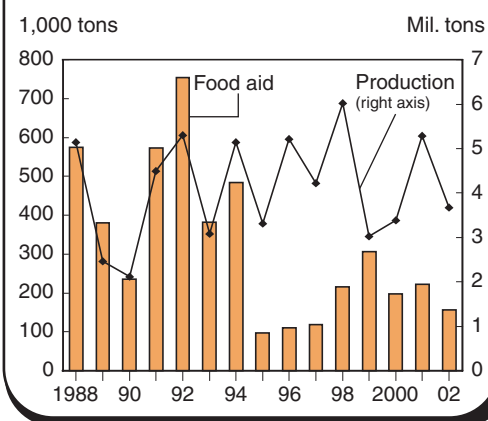
Total food aid, 1,000 tons	104.0	38.2
Food aid per capita, kg	14.5	4.2
	Percent	
Cereal food aid share of imports	39.5	26.6
Total food aid share of supplies	14.4	7.4

Statistical table 14—Sudan

(East Africa)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grain equiv.)	Aggregate availability of all food
			1,000 tons		
1994	5,152	50	508	484	8,380
1995	3,307	51	373	98	6,783
1996	5,207	52	355	111	7,592
1997	4,221	52	635	118	8,220
1998	6,031	53	603	216	8,449
1999	3,027	52	407	306	8,081
2000	3,380	53	449	198	7,171
2001	5,292	54	966	222	8,876
2002	3,682	54	763	156	8,769
Projections				Food gap	
				SQ	NR
2003	5,255	54	702	0	0
2008	5,105	57	750	0	0
2013	5,691	60	759	0	0

Food aid and grain production



1989-91 1999-2001

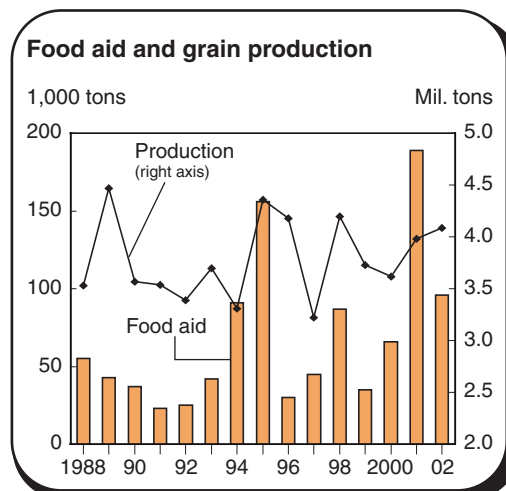
3-year average:

Total food aid, 1,000 tons	396.0	242.1
Food aid per capita, kg	16.0	7.6
	Percent	
Cereal food aid share of imports	38.6	24.3
Total food aid share of supplies	9.9	5.0

Statistical table 15—Tanzania

(East Africa)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grain equiv.)	Aggregate availability of all food
			1,000 tons		
1994	3,305	1,690	265	91	6,544
1995	4,355	1,496	77	156	6,653
1996	4,180	1,488	199	30	6,892
1997	3,220	1,428	316	45	6,452
1998	4,204	1,811	618	87	7,948
1999	3,729	1,818	187	35	7,394
2000	3,619	1,898	482	66	7,607
2001	3,977	1,836	404	189	7,989
2002	4,085	1,837	284	96	8,141
Projections					
				Food gap	
				SQ	NR
2003	3,648	1,980	420	186	1,337
2008	4,946	2,147	489	0	588
2013	5,858	2,328	579	0	322
					10,947

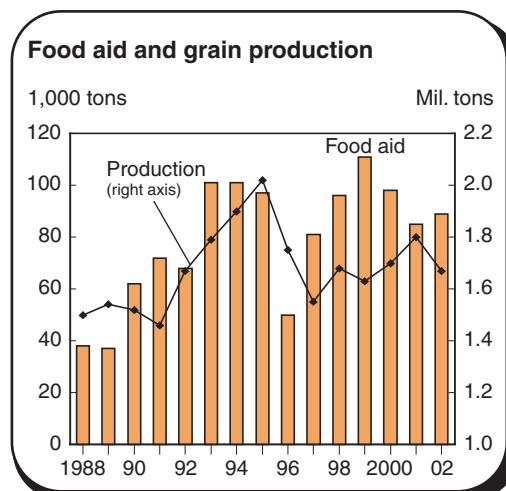


	1989-91	1999-2001
3-year average:		
Total food aid, 1,000 tons	34.3	96.8
Food aid per capita, kg	1.3	2.7
	Percent	
Cereal food aid share of imports	30.3	19.5
Total food aid share of supplies	0.6	1.6

Statistical table 16—Uganda

(East Africa)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grain equiv.)	Aggregate availability of all food
			1,000 tons		
1994	1,900	1,593	30	101	5,865
1995	2,020	1,688	72	97	6,259
1996	1,750	1,431	90	50	5,743
1997	1,550	1,582	153	81	5,849
1998	1,680	2,007	128	96	6,261
1999	1,630	2,673	61	111	6,716
2000	1,695	2,730	97	98	7,156
2001	1,800	2,885	0	85	7,547
2002	1,670	2,898	0	89	7,510
Projections					
				Food gap	
				SQ	NR
2003	1,650	2,931	50	660	0
2008	2,321	3,217	56	582	0
2013	2,756	3,528	64	1,224	0
					7,205
					8,735
					9,866

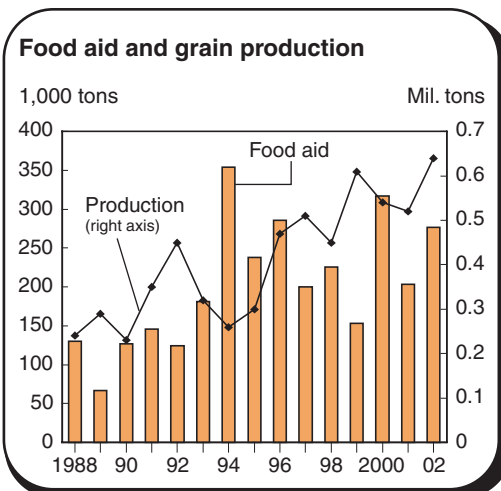


	1989-91	1999-2001
3-year average:		
Total food aid, 1,000 tons	57.2	97.7
Food aid per capita, kg	3.3	4.1
	Percent	
Cereal food aid share of imports	169.6	60.1
Total food aid share of supplies	1.6	2.1

Statistical table 17—Angola

(Southern Africa)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grain equiv.)	Aggregate availability of all food
			1,000 tons		
1994	261	887	152	354	2,275
1995	302	948	276	238	2,440
1996	473	932	328	286	2,679
1997	513	871	251	200	2,552
1998	447	1,175	278	226	2,811
1999	608	1,143	273	153	2,972
2000	538	1,607	274	317	3,474
2001	518	1,981	287	203	3,770
2002	638	1,984	226	277	3,940
Projections				Food gap	
				SQ	NR
2003	551	1,966	268	45	0
2008	764	2,121	301	364	0
2013	894	2,287	326	757	58

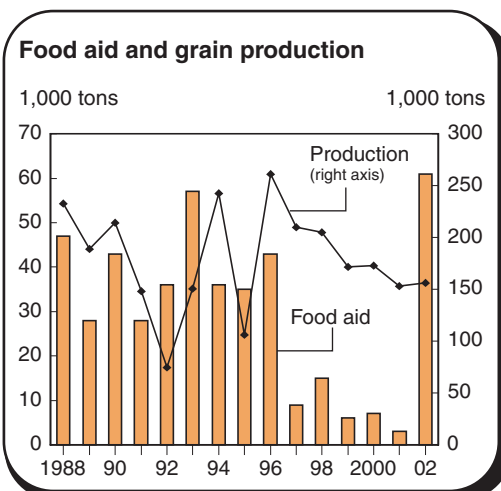


	1989-91	1999-2001
3-year average:		
Total food aid, 1,000 tons	113.4	224.2
Food aid per capita, kg	11.9	16.6
Percent		
Cereal food aid share of imports	30.7	38.6
Total food aid share of supplies	8.8	8.4

Statistical table 18—Lesotho

(Southern Africa)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grain equiv.)	Aggregate availability of all food
			1,000 tons		
1994	243	20	255	36	531
1995	106	20	157	35	364
1996	261	20	257	43	522
1997	210	22	159	9	359
1998	205	23	189	15	469
1999	172	25	180	6	396
2000	173	26	131	7	327
2001	153	26	133	3	333
2002	156	26	0	61	203
Projections				Food gap	
				SQ	NR
2003	55	27	87	46	281
2008	193	29	87	0	192
2013	217	31	98	0	154

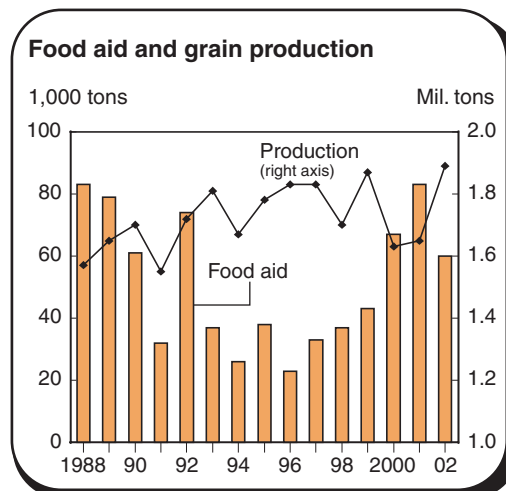


	1989-91	1999-2001
3-year average:		
Total food aid, 1,000 tons	32.8	5.5
Food aid per capita, kg	19.5	2.7
Percent		
Cereal food aid share of imports	22.4	2.8
Total food aid share of supplies	8.6	1.4

Statistical table 19—Madagascar

(Southern Africa)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grain equiv.)	Aggregate availability of all food
			1,000 tons		
1994	1,670	972	118	26	3,059
1995	1,780	956	115	38	3,206
1996	1,830	962	68	23	3,235
1997	1,830	986	93	33	3,328
1998	1,700	983	124	37	3,288
1999	1,870	1,005	153	43	3,518
2000	1,630	1,011	299	67	3,486
2001	1,645	1,034	206	83	3,477
2002	1,885	1,034	103	60	3,659
Projections				Food gap	
				SQ	NR
2003	1,782	1,069	213	151	347
2008	2,130	1,164	252	156	381
2013	2,468	1,267	296	214	471

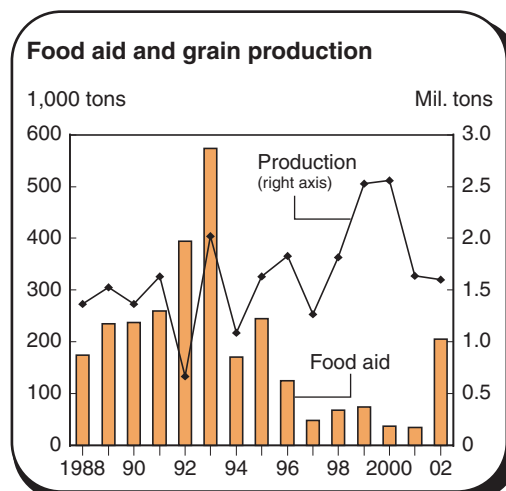


	1989-91	1999-2001
3-year average:		
Total food aid, 1,000 tons	57.4	64.3
Food aid per capita, kg	4.8	3.9
	Percent	
Cereal food aid share of imports	43.9	10.3
Total food aid share of supplies	2.1	2.1

Statistical table 20—Malawi

(Southern Africa)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grain equiv.)	Aggregate availability of all food
			1,000 tons		
1994	1,093	131	351	171	2,403
1995	1,628	159	62	245	2,348
1996	1,833	271	55	125	2,612
1997	1,270	370	125	49	2,372
1998	1,820	522	336	68	3,005
1999	2,525	599	48	74	3,118
2000	2,560	1,050	35	37	3,721
2001	1,637	1,350	123	35	4,008
2002	1,602	574	0	206	3,099
Projections				Food gap	
				SQ	NR
2003	2,043	1,045	42	0	0
2008	2,376	1,119	43	0	0
2013	2,637	1,197	44	0	0

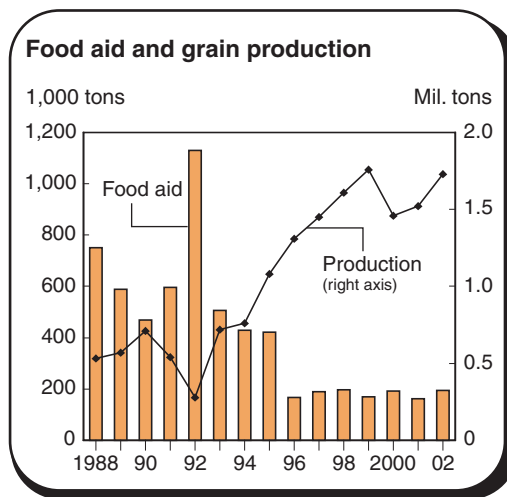


	1989-91	1999-2001
3-year average:		
Total food aid, 1,000 tons	244.2	48.7
Food aid per capita, kg	25.9	4.2
	Percent	
Cereal food aid share of imports	109.1	40.9
Total food aid share of supplies	13.1	1.4

Statistical table 21—Mozambique

(Southern Africa)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grain equiv.)	Aggregate availability of all food
			1,000 tons		
1994	756	1,238	134	429	3,205
1995	1,080	1,528	161	421	3,749
1996	1,313	1,727	260	168	3,782
1997	1,453	1,941	257	190	4,156
1998	1,612	2,049	390	198	4,528
1999	1,757	1,948	256	170	4,497
2000	1,457	1,955	279	191	4,382
2001	1,521	1,968	391	162	4,441
2002	1,728	1,968	119	194	4,088
Projections				Food gap	
				SQ	NR
2003	1,748	2,040	273	0	247
2008	2,381	2,186	287	0	0
2013	2,958	2,342	305	0	0

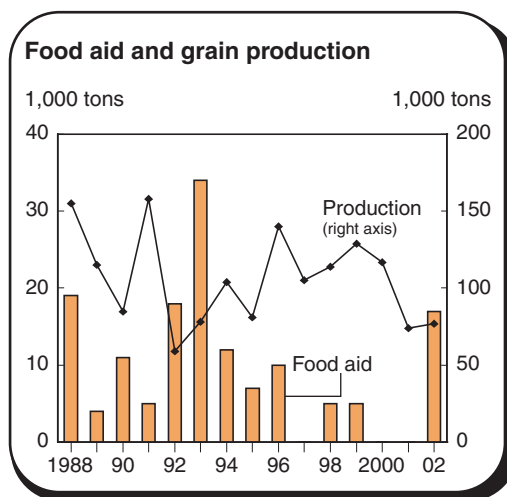


	1989-91	1999-2001
3-year average:		
Total food aid, 1,000 tons	551.2	174.3
Food aid per capita, kg	40.4	9.4
	Percent	
Cereal food aid share of imports	95.0	29.6
Total food aid share of supplies	21.0	4.3

Statistical table 22—Swaziland

(Southern Africa)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grain equiv.)	Aggregate availability of all food
			1,000 tons		
1994	104	2	73	12	269
1995	81	2	44	7	208
1996	140	2	30	10	252
1997	105	2	57	0	224
1998	114	2	45	5	209
1999	129	2	94	5	285
2000	117	2	77	0	231
2001	74	2	115	0	220
2002	77	2	0	17	114
Projections				Food gap	
				SQ	NR
2003	72	2	70	12	39
2008	119	2	72	0	0
2013	137	3	78	0	0

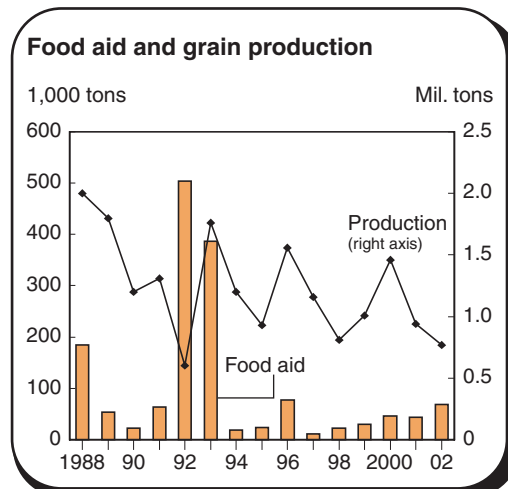


	1989-91	1999-2001
3-year average:		
Total food aid, 1,000 tons	6.9	1.7
Food aid per capita, kg	8.9	1.8
	Percent	
Cereal food aid share of imports	5.2	0.0
Total food aid share of supplies	1.9	0.5

Statistical table 23—Zambia

(Southern Africa)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grain equiv.)	Aggregate availability of all food
			1,000 tons		
1994	1,195	296	53	18	2,018
1995	929	295	130	24	1,912
1996	1,563	297	61	77	1,985
1997	1,157	280	98	11	2,064
1998	807	322	474	22	2,066
1999	1,010	380	47	30	1,806
2000	1,455	322	29	46	2,220
2001	941	373	0	44	1,817
2002	767	373	108	69	1,741
Projections				Food gap	
				SQ	NR
2003	1,295	382	70	24	677
2008	1,335	422	73	0	704
2013	1,552	465	74	0	784

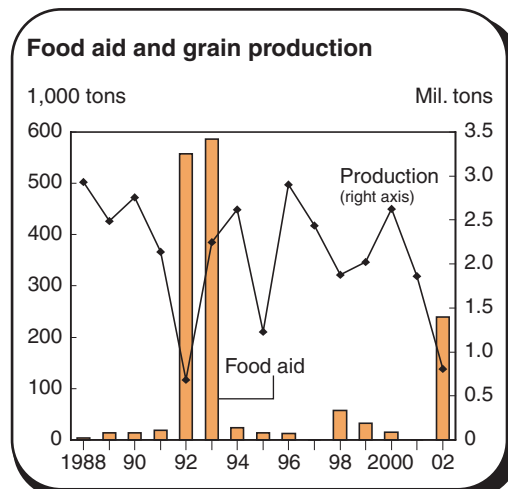


	1989-91	1999-2001
3-year average:		
Total food aid, 1,000 tons	46.9	39.7
Food aid per capita, kg	5.8	3.7
Percent		
Cereal food aid share of imports	31.0	41.8
Total food aid share of supplies	2.5	2.4

Statistical table 24—Zimbabwe

(Southern Africa)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grain equiv.)	Aggregate availability of all food
			1,000 tons		
1994	2,622	58	74	23	2,665
1995	1,225	64	113	13	2,217
1996	2,900	65	445	12	3,316
1997	2,435	68	214	0	2,766
1998	1,883	69	238	57	2,498
1999	2,016	72	218	32	2,898
2000	2,632	74	94	15	3,244
2001	1,858	74	48	0	3,011
2002	814	74	58	239	2,492
Projections				Food gap	
				SQ	NR
2003	1,052	77	80	984	1,615
2008	2,471	87	84	0	0
2013	2,829	97	98	0	0



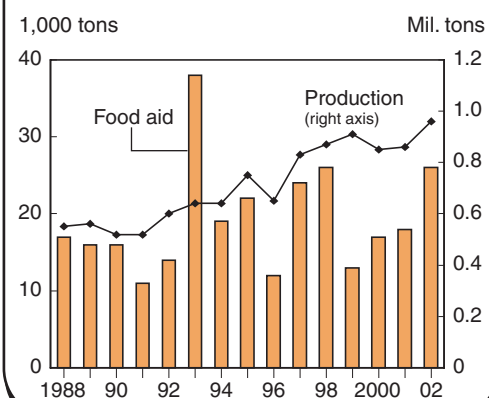
	1989-91	1999-2001
3-year average:		
Total food aid, 1,000 tons	15.1	15.6
Food aid per capita, kg	1.5	1.2
Percent		
Cereal food aid share of imports	17.8	10.0
Total food aid share of supplies	0.6	0.6

Statistical table 25—Benin

(West Africa)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grain equiv.)	Aggregate availability of all food
			1,000 tons		
1994	635	868	234	19	1,617
1995	746	914	205	22	1,751
1996	651	1,018	133	12	1,664
1997	829	1,202	132	24	1,903
1998	868	1,284	73	26	1,899
1999	914	1,360	115	13	2,018
2000	850	1,477	82	17	2,058
2001	857	1,584	105	18	2,149
2002	956	1,563	0	26	2,129
Projections				Food gap	
				SQ	NR
2003	931	1,626	96	95	0
2008	1,122	1,806	111	125	0
2013	1,306	2,003	128	175	0

Food aid and grain production



1989-91 1999-2001

3-year average:

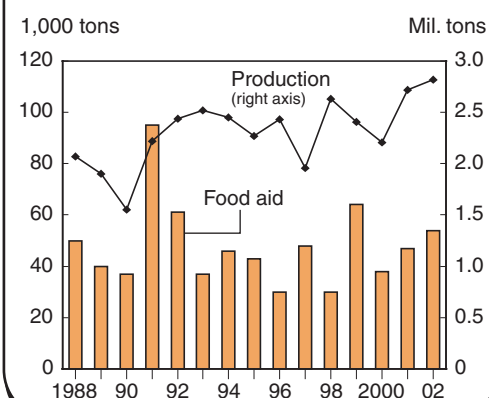
Total food aid, 1,000 tons	14.3	16.3
Food aid per capita, kg	3.1	2.5
	Percent	
Cereal food aid share of imports	5.8	10.6
Total food aid share of supplies	0.9	0.6

Statistical table 26—Burkina Faso

(West Africa)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grain equiv.)	Aggregate availability of all food
			1,000 tons		
1994	2,453	18	74	46	2,864
1995	2,265	27	77	43	2,698
1996	2,425	18	97	30	2,823
1997	1,959	18	97	48	2,401
1998	2,634	20	226	30	3,122
1999	2,412	21	244	64	3,027
2000	2,205	28	233	38	2,813
2001	2,715	37	141	47	3,172
2002	2,824	21	39	54	3,156
Projections				Food gap	
				SQ	NR
2003	2,915	29	134	0	0
2008	3,328	30	136	0	0
2013	3,899	31	133	15	14

Food aid and grain production



1989-91 1999-2001

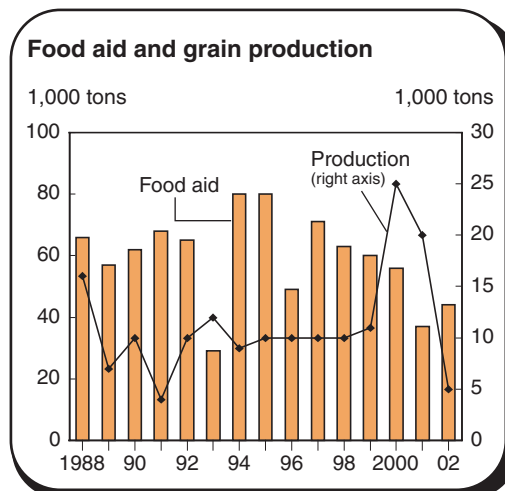
3-year average:

Total food aid, 1,000 tons	57.7	49.8
Food aid per capita, kg	6.4	4.2
	Percent	
Cereal food aid share of imports	33.6	16.8
Total food aid share of supplies	2.7	1.8

Statistical table 27—Cape Verde

(West Africa)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grain equiv.)	Aggregate availability of all food
			1,000 tons		
1994	9	2	5	80	138
1995	10	2	7	80	155
1996	10	2	10	49	118
1997	10	2	0	71	173
1998	10	2	8	63	135
1999	11	3	21	60	149
2000	25	3	8	56	150
2001	20	3	27	37	147
2002	5	3	0	44	84
Projections				Food gap	
				SQ	NR
2003	15	3	22	8	0
2008	21	3	23	12	0
2013	23	3	26	21	0

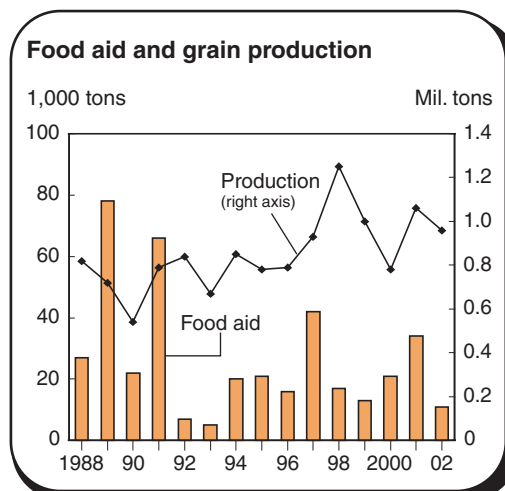


	1989-91	1999-2001
3-year average:		
Total food aid, 1,000 tons	62.3	51.2
Food aid per capita, kg	182.8	117.3
Percent		
Cereal food aid share of imports	82.1	73.3
Total food aid share of supplies	27.7	22.0

Statistical table 28—Chad

(West Africa)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grain equiv.)	Aggregate availability of all food
			1,000 tons		
1994	846	186	33	20	1,402
1995	779	219	19	21	1,483
1996	786	221	32	16	1,507
1997	933	225	18	42	1,733
1998	1,245	230	22	17	2,019
1999	1,000	239	40	13	1,824
2000	775	215	32	21	1,616
2001	1,056	236	32	34	1,952
2002	956	237	40	11	1,871
Projections				Food gap	
				SQ	NR
2003	1,060	238	35	76	267
2008	1,315	260	36	9	232
2013	1,553	283	36	8	266



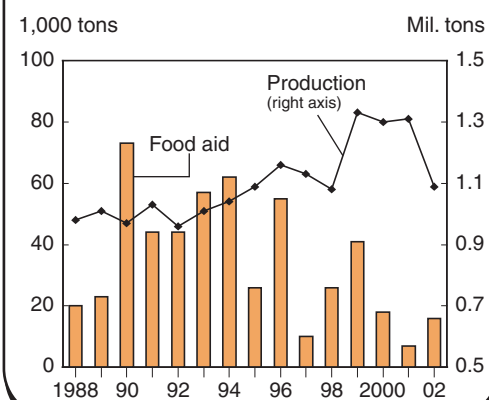
	1989-91	1999-2001
3-year average:		
Total food aid, 1,000 tons	55.3	22.6
Food aid per capita, kg	9.5	2.8
Percent		
Cereal food aid share of imports	72.7	37.3
Total food aid share of supplies	5.4	1.7

Statistical table 29—Côte d'Ivoire

(West Africa)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grain equiv.)	Aggregate availability of all food
			1,000 tons		
1994	1,042	1,671	423	62	3,922
1995	1,092	1,706	722	26	4,267
1996	1,160	1,745	513	55	4,170
1997	1,130	1,788	835	10	4,453
1998	1,078	1,760	1,144	26	4,781
1999	1,325	1,764	1,183	41	5,014
2000	1,295	1,772	1,625	18	5,595
2001	1,305	1,766	2,265	7	6,326
2002	1,090	1,792	284	16	4,302
Projections				Food gap	
				SQ	NR
2003	1,090	1,808	1,456	65	0
2008	1,438	1,936	1,522	16	0
2013	1,598	2,072	1,601	172	0

Food aid and grain production



1989-91 1999-2001

3-year average:

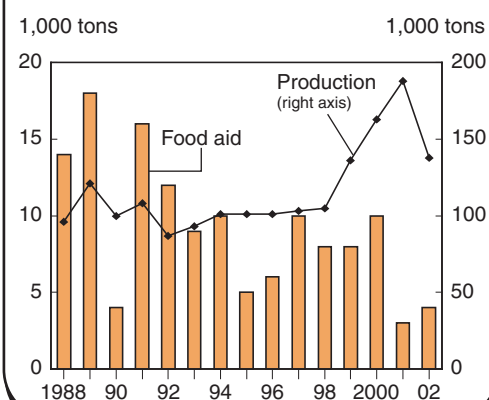
Total food aid, 1,000 tons	46.4	21.8
Food aid per capita, kg	3.7	1.3
	Percent	
Cereal food aid share of imports	7.6	1.3
Total food aid share of supplies	1.4	0.4

Statistical table 30—Gambia

(West Africa)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grain equiv.)	Aggregate availability of all food
			1,000 tons		
1993	93	2	80	11	279
1994	101	2	100	2	289
1995	101	2	96	3	306
1996	101	2	116	6	331
1997	78	2	134	5	325
1998	93	2	61	6	291
1999	134	2	62	6	335
2000	163	2	87	3	390
2001	183	2	161	5	491
Projections				Food gap	
				SQ	NR
2003	145	3	130	41	0
2008	214	3	130	10	0
2013	262	3	131	0	0

Food aid and grain production



1989-91 1999-2001

3-year average:

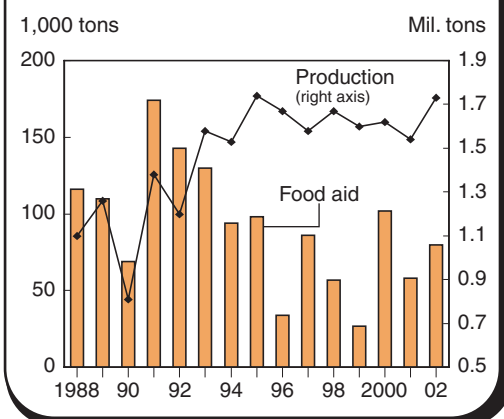
Total food aid, 1,000 tons	12.4	7.4
Food aid per capita, kg	13.3	5.5
	Percent	
Cereal food aid share of imports	12.9	3.7
Total food aid share of supplies	3.9	1.8

Statistical table 31—Ghana

(West Africa)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grain equiv.)	Aggregate availability of all food
			1,000 tons		
1994	1,532	2,382	414	94	4,479
1995	1,737	2,717	187	98	4,540
1996	1,673	2,960	113	34	4,589
1997	1,578	2,954	182	86	4,838
1998	1,665	3,100	340	57	4,987
1999	1,601	3,461	276	27	5,138
2000	1,615	3,540	375	102	5,316
2001	1,541	3,836	527	58	5,778
2002	1,728	4,183	243	80	6,114
Projections				Food gap	
				SQ	NR
2003	1,670	4,104	398	0	0
2008	2,013	4,559	457	0	0
2013	2,278	5,054	522	0	0

Food aid and grain production



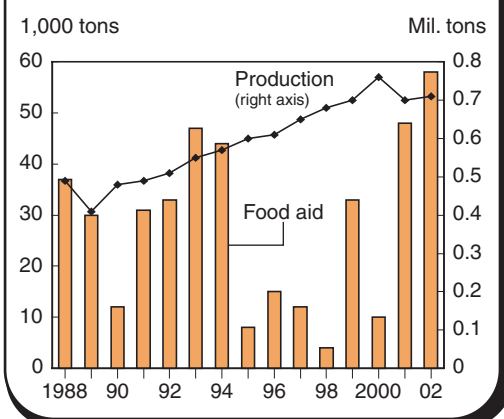
	1989-91	1999-2001
3-year average:		
Total food aid, 1,000 tons	117.5	62.3
Food aid per capita, kg	7.8	3.2
Percent		
Cereal food aid share of imports	31.7	10.5
Total food aid share of supplies	3.5	1.1

Statistical table 32—Guinea

(West Africa)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grain equiv.)	Aggregate availability of all food
			1,000 tons		
1994	574	287	349	44	1,780
1995	600	299	407	8	1,877
1996	610	319	295	15	1,829
1997	645	361	296	12	1,883
1998	677	372	252	4	1,903
1999	703	403	226	33	2,030
2000	756	411	287	10	2,048
2001	704	448	330	48	2,119
2002	710	454	83	58	1,926
Projections				Food gap	
				SQ	NR
2003	710	445	239	77	21
2008	915	485	249	0	0
2013	1,052	527	259	19	0

Food aid and grain production



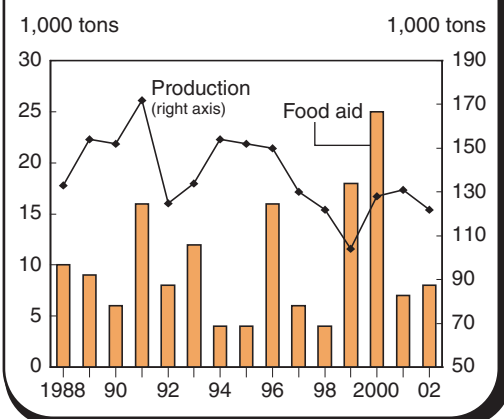
	1989-91	1999-2001
3-year average:		
Total food aid, 1,000 tons	24.3	30.6
Food aid per capita, kg	4.0	3.7
Percent		
Cereal food aid share of imports	7.9	14.1
Total food aid share of supplies	2.3	1.9

Statistical table 33—Guinea-Bissau

(West Africa)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grain equiv.)	Aggregate availability of all food
			1,000 tons		
1994	154	24	64	4	314
1995	152	25	61	4	311
1996	150	28	52	16	307
1997	130	31	85	6	330
1998	122	32	40	4	277
1999	104	33	54	18	287
2000	128	33	68	25	327
2001	131	34	72	7	329
2002	122	34	0	8	245
Projections				Food gap	
				SQ	NR
2003	137	34	75	1	0
2008	160	36	90	0	0
2013	188	38	105	0	0

Food aid and grain production



1989-91 1999-2001

3-year average:

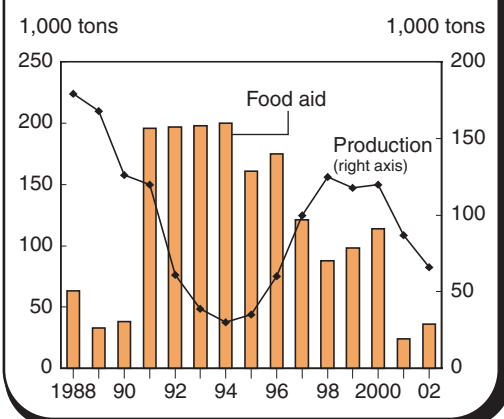
Total food aid, 1,000 tons	10.5	16.5
Food aid per capita, kg	11.1	13.4
	Percent	
Cereal food aid share of imports	16.4	14.7
Total food aid share of supplies	3.3	5.3

Statistical table 34—Liberia

(West Africa)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grain equiv.)	Aggregate availability of all food
			1,000 tons		
1994	30	131	0	200	448
1995	35	99	0	161	444
1996	60	116	57	175	535
1997	100	145	63	121	570
1998	125	156	145	88	681
1999	118	180	76	98	649
2000	120	216	82	114	744
2001	87	232	85	24	658
2002	66	232	21	36	628
Projections				Food gap	
				SQ	NR
2003	66	232	67	122	161
2008	108	251	64	240	289
2013	116	271	65	390	448

Food aid and grain production



1989-91 1999-2001

3-year average:

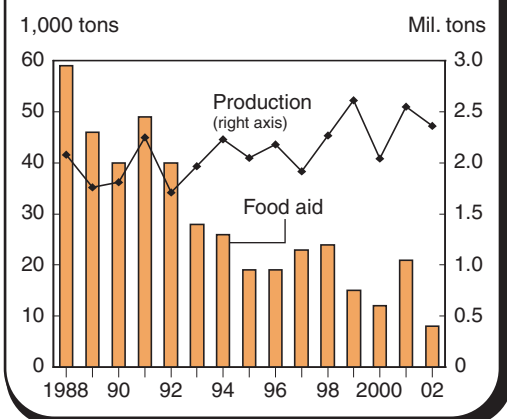
Total food aid, 1,000 tons	88.8	78.5
Food aid per capita, kg	41.4	25.5
	Percent	
Cereal food aid share of imports	58.3	40.3
Total food aid share of supplies	17.2	14.4

Statistical table 35—Mali

(West Africa)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grain equiv.)	Aggregate availability of all food
			1,000 tons		
1994	2,234	7	22	26	2,781
1995	2,050	8	75	19	2,655
1996	2,177	9	94	19	2,741
1997	1,915	10	50	23	2,390
1998	2,270	12	144	24	2,856
1999	2,610	32	146	15	3,017
2000	2,042	23	103	12	2,864
2001	2,554	37	82	21	3,111
2002	2,362	43	0	8	2,900
Projections				Food gap	
				SQ	NR
2003	2,528	37	101	68	0
2008	3,054	42	117	0	0
2013	3,534	47	134	0	0

Food aid and grain production



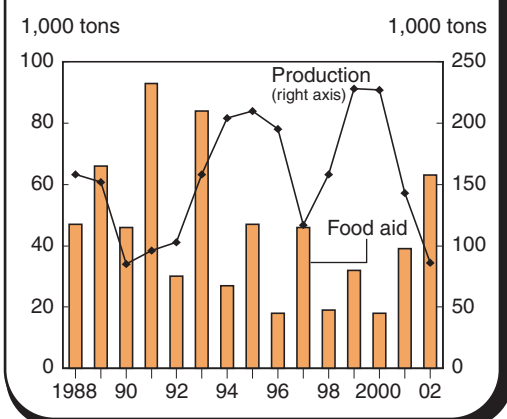
	1989-91	1999-2001
3-year average:		
Total food aid, 1,000 tons	45.0	15.9
Food aid per capita, kg	5.1	1.4
Percent		
Cereal food aid share of imports	49.0	11.2
Total food aid share of supplies	2.1	0.6

Statistical table 36—Mauritania

(West Africa)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grain equiv.)	Aggregate availability of all food
			1,000 tons		
1994	204	1	198	27	693
1995	210	1	185	47	742
1996	195	1	270	18	779
1997	117	1	327	46	779
1998	158	1	782	19	906
1999	228	2	471	32	951
2000	227	2	251	18	864
2001	143	2	219	39	781
2002	86	2	259	63	783
Projections				Food gap	
				SQ	NR
2003	133	2	268	129	0
2008	243	2	257	106	0
2013	268	2	264	209	0

Food aid and grain production

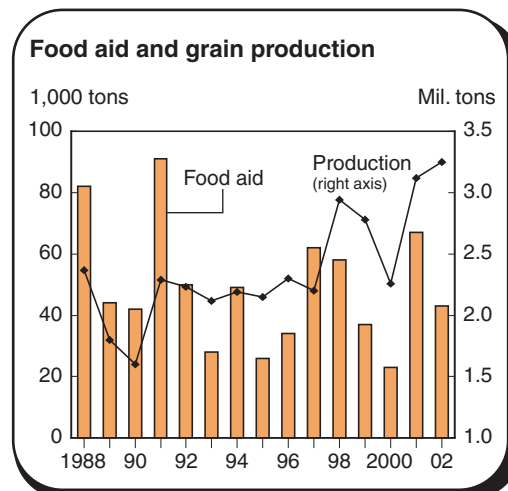


	1989-91	1999-2001
3-year average:		
Total food aid, 1,000 tons	68.3	29.6
Food aid per capita, kg	34.3	10.8
Percent		
Cereal food aid share of imports	25.3	8.0
Total food aid share of supplies	13.7	4.3

Statistical table 37—Niger

(West Africa)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grain equiv.)	Aggregate availability of all food
			1,000 tons		
1994	2,190	49	73	49	2,591
1995	2,153	56	61	26	2,576
1996	2,296	62	71	34	2,830
1997	2,195	76	124	62	3,000
1998	2,940	99	197	58	3,792
1999	2,776	60	126	37	3,569
2000	2,260	95	237	23	3,257
2001	3,115	60	242	67	4,097
2002	3,254	60	25	43	4,040
Projections				Food gap	
				SQ	NR
2003	2,945	78	172	322	0
2008	3,524	89	180	421	0
2013	4,019	101	185	751	0

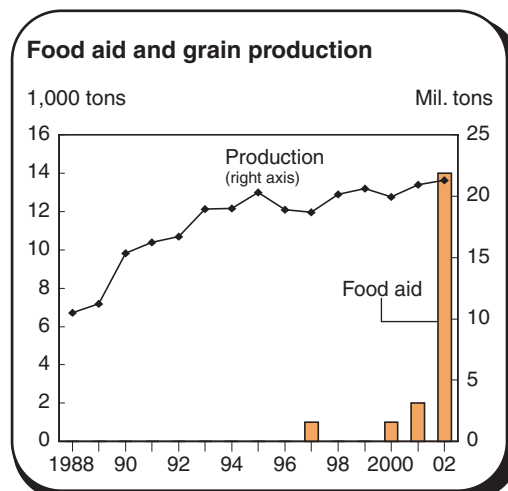


	1989-91	1999-2001
3-year average:		
Total food aid, 1,000 tons	59.0	42.1
Food aid per capita, kg	7.6	3.7
Percent		
Cereal food aid share of imports	50.3	16.5
Total food aid share of supplies	2.7	1.3

Statistical table 38—Nigeria

(West Africa)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grain equiv.)	Aggregate availability of all food
			1,000 tons		
1994	19,017	16,347	1,178	0	34,148
1995	20,302	16,636	1,023	0	35,530
1996	18,885	16,849	1,259	0	35,018
1997	18,700	17,453	1,885	1	35,421
1998	20,145	18,482	2,132	0	37,392
1999	20,605	19,209	2,418	0	39,305
2000	19,945	19,131	3,051	1	39,344
2001	20,950	19,359	3,687	2	43,822
2002	21,300	20,077	2,736	14	44,904
Projections				Food gap	
				SQ	NR
2003	21,655	20,272	3,195	0	0
2008	24,687	22,024	3,444	0	0
2013	27,384	23,891	3,637	1,296	0

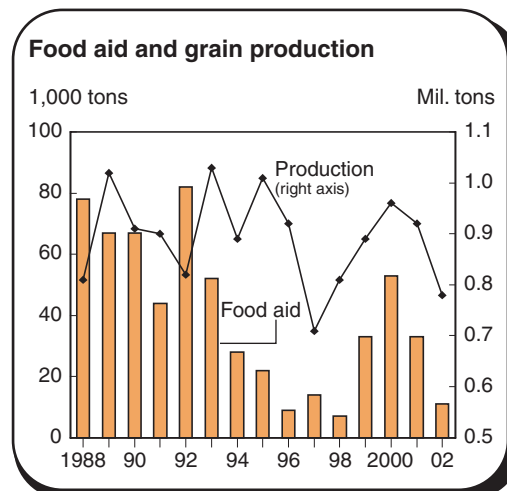


	1989-91	1999-2001
3-year average:		
Total food aid, 1,000 tons	0.0	1.1
Food aid per capita, kg	0.0	0.0
Percent		
Cereal food aid share of imports	0.0	0.0
Total food aid share of supplies	0.0	0.0

Statistical table 39—Senegal

(West Africa)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grain equiv.)	Aggregate availability of all food
			1,000 tons		
1994	886	31	554	28	2,335
1995	1,005	25	679	22	2,557
1996	917	16	762	9	2,603
1997	706	20	592	14	2,329
1998	805	25	850	7	2,809
1999	886	39	857	33	2,672
2000	955	49	752	53	2,816
2001	921	50	985	33	2,832
2002	778	41	292	11	2,132
Projections				Food gap	
				SQ	NR
2003	885	47	703	0	0
2008	1,098	49	751	0	0
2013	1,241	51	797	0	0

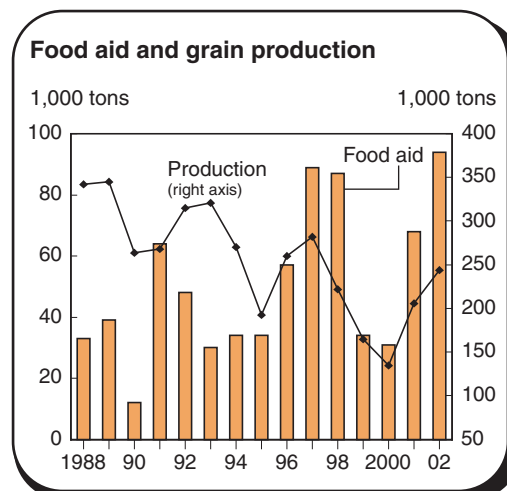


	1989-91	1999-2001
3-year average:		
Total food aid, 1,000 tons	59.3	39.5
Food aid per capita, kg	8.1	4.1
	Percent	
Cereal food aid share of imports	9.0	3.7
Total food aid share of supplies	3.5	2.0

Statistical table 40—Sierra Leone

(West Africa)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grain equiv.)	Aggregate availability of all food
			1,000 tons		
1994	270	104	235	34	914
1995	193	95	248	34	921
1996	260	118	212	57	922
1997	282	129	127	89	784
1998	222	119	160	87	787
1999	165	93	159	34	781
2000	135	97	166	31	810
2001	206	104	161	68	856
2002	244	104	0	94	895
Projections				Food gap	
				SQ	NR
2003	248	107	102	52	305
2008	260	115	105	180	479
2013	297	125	103	252	592

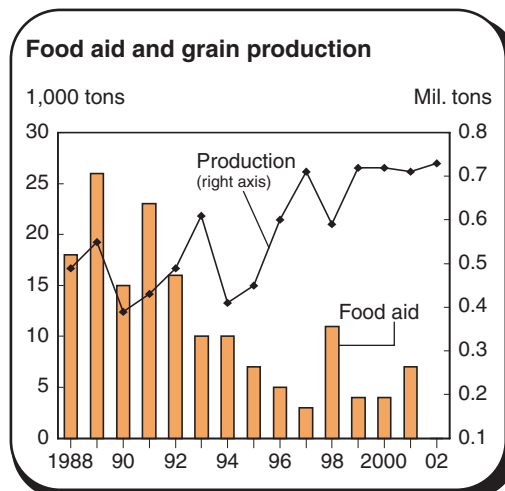


	1989-91	1999-2001
3-year average:		
Total food aid, 1,000 tons	38.6	44.4
Food aid per capita, kg	9.5	9.6
	Percent	
Cereal food aid share of imports	21.1	14.9
Total food aid share of supplies	6.6	8.2

Statistical table 41—Togo

(West Africa)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grain equiv.)	Aggregate availability of all food
			1,000 tons		
1994	405	378	46	10	727
1995	450	416	62	7	872
1996	600	423	81	5	1,060
1997	705	470	99	3	1,169
1998	586	470	184	11	1,167
1999	718	508	121	4	1,223
2000	718	468	92	4	1,173
2001	705	442	179	7	1,208
2002	731	443	100	0	1,229
Projections				Food gap	
				SQ	NR
2003	720	468	126	82	13
2008	928	523	132	20	0
2013	1,069	585	137	25	0

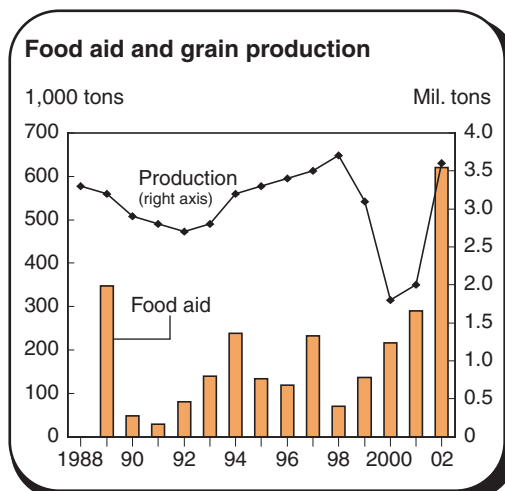


	1989-91	1999-2001
3-year average:		
Total food aid, 1,000 tons	21.3	5.1
Food aid per capita, kg	6.2	1.1
	Percent	
Cereal food aid share of imports	15.7	3.8
Total food aid share of supplies	2.2	0.4

Statistical table 42—Afghanistan

(Asia)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grain equiv.)	Aggregate availability of all food
			1,000 tons		
1994	3,158	88	47	238	3,671
1995	3,310	90	77	134	4,101
1996	3,378	90	75	119	4,086
1997	3,520	90	32	233	4,171
1998	3,675	90	105	71	3,644
1999	3,124	90	170	136	3,741
2000	1,763	92	518	216	3,862
2001	1,966	90	1,046	290	4,006
2002	3,591	92	549	620	4,180
Projections				Food gap	
				SQ	NR
2003	5,371	96	701	0	0
2008	4,451	109	763	374	1,058
2013	5,698	123	742	87	880

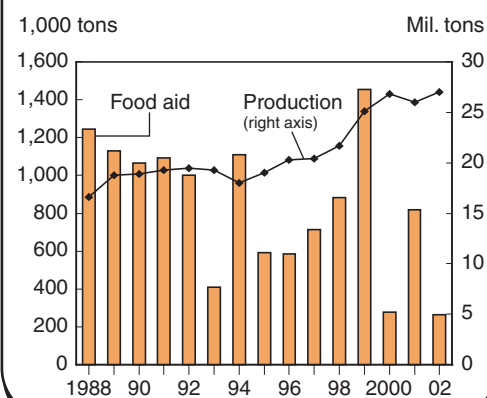


	1989-91	1999-2001
3-year average:		
Total food aid, 1,000 tons	141.2	214.1
Food aid per capita, kg	10.3	9.5
	Percent	
Cereal food aid share of imports	53.3	25.2
Total food aid share of supplies	4.2	6.7

Statistical table 43—Bangladesh

(Asia)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grain equiv.)	Aggregate availability of all food
			1,000 tons		
1994	18,011	457	0	1,110	21,947
1995	18,979	467	1,809	592	25,161
1996	20,299	472	1,719	587	26,614
1997	20,365	469	908	715	26,031
1998	21,706	478	1,300	883	27,383
1999	25,104	771	3,323	1,453	34,279
2000	26,809	812	1,866	276	32,552
2001	25,970	876	1,023	818	33,628
2002	26,960	874	941	263	33,385
Projections				Food gap	
				SQ	NR
2003	27,700	879	1,384	0	0
2008	31,560	947	1,571	0	0
2013	35,504	1,020	1,746	0	0

Food aid and grain production


1989-91 1999-2001

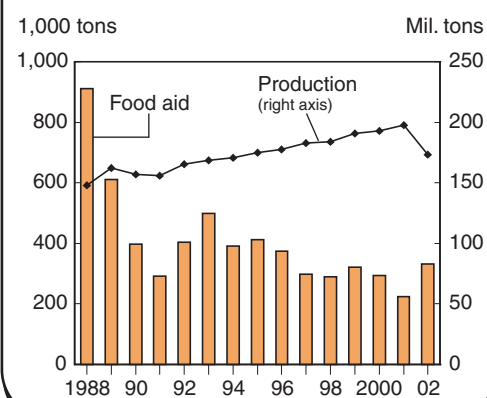
3-year average:

Total food aid, 1,000 tons	1,095.2	849.4
Food aid per capita, kg	10.0	6.1
	Percent	
Cereal food aid share of imports	60.0	28.8
Total food aid share of supplies	5.2	2.9

Statistical table 44—India

(Asia)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grain equiv.)	Aggregate availability of all food
			1,000 tons		
1994	170,844	6,186	0	391	244,693
1995	174,870	6,132	0	412	249,731
1996	177,758	6,383	374	374	255,889
1997	182,842	7,778	1,279	299	261,326
1998	184,020	6,371	1,597	290	260,453
1999	190,960	7,899	1,353	322	267,404
2000	192,871	8,164	0	293	263,036
2001	197,442	7,592	0	225	278,838
2002	173,170	8,059	38	331	281,347
Projections				Food gap	
				SQ	NR
2003	189,500	8,251	283	0	0
2008	216,347	9,035	341	0	0
2013	238,342	9,882	400	0	0

Food aid and grain production


1989-91 1999-2001

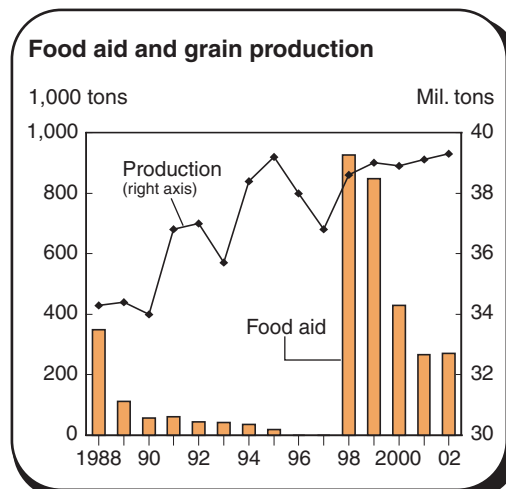
3-year average:

Total food aid, 1,000 tons	433.4	280.0
Food aid per capita, kg	0.5	0.3
	Percent	
Cereal food aid share of imports	101.0	38.6
Total food aid share of supplies	0.3	0.1

Statistical table 45—Indonesia

(Asia)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grain equiv.)	Aggregate availability of all food
			1,000 tons		
1994	38,433	5,695	5,078	37	55,610
1995	39,215	5,755	8,398	19	62,473
1996	38,034	6,204	6,948	0	61,403
1997	36,818	5,496	5,087	0	56,017
1998	38,647	5,452	5,779	927	59,278
1999	39,000	5,876	7,765	848	64,294
2000	38,860	5,836	6,456	429	62,685
2001	39,089	6,097	4,539	266	60,652
2002	39,300	5,965	5,067	271	61,101
Projections				Food gap	
				SQ	NR
2003	39,800	6,150	6,036	0	0
2008	44,462	6,620	6,941	0	0
2013	48,469	7,119	7,736	0	0

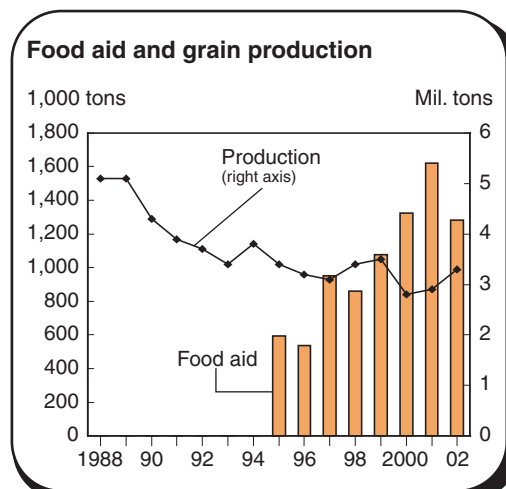


	1989-91	1999-2001
3-year average:		
Total food aid, 1,000 tons	76.9	514.3
Food aid per capita, kg	0.4	2.4
Percent		
Cereal food aid share of imports	3.3	7.3
Total food aid share of supplies	0.2	1.0

Statistical table 46—Korea, Democratic Republic

(Asia)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grain equiv.)	Aggregate availability of all food
			1,000 tons		
1994	3,825	232	573	0	5,343
1995	3,375	176	416	593	5,485
1996	3,175	207	583	537	5,381
1997	3,075	334	556	952	5,794
1998	3,400	513	712	859	6,347
1999	3,450	595	202	1,076	6,225
2000	2,800	655	493	1,325	6,269
2001	2,930	785	416	1,622	6,662
2002	3,295	674	0	1,282	5,809
Projections				Food gap	
				SQ	NR
2003	3,120	726	444	247	0
2008	3,433	792	447	254	0
2013	3,612	864	442	334	0



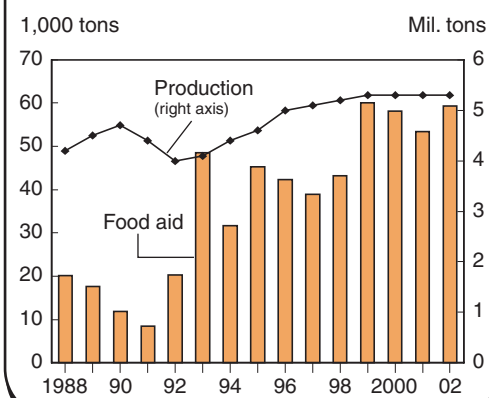
	1989-91	1999-2001
3-year average:		
Total food aid, 1,000 tons	0.0	1,340.7
Food aid per capita, kg	0.0	51.9
Percent		
Cereal food aid share of imports	0.0	77.3
Total food aid share of supplies	0.0	24.6

Statistical table 47—Nepal

(Asia)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grain equiv.)	Aggregate availability of all food
			1,000 tons		
1994	4,427	205	40	32	5,176
1995	4,585	215	3	45	5,375
1996	4,985	228	36	42	5,657
1997	5,110	250	4	39	5,442
1998	5,165	235	0	43	5,780
1999	5,308	270	0	60	6,012
2000	5,310	291	162	58	6,285
2001	5,340	322	12	53	6,157
2002	5,340	358	0	59	6,205
Projections				Food gap	
				SQ	NR
2003	5,340	335	49	408	0
2008	6,258	362	58	165	0
2013	7,005	392	68	154	0

Food aid and grain production



1989-91 1999-2001

3-year average:

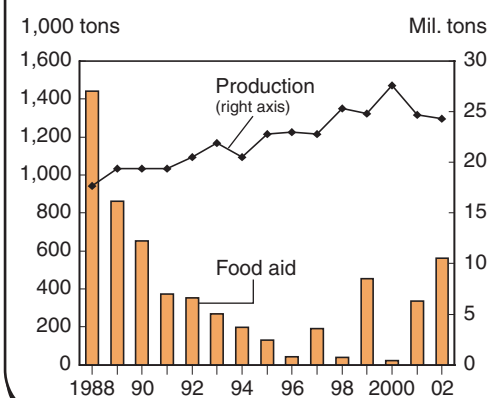
Total food aid, 1,000 tons	12.6	57.2
Food aid per capita, kg	0.7	2.4
	Percent	
Cereal food aid share of imports	101.9	43.0
Total food aid share of supplies	0.3	1.0

Statistical table 48—Pakistan

(Asia)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grain equiv.)	Aggregate availability of all food
			1,000 tons		
1994	20,537	331	1,818	196	34,553
1995	22,833	343	2,612	131	36,583
1996	23,013	336	1,962	41	36,945
1997	22,826	316	2,323	191	37,005
1998	25,285	425	2,512	40	39,089
1999	24,830	516	2,808	455	41,060
2000	27,599	531	1,041	24	41,596
2001	24,730	487	103	335	38,691
2002	24,304	500	275	562	40,908
Projections				Food gap	
				SQ	NR
2003	24,550	530	1,618	0	0
2008	30,743	591	1,773	0	0
2013	34,896	659	1,930	0	0

Food aid and grain production



1989-91 1999-2001

3-year average:

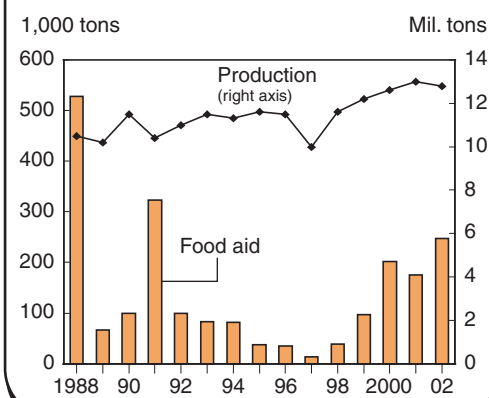
Total food aid, 1,000 tons	628.9	271.1
Food aid per capita, kg	5.7	1.9
	Percent	
Cereal food aid share of imports	20.3	11.5
Total food aid share of supplies	2.9	1.0

Statistical table 49—Philippines

(Asia)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grain equiv.)	Aggregate availability of all food
			1,000 tons		
1994	11,343	972	2,174	82	18,513
1995	11,587	978	2,597	37	18,224
1996	11,480	984	3,198	35	20,109
1997	10,016	992	3,465	14	19,550
1998	11,568	893	4,772	38	21,189
1999	12,221	942	3,042	97	20,019
2000	12,643	900	3,621	201	20,771
2001	12,955	857	3,772	175	21,377
2002	12,750	859	3,701	247	22,335
Projections				Food gap	
				SQ	NR
2003	12,900	893	3,892	0	0
2008	14,801	950	4,551	0	0
2013	16,368	1,009	5,190	0	0

Food aid and grain production



1989-91 1999-2001

3-year average:

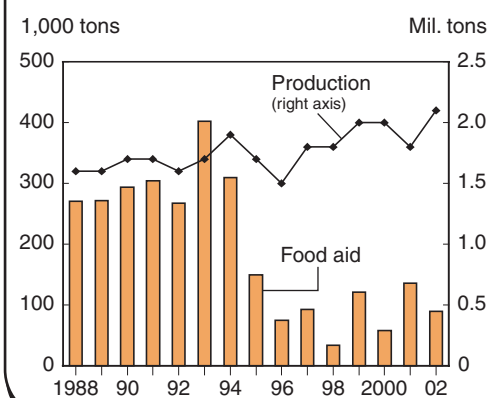
Total food aid, 1,000 tons	163.3	157.8
Food aid per capita, kg	2.7	2.0
	Percent	
Cereal food aid share of imports	3.5	3.2
Total food aid share of supplies	1.2	0.9

Statistical table 50—Sri Lanka

(Asia)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grain equiv.)	Aggregate availability of all food
			1,000 tons		
1994	1,905	140	622	309	4,834
1995	1,679	138	985	149	4,857
1996	1,502	137	1,191	75	4,738
1997	1,758	118	1,197	92	4,995
1998	1,845	107	1,158	33	5,172
1999	1,962	105	1,105	121	5,222
2000	1,955	111	975	58	5,250
2001	1,835	108	824	136	5,235
2002	2,073	108	765	89	5,219
Projections				Food gap	
				SQ	NR
2003	2,123	111	915	0	0
2008	2,087	117	1,029	0	0
2013	2,176	123	1,119	0	0

Food aid and grain production



1989-91 1999-2001

3-year average:

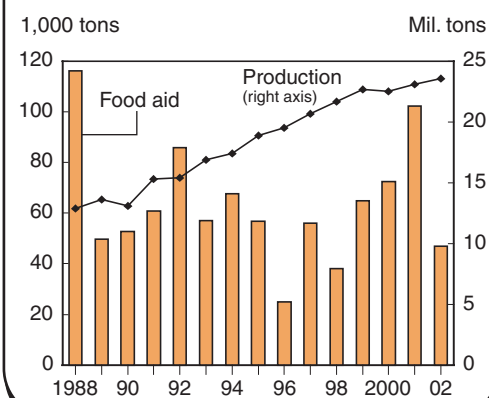
Total food aid, 1,000 tons	289.8	104.8
Food aid per capita, kg	17.0	5.5
	Percent	
Cereal food aid share of imports	29.2	9.1
Total food aid share of supplies	9.9	3.2

Statistical table 51—Vietnam

(Asia)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grain equiv.)	Aggregate availability of all food
			1,000 tons		
1994	17,390	1,400	322	68	18,617
1995	18,860	1,281	444	57	19,747
1996	19,540	1,246	490	25	19,041
1997	20,744	1,356	427	56	19,973
1998	21,720	1,120	630	38	21,134
1999	22,676	1,182	646	65	20,306
2000	22,478	1,194	786	72	22,145
2001	23,148	1,465	786	102	22,298
2002	23,580	1,910	930	47	23,502
Projections				Food gap	
				SQ	NR
2003	23,250	1,569	894	0	0
2008	29,945	1,733	1,093	0	0
2013	36,028	1,912	1,330	0	0

Food aid and grain production



1989-91 1999-2001

3-year average:

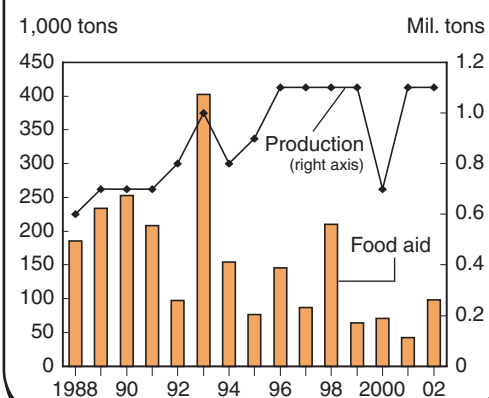
Total food aid, 1,000 tons	54.4	79.8
Food aid per capita, kg	0.8	1.0
	Percent	
Cereal food aid share of imports	18.6	9.5
Total food aid share of supplies	0.3	0.3

Statistical table 52—Bolivia

(Latin America & Caribbean)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grain equiv.)	Aggregate availability of all food
			1,000 tons		
1994	839	266	201	154	1,800
1995	850	263	286	76	1,926
1996	1,055	270	86	146	1,932
1997	1,134	282	116	87	1,984
1998	1,061	263	0	210	2,005
1999	1,069	303	287	64	2,162
2000	695	407	395	71	2,355
2001	1,058	401	368	42	2,354
2002	1,051	411	419	98	2,498
Projections				Food gap	
				SQ	NR
2003	1,050	426	398	0	0
2008	1,179	479	446	0	0
2013	1,391	538	483	0	0

Food aid and grain production



1989-91 1999-2001

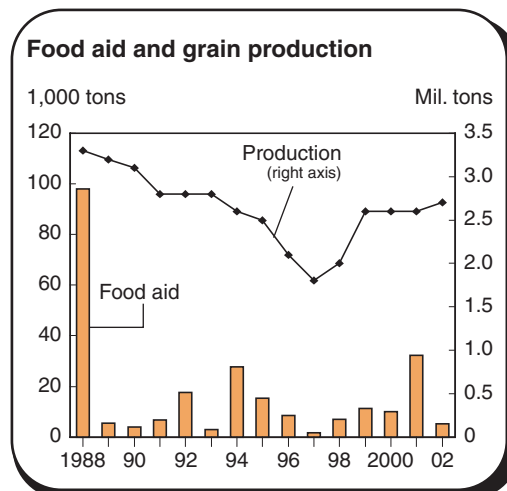
3-year average:

Total food aid, 1,000 tons	231.6	59.1
Food aid per capita, kg	35.2	6.9
	Percent	
Cereal food aid share of imports	70.9	13.5
Total food aid share of supplies	16.0	3.2

Statistical table 53—Colombia

(Latin America & Caribbean)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grain equiv.)	Aggregate availability of all food
			1,000 tons		
1994	2,610	1,257	2,325	28	10,413
1995	2,469	1,247	2,494	15	10,525
1996	2,129	1,296	3,172	9	11,296
1997	1,834	1,172	3,191	2	10,846
1998	2,026	1,116	3,682	7	11,796
1999	2,583	1,225	3,083	11	11,465
2000	2,633	1,273	2,253	10	11,086
2001	2,643	1,318	3,397	32	12,279
2002	2,671	1,334	3,213	5	12,425
Projections				Food gap	
				SQ	NR
2003	2,741	1,352	3,237	0	0
2008	2,791	1,458	4,310	0	0
2013	2,896	1,570	5,564	0	0

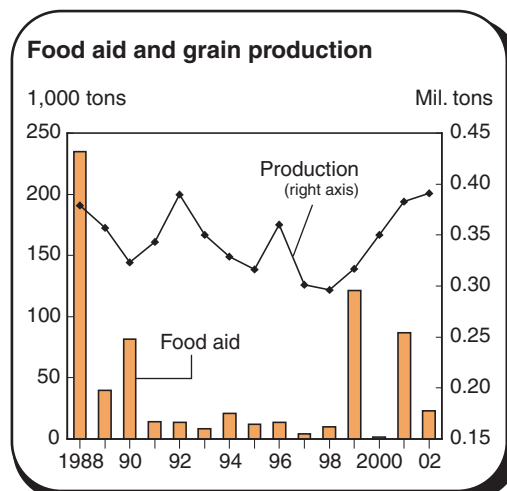


	1989-91	1999-2001
3-year average:		
Total food aid, 1,000 tons	5.4	17.9
Food aid per capita, kg	0.2	0.4
	Percent	
Cereal food aid share of imports	0.5	0.6
Total food aid share of supplies	0.1	0.3

Statistical table 54—Dominican Republic

(Latin America & Caribbean)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grain equiv.)	Aggregate availability of all food
			1,000 tons		
1994	329	63	890	21	1,847
1995	316	85	982	12	1,934
1996	360	78	1,011	13	1,924
1997	301	64	1,118	4	2,076
1998	296	74	958	10	1,815
1999	317	84	1,318	122	2,022
2000	350	79	1,352	2	2,136
2001	383	87	1,401	87	2,229
2002	391	83	1,346	23	2,131
Projections				Food gap	
				SQ	NR
2003	398	88	1,564	0	0
2008	392	98	2,418	0	0
2013	394	108	3,689	0	0

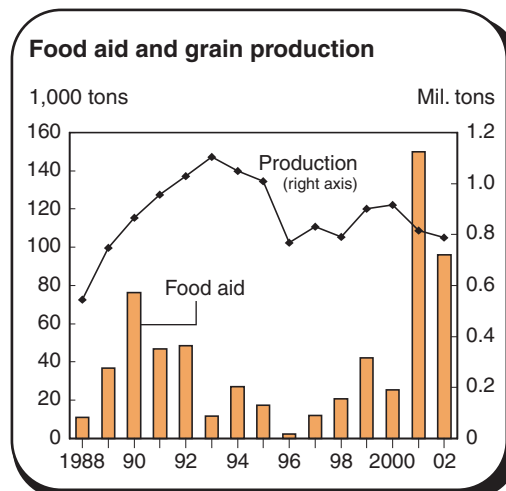


	1989-91	1999-2001
3-year average:		
Total food aid, 1,000 tons	45.1	70.0
Food aid per capita, kg	6.4	8.2
	Percent	
Cereal food aid share of imports	1.0	1.7
Total food aid share of supplies	3.6	3.5

Statistical table 55—Ecuador

(Latin America & Caribbean)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grain equiv.)	Aggregate availability of all food
			1,000 tons		
1994	1,050	137	343	27	2,749
1995	1,009	123	358	17	2,722
1996	767	120	432	2	3,047
1997	831	164	622	12	2,865
1998	791	136	985	21	3,250
1999	901	143	705	42	3,219
2000	917	73	588	25	3,204
2001	816	117	550	150	3,020
2002	788	98	624	96	3,082
Projections				Food gap	
				SQ	NR
2003	797	97	732	0	139
2008	974	104	1,215	0	0
2013	981	112	1,988	0	0

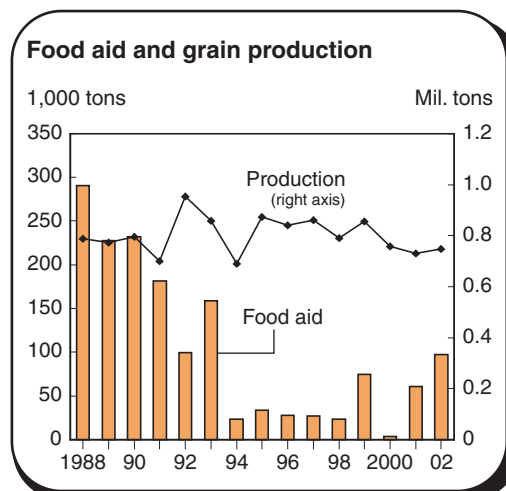


	1989-91	1999-2001
3-year average:		
Total food aid, 1,000 tons	53.4	72.5
Food aid per capita, kg	5.2	5.6
Percent		
Cereal food aid share of imports	10.5	8.3
Total food aid share of supplies	3.3	3.9

Statistical table 56—El Salvador

(Latin America & Caribbean)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grain equiv.)	Aggregate availability of all food
			1,000 tons		
1994	690	32	426	24	1,529
1995	873	27	370	33	1,443
1996	841	26	353	27	1,178
1997	860	23	527	27	1,675
1998	790	20	364	23	1,299
1999	855	25	105	75	1,112
2000	759	24	678	3	1,594
2001	731	25	709	60	1,818
2002	748	24	630	98	1,709
Projections				Food gap	
				SQ	NR
2003	755	26	797	0	0
2008	841	29	1,214	0	0
2013	903	33	1,860	0	0



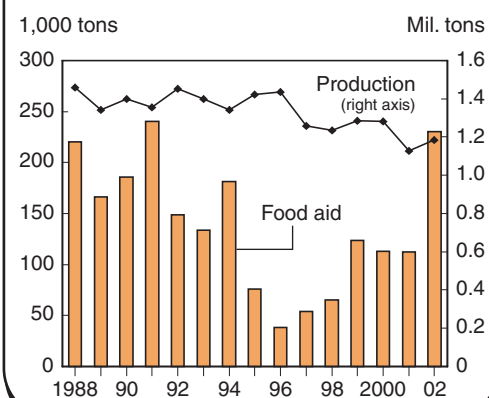
	1989-91	1999-2001
3-year average:		
Total food aid, 1,000 tons	213.6	46.1
Food aid per capita, kg	41.8	7.2
Percent		
Cereal food aid share of imports	63.3	4.9
Total food aid share of supplies	18.6	3.1

Statistical table 57—Guatemala

(Latin America & Caribbean)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grain equiv.)	Aggregate availability of all food
			1,000 tons		
1994	1,343	47	369	181	2,398
1995	1,423	48	371	76	2,338
1996	1,436	49	566	38	2,352
1997	1,258	50	513	54	2,278
1998	1,235	51	674	65	2,414
1999	1,285	53	575	124	2,349
2000	1,283	55	557	113	2,320
2001	1,128	57	893	112	2,602
2002	1,186	62	750	230	2,707
Projections				Food gap	
				SQ	NR
2003	1,186	67	893	0	415
2008	1,329	80	1,559	0	0
2013	1,372	96	2,803	0	0

Food aid and grain production



1989-91 1999-2001

3-year average:

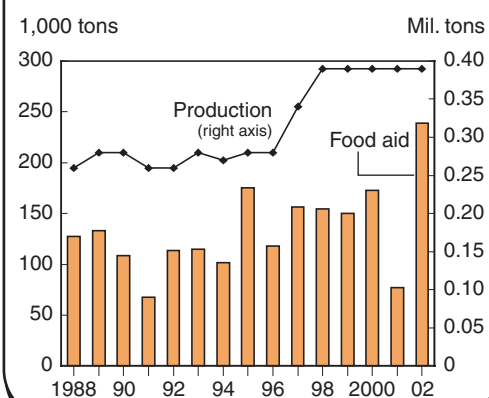
Total food aid, 1,000 tons	197.4	116.2
Food aid per capita, kg	22.6	9.9
Percent		
Cereal food aid share of imports	58.4	11.6
Total food aid share of supplies	10.8	5.4

Statistical table 58—Haiti

(Latin America & Caribbean)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grain equiv.)	Aggregate availability of all food
			1,000 tons		
1994	270	216	241	101	1,322
1995	280	219	331	175	1,569
1996	280	215	354	118	1,565
1997	340	211	316	157	1,679
1998	390	213	404	155	1,850
1999	390	217	403	150	1,867
2000	390	224	371	173	1,898
2001	390	219	430	77	1,836
2002	390	221	48	239	1,657
Projections				Food gap	
				SQ	NR
2003	390	226	279	0	335
2008	465	240	274	0	367
2013	495	254	267	52	484

Food aid and grain production



1989-91 1999-2001

3-year average:

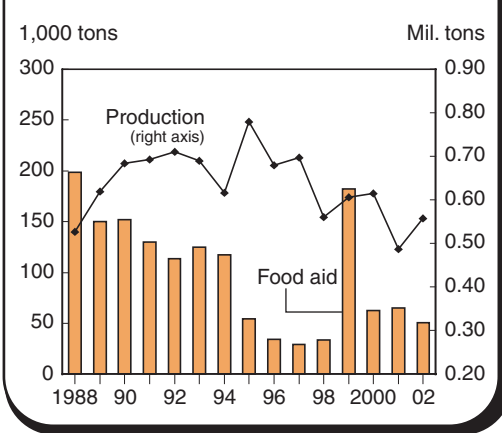
Total food aid, 1,000 tons	103.2	133.2
Food aid per capita, kg	14.9	16.1
Percent		
Cereal food aid share of imports	30.3	21.0
Total food aid share of supplies	11.8	10.9

Statistical table 59—Honduras

(Latin America & Caribbean)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grain equiv.)	Aggregate availability of all food
			1,000 tons		
1994	617	7	190	118	1,142
1995	780	7	200	54	1,194
1996	679	8	192	34	1,036
1997	697	8	353	29	1,384
1998	560	9	202	34	1,142
1999	606	9	287	182	1,273
2000	615	9	218	62	1,134
2001	487	9	447	65	1,395
2002	558	8	607	51	1,608
Projections				Food gap	
				SQ	NR
2003	598	9	463	0	253
2008	666	11	612	0	108
2013	753	13	789	0	0

Food aid and grain production



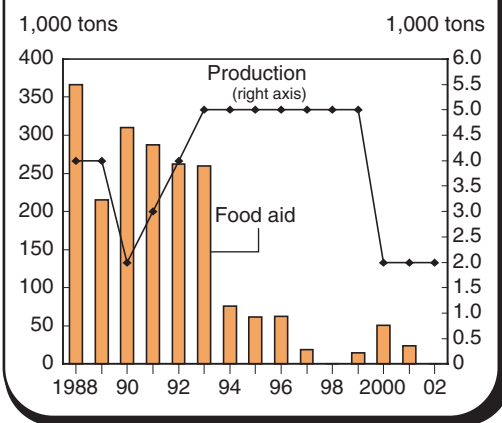
	1989-91	1999-2001
3-year average:		
Total food aid, 1,000 tons	144.1	103.2
Food aid per capita, kg	29.6	15.7
Percent		
Cereal food aid share of imports	70.5	18.5
Total food aid share of supplies	14.6	9.3

Statistical table 60—Jamaica

(Latin America & Caribbean)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grain equiv.)	Aggregate availability of all food
			1,000 tons		
1994	5	97	274	76	659
1995	5	102	366	62	711
1996	5	107	223	63	627
1997	5	87	415	19	746
1998	5	81	451	0	762
1999	5	81	426	14	731
2000	2	62	407	51	749
2001	2	66	459	23	755
2002	2	66	425	0	726
Projections				Food gap	
				SQ	NR
2003	2	65	454	0	0
2008	2	70	562	0	0
2013	2	76	678	0	0

Food aid and grain production



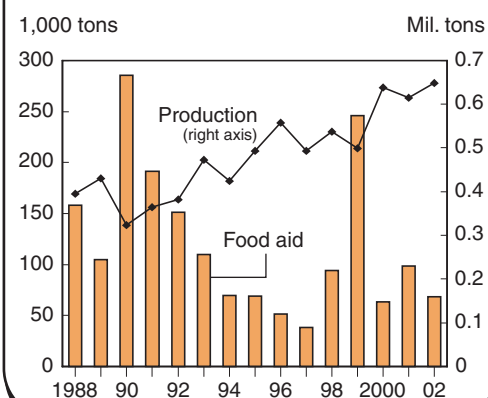
	1989-91	1999-2001
3-year average:		
Total food aid, 1,000 tons	270.7	29.5
Food aid per capita, kg	114.3	11.4
Percent		
Cereal food aid share of imports	71.8	6.0
Total food aid share of supplies	44.4	4.1

Statistical table 61—Nicaragua

(Latin America & Caribbean)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grain equiv.)	Aggregate availability of all food
			1,000 tons		
1994	425	21	129	70	979
1995	493	21	133	69	1,042
1996	558	21	159	52	1,048
1997	494	22	153	38	1,012
1998	537	21	105	94	1,035
1999	499	22	57	246	1,092
2000	639	22	152	63	993
2001	615	21	131	98	1,086
2002	649	22	118	68	1,121
Projections				Food gap	
				SQ	NR
2003	642	23	146	0	275
2008	747	25	176	0	276
2013	821	27	212	0	314

Food aid and grain production



1989-91 1999-2001

3-year average:

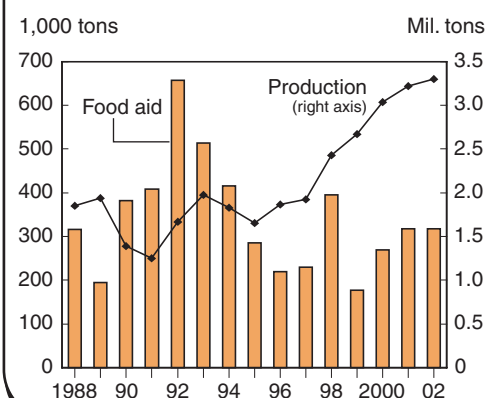
Total food aid, 1,000 tons	193.7	136.0
Food aid per capita, kg	50.7	26.1
	Percent	
Cereal food aid share of imports	85.5	40.0
Total food aid share of supplies	29.4	14.9

Statistical table 62—Peru

(Latin America & Caribbean)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grain equiv.)	Aggregate availability of all food
			1,000 tons		
1994	1,830	686	2,162	416	5,654
1995	1,654	850	2,266	286	6,299
1996	1,868	857	2,487	219	6,404
1997	1,927	917	2,451	230	5,800
1998	2,434	1,001	2,652	395	6,624
1999	2,672	1,137	2,505	177	6,934
2000	3,039	1,198	2,259	269	6,932
2001	3,222	1,045	2,280	318	7,063
2002	3,301	1,203	2,310	318	7,385
Projections				Food gap	
				SQ	NR
2003	3,441	1,200	2,543	0	0
2008	3,755	1,314	3,559	0	0
2013	4,025	1,436	4,887	0	0

Food aid and grain production



1989-91 1999-2001

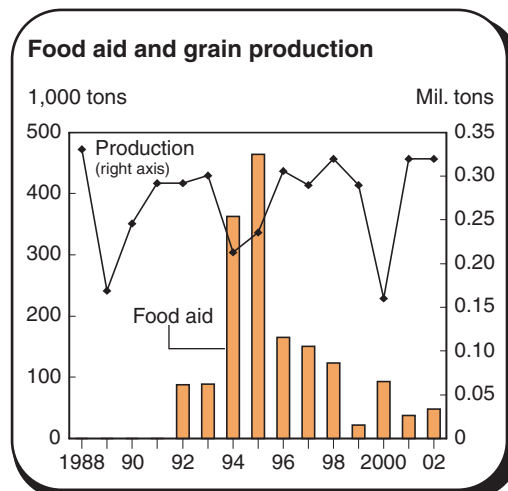
3-year average:

Total food aid, 1,000 tons	328.4	254.6
Food aid per capita, kg	15.2	9.8
	Percent	
Cereal food aid share of imports	18.1	3.1
Total food aid share of supplies	8.7	3.8

Statistical table 63—Armenia

(Commonwealth of Independent States)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grain equiv.)	Aggregate availability of all food
			1,000 tons		
1994	213	80	143	363	902
1995	236	82	0	464	1,017
1996	306	82	138	165	933
1997	290	69	244	151	1,004
1998	320	85	372	123	1,131
1999	290	80	290	22	960
2000	160	56	387	94	981
2001	320	70	338	38	998
2002	320	72	159	48	850
Projections				Food gap	
				SQ	NR
2003	300	67	287	0	0
2008	332	74	302	0	0
2013	358	82	311	0	0

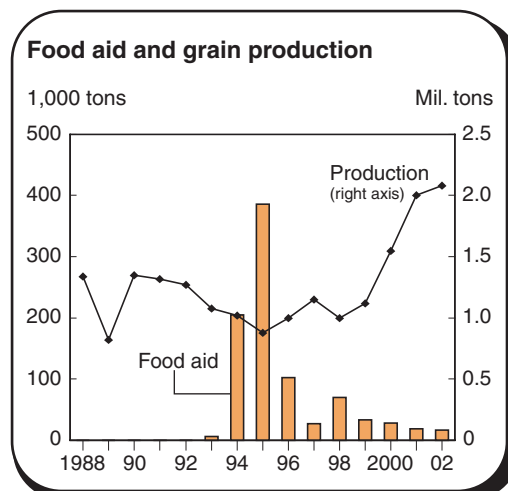


	1989-91	1999-2001
3-year average:		
Total food aid, 1,000 tons	--	51.1
Food aid per capita, kg	--	13.5
		Percent
Cereal food aid share of imports	--	10.0
Total food aid share of supplies	--	6.2

Statistical table 64—Azerbaijan

(Commonwealth of Independent States)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grain equiv.)	Aggregate availability of all food
			1,000 tons		
1994	1,015	29	472	205	1,966
1995	878	30	0	386	1,388
1996	1,000	41	476	102	1,912
1997	1,150	43	531	28	2,081
1998	1,002	60	632	71	2,139
1999	1,116	76	699	34	2,127
2000	1,550	91	748	28	2,511
2001	2,000	117	640	19	2,905
2002	2,080	134	784	17	3,119
Projections				Food gap	
				SQ	NR
2003	1,840	120	833	0	0
2008	2,036	133	863	0	0
2013	2,186	148	877	0	0

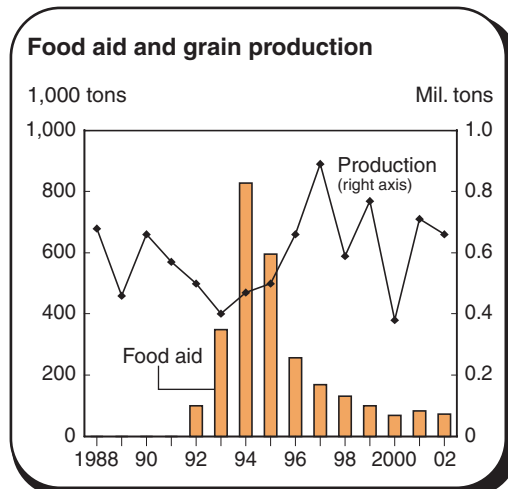


	1989-91	1999-2001
3-year average:		
Total food aid, 1,000 tons	--	26.7
Food aid per capita, kg	--	3.3
		Percent
Cereal food aid share of imports	--	2.7
Total food aid share of supplies	--	1.1

Statistical table 65—Georgia

(Commonwealth of Independent States)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grain equiv.)	Aggregate availability of all food
			1,000 tons		
1994	470	58	0	828	602
1995	497	69	0	595	1,155
1996	658	56	311	256	1,359
1997	891	69	321	168	1,222
1998	589	68	284	131	1,380
1999	771	87	192	100	1,269
2000	380	59	730	68	1,598
2001	705	83	125	84	1,046
2002	660	81	329	72	1,266
Projections				Food gap	
				SQ	NR
2003	660	75	399	0	0
2008	686	80	431	0	0
2013	728	85	452	0	0

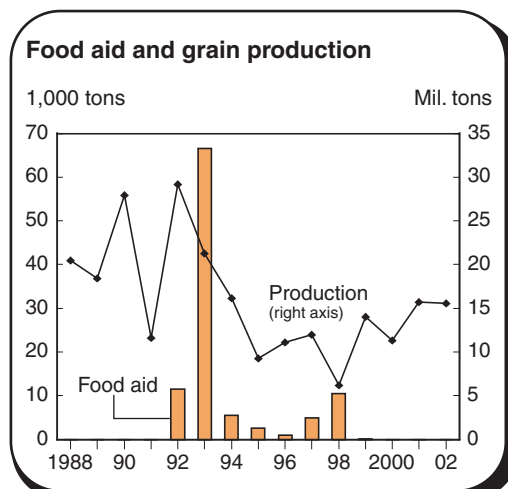


	1989-91	1999-2001
3-year average:		
Total food aid, 1,000 tons	--	84.0
Food aid per capita, kg	--	16.0
Percent		
Cereal food aid share of imports	--	17.1
Total food aid share of supplies	--	6.8

Statistical table 66—Kazakhstan

(Commonwealth of Independent States)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grain equiv.)	Aggregate availability of all food
			1,000 tons		
1994	16,182	399	8	6	7,216
1995	9,295	336	6	3	6,798
1996	11,087	324	19	1	5,501
1997	12,011	288	15	5	5,627
1998	6,235	247	21	10	4,960
1999	14,045	331	22	0	8,521
2000	11,305	331	18	0	3,245
2001	15,738	427	24	0	5,823
2002	15,575	441	15	0	6,843
Projections				Food gap	
				SQ	NR
2003	13,940	415	27	0	0
2008	14,084	442	24	0	0
2013	14,911	470	21	0	0

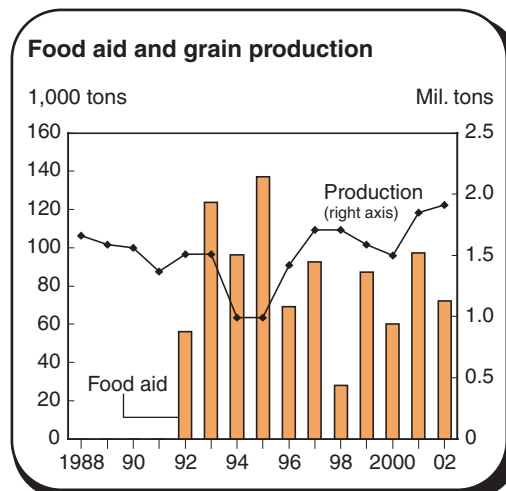


	1989-91	1999-2001
3-year average:		
Total food aid, 1,000 tons	--	0.0
Food aid per capita, kg	--	0.0
Percent		
Cereal food aid share of imports	--	0.0
Total food aid share of supplies	--	0.0

Statistical table 67—Kyrgyzstan

(Commonwealth of Independent States)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grain equiv.)	Aggregate availability of all food
			1,000 tons		
1994	993	60	9	96	1,002
1995	985	83	44	137	1,215
1996	1,415	108	99	69	1,427
1997	1,713	130	74	93	1,771
1998	1,713	149	117	28	1,639
1999	1,591	184	76	87	1,651
2000	1,503	201	177	60	1,780
2001	1,853	225	62	97	1,703
2002	1,908	239	124	72	1,787
Projections				Food gap	
				SQ	NR
2003	1,703	241	124	0	0
2008	1,962	274	136	0	0
2013	2,113	311	146	0	0

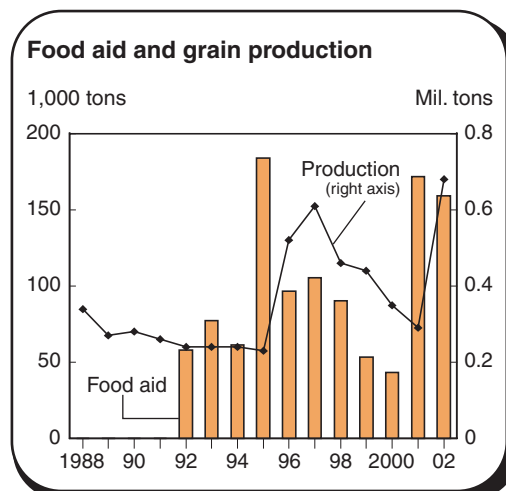


	1989-91	1999-2001
3-year average:		
Total food aid, 1,000 tons	--	81.5
Food aid per capita, kg	--	16.4
		Percent
Cereal food aid share of imports	--	34.3
Total food aid share of supplies	--	3.8

Statistical table 68—Tajikistan

(Commonwealth of Independent States)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grain equiv.)	Aggregate availability of all food
			1,000 tons		
1994	237	26	981	61	1,769
1995	226	22	450	184	1,350
1996	516	21	175	96	1,093
1997	606	25	272	105	1,318
1998	464	34	366	90	1,255
1999	437	46	388	53	1,232
2000	345	59	333	43	1,117
2001	292	61	329	172	1,203
2002	682	77	301	159	1,487
Projections				Food gap	
				SQ	NR
2003	772	67	320	0	0
2008	530	75	369	0	118
2013	570	83	378	0	146

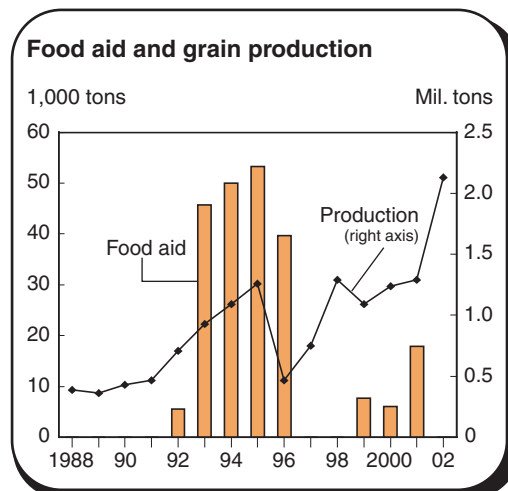


	1989-91	1999-2001
3-year average:		
Total food aid, 1,000 tons	--	113.7
Food aid per capita, kg	--	18.6
		Percent
Cereal food aid share of imports	--	20.3
Total food aid share of supplies	--	12.3

Statistical table 69—Turkmenistan

(Commonwealth of Independent States)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grain equiv.)	Aggregate availability of all food
			1,000 tons		
1994	1,093	6	354	50	1,176
1995	1,264	4	201	53	997
1996	465	4	462	40	1,206
1997	750	3	440	0	1,453
1998	1,287	5	187	0	1,392
1999	1,091	5	101	8	1,365
2000	1,238	6	69	6	1,342
2001	1,287	6	263	18	1,600
2002	2,130	5	12	0	1,807
Projections				Food gap	
				SQ	NR
2003	1,938	5	124	0	0
2008	1,914	6	137	0	0
2013	2,020	6	146	0	0

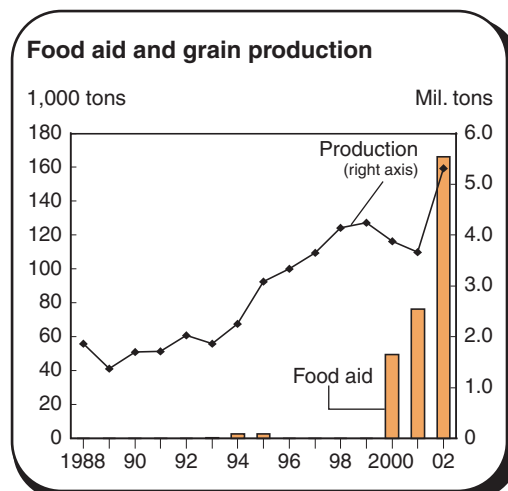


	1989-91	1999-2001
3-year average:		
Total food aid, 1,000 tons	--	10.5
Food aid per capita, kg	--	2.2
Percent		
Cereal food aid share of imports	--	5.0
Total food aid share of supplies	--	0.7

Statistical table 70—Uzbekistan

(Commonwealth of Independent States)

Year	Grain production	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grain equiv.)	Aggregate availability of all food
			1,000 tons		
1994	2,259	110	3,202	3	6,463
1995	3,077	85	1,486	3	5,887
1996	3,341	99	1,918	0	6,877
1997	3,650	134	797	0	6,422
1998	4,142	134	525	0	6,637
1999	4,254	127	725	0	6,857
2000	3,875	141	695	49	6,771
2001	3,672	142	577	76	6,379
2002	5,323	141	553	166	7,624
Projections				Food gap	
				SQ	NR
2003	5,425	152	603	0	0
2008	4,799	162	695	0	0
2013	5,068	173	753	0	0



	1989-91	1999-2001
3-year average:		
Total food aid, 1,000 tons	--	41.9
Food aid per capita, kg	--	1.7
Percent		
Cereal food aid share of imports	--	4.2
Total food aid share of supplies	--	0.9

Appendix 1—Food Security Model: Definition and Methodology

The Food Security Assessment model used in this report was developed by USDA's Economic Research Service for use in projecting food consumption and access and food gaps (previously called food needs) in low-income countries through 2013. In this report, we have renamed the region formerly called New Independent States (NIS) to the more commonly used Commonwealth of Independent States (CIS). The reference to food is divided into three groups: grains, root crops, and a category called "other," which includes all other commodities consumed, thus covering 100 percent of food consumption. All of these commodities are expressed in grain equivalent.

Food security of a country is evaluated based on the gap between projected domestic food consumption (produced domestically plus imported minus nonfood use) and a consumption requirement. For the first time, we are using total food aid data (cereal and non-cereal food commodities). These data are provided by the World Food Program (WFP). All food aid commodities were converted into grain equivalent based on calorie content to allow aggregation. For example: grain has roughly 3.5 calories per gram and tubers have about 1 calorie per gram. One ton of tubers is therefore equivalent to 0.29 tons of grain (1 divided by 3.5), one ton of vegetable oil (8 calories per gram) is equivalent to 2.29 tons of grain (8 divided by 3.5).

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

Food gaps are projected using two consumption criteria:

1) *Status quo target*, where the objective is to maintain average per capita consumption of the recent past. The most recent 3-year average (2000-2002) is used for the per capita consumption target to eliminate short-term fluctuations.

2) *Nutrition-based target*, where the objective is to maintain the daily caloric intake standards of about 2,100 calories per capita per day—depending on the region—recommended by the UN's Food and

Agriculture Organization (FAO). The caloric requirements (based on total share of grains, root crops, and "other") used in this assessment are those necessary to sustain life with minimum food-gathering activities.

The status quo measure embodies a "safety-net" criterion by providing food consumption stability at recently achieved levels. The nutrition-based target assists in comparisons of relative well-being. Comparing the two consumption measures either for countries or regions provides an indicator of the need depending on whether the objectives are to achieve consumption stability and/or to meet a nutritional standard. Large nutrition-based needs relative to status quo needs, for example, mean additional food must be provided if improved nutrition levels are the main objective. In cases where nutrition-based requirements are below status quo consumption needs, food availability could decline without risking nutritional adequacy, on average. Both methods, however, fail to address inequalities of food distribution within a country.

Structural Framework for Projecting Food Consumption in the Aggregate and by Income Group

Projection of food availability—The simulation framework used for projecting aggregate food availability is based on partial equilibrium recursive models of 70 lower income countries. The country models are synthetic, meaning that the parameters that are used are either cross-country estimates or are estimated by other studies. Each country model includes three commodity groups: grains, root crops, and "other." The production side of the grain and root crops are divided into yield and area response. Crop area is a function of 1-year lag return (real price times yield), while yield responds to input use. Commercial imports are assumed to be a function of domestic price, world commodity price, and foreign exchange availability. Food aid received by countries is assumed constant at the base level during the projection period. Foreign exchange availability is a key determinant of commercial food imports and is the sum of the value of export earnings and net flow of credit. Foreign exchange availability is assumed to be equal to foreign exchange use, meaning that foreign exchange reserve is assumed constant during the projection period. Countries are assumed to be price takers in the international market, meaning that world prices are exogenous

in the model. However, producer prices are linked to the international market. The projection of consumption for the “other” commodities is simply based on a trend that follows the projected growth in supply of the food crops (grains plus root crops). Although this is a very simplistic approach, it represents an improvement from the previous assessments where the contribution by commodities to the diet, such as meat and dairy products, was overlooked. The plan is to enhance this aspect of the model in the future.

For the commodity groups grains and root crops (c), food consumption (*FC*) is defined as domestic supply (*DS*) minus nonfood use (*NF*). *n* is a country index and *t* is a 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*), changes in stocks (*CSTK*), and food aid (*FA*).

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

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

$$PR_{cnt} = AR_{cnt} * YL_{cnt} \quad (4)$$

$$YL_{cnt} = f(LB_{cnt}, FR_{cnt}, K_{cnt}, T_{cnt}) \quad (5)$$

$$RPY_{cnt} = YL_{cnt} * DP_{cnt} \quad (6)$$

$$RNPY_{cnt} = NYL_{cnt} * NDP_{cnt} \quad (7)$$

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

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

The commercial import demand function is defined as:

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

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

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

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

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

$$P = P_1 + \dots + P_i \quad (13)$$

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

i = 1 to 5

where *C* and *Y* are known average per capita food consumption (all commodities in grain equivalent) and per capita income (all quintiles), *C_o* is total food consumption, *P* is the total population, *i* is income quintile, *a* is the intercept, *b* is the consumption income propensity, and *b/C* is consumption income elasticity (point estimate elasticity is calculated for

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

individual countries). To estimate per capita consumption by income group, the parameter of b was estimated based on cross-country (70 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 1980-2002 for most variables are from a USDA database. Data for grain production in 2003 for most countries are based on a USDA database as of October 2003. Food aid data are from the World Food Program (WFP), and financial data are from the International Monetary Fund and the World Bank. Historical nonfood-use data, including seed, waste, processing use, and other uses, are estimated from the FAO *Food Balance* series. The base year data used for projections are the average for 2000-2002, except export earnings that are 1999-2001.

Endogenous variables:

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

Exogenous variables:

Population—data are from FAOSTAT as of September 2003.

World price—data are USDA/baseline projections.

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

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

Cereal and roots and tuber exports—FAO data.

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—1988-2002 data from World Food Program (WFP).

Gross Domestic Product—World Bank data.

Merchandise and service imports and exports—World Bank data.

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

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

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

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

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

(Shahla Shapouri)

Appendix table-2a—List of countries and their food gaps in 2003

	2003 food gaps			2003 food gaps			
	Status quo	Nutrition	Distribution	Status quo	Nutrition	Distribution	
	1,000 tons			1,000 tons			
Angola	45	0	126	Algeria	0	0	0
Benin	95	0	13	Egypt	0	0	0
Burkina Faso	0	0	313	Morocco	0	0	0
Burundi	58	411	494	Tunisia	0	0	0
Cameroon	166	0	205	North Africa	0	0	0
Cape Verde	8	0	0	Afghanistan	0	0	182
Central African Republic	49	73	214	Bangladesh	0	0	1,786
Chad	76	267	415	India	0	0	2,296
Congo, Dem. Rep.	749	3,968	4,433	Indonesia	0	0	208
Côte d'Ivoire	65	0	0	Korea, Dem. Rep.	247	0	231
Eritrea	0	300	332	Nepal	408	0	180
Ethiopia	2,030	5,180	5,735	Pakistan	0	0	361
Gambia	41	0	17	Philippines	0	0	524
Ghana	0	0	83	Sri Lanka	0	0	19
Guinea	77	21	154	Vietnam	0	0	144
Guinea-Bissau	1	0	7	Asia	655	0	5,929
Kenya	124	851	1,337	Bolivia	0	0	133
Lesotho	46	281	303	Colombia	0	0	647
Liberia	122	161	195	Dominican Republic	0	0	45
Madagascar	151	347	547	Ecuador	0	139	359
Malawi	0	0	14	El Salvador	0	0	73
Mali	68	0	319	Guatemala	0	415	627
Mauritania	129	0	20	Haiti	0	335	536
Mozambique	0	247	548	Honduras	0	253	405
Niger	322	0	380	Jamaica	0	0	5
Nigeria	0	0	446	Nicaragua	0	275	398
Rwanda	80	0	16	Peru	0	0	218
Senegal	0	0	121	Latin America and the Caribbean	0	1,417	3,445
Sierra Leone	52	305	522	Armenia	0	0	199
Somalia	80	907	977	Azerbaijan	0	0	48
Sudan	0	0	67	Georgia	0	0	0
Swaziland	12	39	57	Kazakhstan	0	0	30
Tanzania	186	1,337	1,724	Kyrgyzstan	0	0	0
Togo	82	13	94	Tajikistan	0	0	0
Uganda	660	0	94	Turkmenistan	0	0	17
Zambia	24	677	879	Uzbekistan	0	0	0
Zimbabwe	984	1,615	1,724	Commonwealth of Independent States	0	0	294
Sub-Saharan Africa	6,582	17,001	22,927	Total	7,237	18,418	32,596

Source: ERS calculations.

Appendix table-2b—List of countries and their food gaps in 2013

	2013 food gaps				2013 food gaps		
	Status quo	Nutrition	Distribution		Status quo	Nutrition	Distribution
	<i>1,000 tons</i>				<i>1,000 tons</i>		
Angola	757	58	484	Algeria	0	0	112
Benin	175	0	21	Egypt	1,964	0	11
Burkina Faso	15	14	556	Morocco	0	0	0
Burundi	170	646	751	Tunisia	0	0	26
Cameroon	0	0	183	North Africa	1,964	0	148
Cape Verde	21	0	0	Afghanistan	87	880	1,422
Central African Republic	89	118	277	Bangladesh	0	0	1,066
Chad	8	266	495	India	0	0	1
Congo, Dem. Rep.	1,771	6,269	6,884	Indonesia	0	0	184
Côte d'Ivoire	172	0	7	Korea, Dem. Rep.	334	0	276
Eritrea	145	596	629	Nepal	154	0	114
Ethiopia	0	216	1,809	Pakistan	0	0	0
Gambia	0	0	11	Philippines	0	0	132
Ghana	0	0	59	Sri Lanka	0	0	21
Guinea	19	0	152	Vietnam	0	0	0
Guinea-Bissau	0	0	6	Asia	574	880	3,216
Kenya	0	31	898	Bolivia	0	0	105
Lesotho	0	154	189	Colombia	0	0	152
Liberia	390	448	489	Dominican Rep.	0	0	0
Madagascar	214	471	730	Ecuador	0	0	0
Malawi	0	0	24	El Salvador	0	0	0
Mali	0	0	351	Guatemala	0	0	0
Mauritania	209	0	40	Haiti	52	484	707
Mozambique	0	0	150	Honduras	0	0	221
Niger	751	0	671	Jamaica	0	0	0
Nigeria	1,296	0	660	Nicaragua	0	314	472
Rwanda	287	0	69	Peru	0	0	0
Senegal	0	0	172	Latin America and the Caribbean	52	798	1,658
Sierra Leone	252	592	836	Armenia	0	0	505
Somalia	285	1,482	1,576	Azerbaijan	0	0	10
Sudan	0	0	452	Georgia	0	0	0
Swaziland	0	0	19	Kazakhstan	0	0	0
Tanzania	0	322	1,137	Kyrgyzstan	0	0	0
Togo	25	0	78	Tajikistan	0	146	0
Uganda	1,224	0	189	Turkmenistan	0	0	199
Zambia	0	784	1,047	Uzbekistan	0	0	0
Zimbabwe	0	0	242	Commonwealth of Independent States	0	146	714
Sub-Saharan Africa	8,276	12,467	22,342	Total	10,867	14,291	28,077

Source: ERS calculations.

Appendix 3--Country indicators

Region and country	Population 2003	Population growth rate 2003	Grain production		Root production growth 1980-2002	Projected annual growth in supply 2003-2013	Per capita GNI 2001	Macroeconomic indicators		Export earnings growth 2000	Official development assistance as a share of GNI 2000	External debt Present value as a share of GNI 2000
			Growth 1980-2002	Coefficient of variation 1980-2002				Per capita GDP growth 2001	GDP growth 2001			
----- Percent -----												
\$ U.S.												
North Africa:												
Algeria	15,933	1.8	-0.8	46.9	-1.0	1.6	1,650	0.6	2.1	-2.2	0.3	42.5
Egypt	71,378	1.7	4.7	6.4	1.6	1.8	1,530	1.0	2.9	8.2	1.3	29.4
Morocco	31,519	1.8	0.2	47.6	2.9	1.1	1,190	4.8	6.5	1.4	1.6	51.0
Tunisia	9,788	1.1	0.9	47.8	3.9	2.0	2,070	3.7	4.9	14.4	2.0	57.1
Central Africa:												
Cameroon	15,863	2.2	2.6	14.0	1.6	2.3	580	3.1	5.3	1.9	5.0	104.1
Central African Rep.	3,905	1.7	1.7	14.4	0.3	1.4	260	0.1	1.5	--	7.9	85.2
Congo, Dem. Rep.	56,316	3.4	3.0	10.2	0.1	2.7	80	-7.1	-4.5	2.0	5.3	238.8
West Africa:												
Benin	6,822	2.8	4.9	9.4	4.5	2.5	380	2.3	5.0	7.8	11.6	70.8
Burkina Faso	12,623	3.1	4.5	13.7	-1.9	3.0	220	3.1	5.6	0.1	15.7	60.0
Cape Verde	455	2.2	6.8	59.5	-3.9	1.1	1,340	0.6	3.3	14.1	13.1	61.5
Chad	8,646	3.1	3.6	17.8	0.1	3.2	200	5.5	8.5	-7.4	11.2	69.3
Côte d'Ivoire	17,038	2.1	2.7	7.5	2.4	1.7	630	-3.3	-0.9	-1.2	1.9	118.4
Gambia	1,399	2.4	3.2	19.6	0.7	3.1	320	3.0	6.0	20.5	13.3	127.9
Ghana	20,626	2.2	6.0	15.6	4.6	2.3	290	1.9	4.0	0.3	12.7	131.9
Guinea	8,524	1.5	3.5	6.1	5.0	2.5	410	1.3	3.6	3.3	9.4	112.3
Guinea-Bissau	1,289	2.4	2.9	22.5	2.8	3.0	160	-2.0	0.2	6.6	32.0	364.8
Liberia	3,439	5.7	-4.6	32.4	1.0	1.6	140	2.6	5.3	--	8.3	449.1
Mali	12,385	2.8	4.2	12.4	2.6	3.1	230	-0.9	1.4	24.7	13.9	115.0
Mauritania	2,912	3.0	7.2	38.4	0.3	1.9	360	1.4	4.6	8.0	26.6	220.0
Niger	12,077	3.7	3.1	15.0	-6.9	2.8	180	4.2	7.6	--	12.8	80.2
Nigeria	123,129	2.6	5.3	12.0	7.6	1.9	290	1.5	3.9	5.6	0.5	81.4
Senegal	10,156	2.5	0.9	17.9	4.3	2.2	490	3.2	5.7	6.6	9.2	75.8
Sierra Leone	5,047	4.6	-3.3	12.4	3.2	1.5	140	3.3	5.4	13.2	45.8	162.9
Togo	4,887	2.6	4.8	14.3	2.6	2.8	270	-0.1	2.7	-1.3	3.8	113.9
East Africa:												
Burundi	6,955	3.0	-3.0	15.9	1.6	2.7	100	1.3	3.2	19.9	19.3	156.8
Eritrea	4,153	4.3	0.0	52.5	0.5	0.8	160	6.9	9.7	55.3	40.8	59.7
Ethiopia	69,273	2.4	3.1	17.3	1.3	5.1	100	5.2	7.7	-1.6	17.5	92.3
Kenya	32,474	1.9	0.3	14.2	2.3	2.6	350	-1.0	1.1	6.8	4.0	51.9
Rwanda	8,105	2.1	-2.2	15.6	3.5	1.5	220	4.5	6.7	39.9	17.3	76.3
Somalia	9,961	4.3	-2.8	36.7	3.7	3.0	--	--	--	--	--	--
Sudan	33,318	2.3	2.7	32.4	-1.8	1.4	340	4.9	6.9	--	1.5	137.5
Tanzania	37,648	2.3	1.8	12.2	2.3	3.3	270	3.4	5.7	17.8	13.3	71.9
Uganda	25,638	3.2	1.8	9.3	1.9	2.9	260	2.0	4.6	6.2	14.1	67.2

See footnotes at end of table.

Continued--

Appendix 3--Country indicators--Continued

Region and country	Population 2003	Population growth rate 2003	Grain production		Root production growth 1980-2002	Projected annual growth in supply 2003-2013	Macroeconomic indicators			Official development assistance as a share of GNI 2000	External debt Present value as a share of GNI 2000
			Growth 1980-2002	Coefficient of variation 1980-2002			Per capita GNI 2001	Per capita GDP growth 2001	GDP growth 2001		
1,000											
Percent											
\$ U.S.											
Southern Africa:											
Angola	14,367	3.0	2.4	24.9	2.7	1.8	0.3	3.2	--	3.4	122.1
Lesotho	2,081	0.7	0.2	27.5	7.9	3.5	2.6	4.0	40.4	5.5	60.4
Madagascar	17,387	2.9	1.0	4.9	0.9	2.7	3.0	6.0	6.0	7.8	91.5
Malawi	12,066	2.2	2.0	24.0	6.1	2.0	-3.5	-1.5	3.7	23.4	151.6
Mozambique	19,286	1.8	6.7	29.0	0.4	3.1	11.5	13.9	60.0	28.1	134.4
Swaziland	951	0.9	0.6	27.9	-0.4	3.1	-0.6	1.6	10.3	2.3	24.0
Zambia	11,094	2.1	-0.7	32.1	6.0	2.7	2.9	4.9	29.0	10.7	162.0
Zimbabwe	13,298	1.7	-1.6	32.9	4.4	5.3	-9.8	-8.4	-3.6	1.8	42.9
Asia:											
Afghanistan	24,318	4.2	-2.3	16.0	-1.2	2.3	--	--	--	--	--
Bangladesh	146,317	2.1	2.6	7.7	2.1	2.4	3.5	5.3	22.8	2.2	32.8
India	1,055,996	1.5	2.4	5.3	1.6	2.1	3.7	5.4	9.0	0.4	20.5
Indonesia	219,943	1.2	1.8	4.1	-0.2	1.9	2.0	3.3	1.9	1.1	97.2
Korea, Dem. Rep.	26,525	1.3	-2.9	13.0	5.0	0.0	--	--	--	--	--
Nepal	24,707	2.4	2.9	6.1	3.8	2.4	2.4	4.8	--	6.7	46.7
Pakistan	152,419	2.6	2.5	5.6	4.3	2.9	0.3	2.7	11.8	3.4	55.4
Philippines	79,982	1.9	2.0	5.4	-0.1	2.3	1.2	3.4	-3.2	0.8	69.2
Sri Lanka	19,467	0.9	1.0	8.3	-3.6	1.0	-2.8	-1.4	-6.5	2.0	52.4
Vietnam	81,252	1.3	5.0	5.5	-2.1	4.0	5.5	6.8	--	4.4	38.4
Latin America and the Caribbean:											
Bolivia	8,884	2.2	2.7	15.2	-0.1	2.6	-1.0	1.2	4.9	9.4	60.3
Colombia	44,157	1.6	-0.8	11.5	0.6	3.2	-0.3	1.4	4.1	0.5	46.2
Dominican Republic	8,759	1.5	-0.5	11.1	0.5	7.3	1.1	2.7	-7.9	0.5	25.3
Ecuador	13,325	1.8	3.0	19.1	1.4	6.0	3.7	5.6	5.0	1.1	85.8
El Salvador	6,630	1.8	1.3	11.3	5.4	5.7	-0.1	1.8	11.9	1.7	34.8
Guatemala	12,301	2.6	0.3	8.6	0.6	6.7	-0.5	2.1	0.0	1.1	22.2
Haiti	8,530	1.6	1.1	20.1	0.1	1.0	-3.8	-1.7	-3.2	4.4	33.4
Honduras	6,875	2.3	1.0	15.1	3.5	3.7	0.0	2.6	4.6	10.9	80.9
Jamaica	2,646	0.9	-5.4	52.5	-1.0	3.5	1.1	1.7	-5.0	0.7	67.9
Nicaragua	5,482	2.6	2.4	14.1	2.8	2.4	--	--	--	--	--
Peru	26,927	1.6	4.0	18.6	1.6	3.7	-1.3	0.2	6.9	0.9	52.1
Commonwealth of Independent States:											
Armenia	3,794	0.1	0.4	44.8	0.8	1.3	9.4	9.6	22.9	9.7	45.9
Azerbaijan	8,185	0.6	1.7	41.2	14.8	1.2	9.0	9.9	26.5	4.3	23.3
Georgia	5,179	-0.5	0.6	46.7	6.9	1.1	6.2	4.5	-1.2	9.2	54.3
Kazakhstan	15,994	-0.4	-5.8	75.7	-5.1	0.9	14.4	13.2	-3.3	0.7	67.9
Kyrgyzstan	5,096	1.2	0.0	44.2	12.8	1.9	4.5	5.3	-2.2	12.9	117.6
Tajikistan	6,214	0.7	2.8	45.9	40.9	0.1	9.3	10.2	-9.1	15.5	105.9
Turkmenistan	5,012	1.9	10.5	40.4	3.4	0.8	17.2	20.5	4.8	1.2	--
Uzbekistan	25,942	1.4	8.7	23.3	1.8	0.5	3.2	4.5	-5.4	1.4	41.8

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

Source: Population=UN World Population Prospects, 2000; Macroeconomic indicators=World Development Indicators, 2003, World Development Report 2003, World Bank.

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