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# ***ERS Staff Paper***

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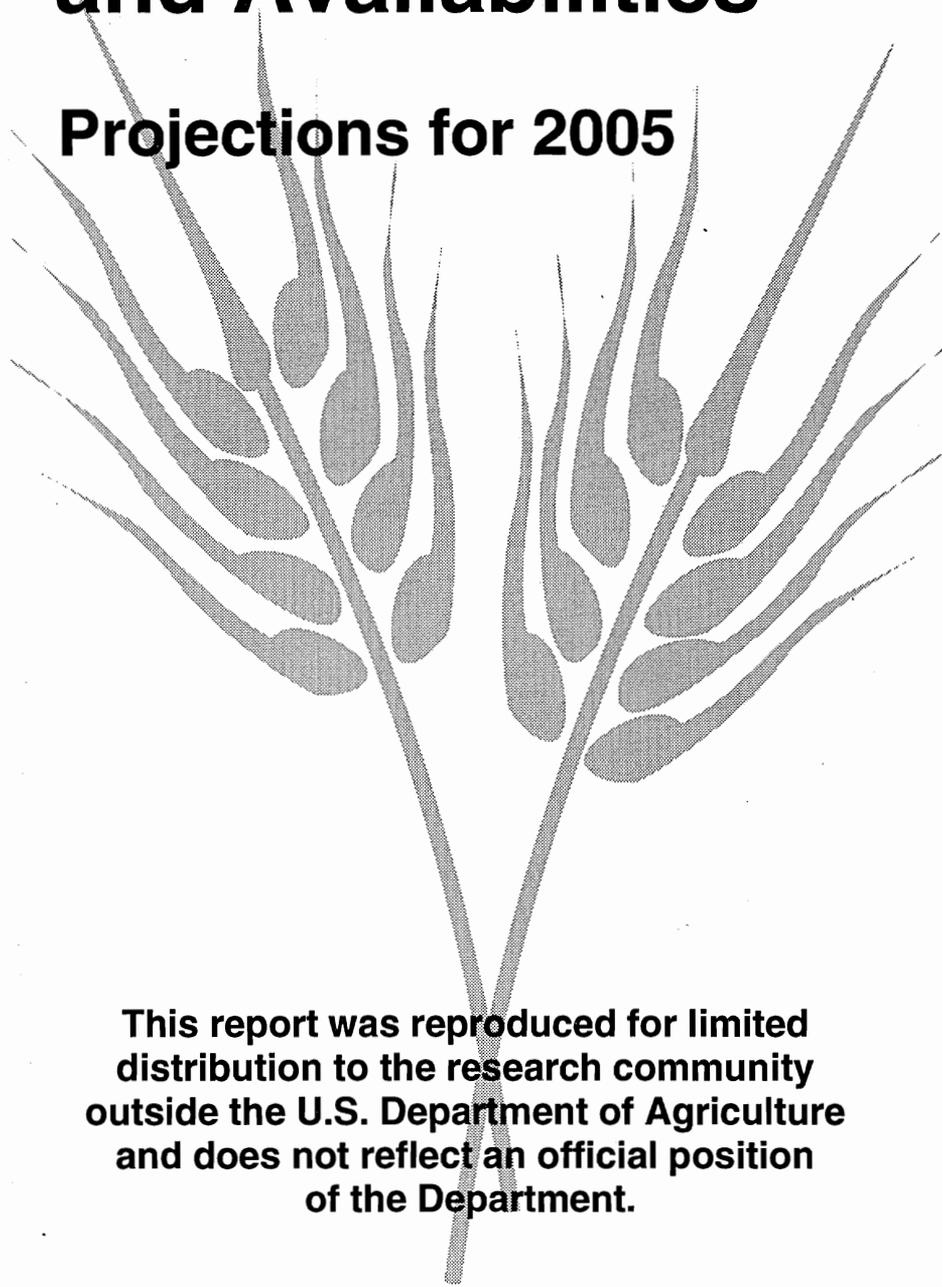
Economic  
Research  
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Commercial  
Agriculture  
Division

Number 9523

## **Food Aid Needs and Availabilities**

### **Projections for 2005**



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**Food Aid Needs and Availabilities: Projections for 2005.** By Margaret Missiaen, Shahla Shapouri, and Ron Trostle. Commercial Agriculture Division, Economic Research Service, U.S. Department of Agriculture. Staff Paper No. AGES 9523

### **Abstract**

Food aid needs will nearly double over the next decade, even with reasonably optimistic assumptions about recipient countries' ability to produce their own food or to import food commercially. Total food aid needs to maintain consumption and meet emergency needs are projected at 15 million tons in 1996, increasing to 27 million tons by 2005. Other scenarios result in even higher food aid needs. There is a looming mismatch between food aid resources and needs. If global food aid budgets are maintained at 1995 levels, the gap between needs and resources will grow rapidly. Factors limiting food aid availabilities include changes in agricultural policies that will reduce surpluses and reductions in aid budgets in donor countries. The study has major implications for thinking about food aid over the next decade. The need for food aid--both chronic and emergency--will not automatically diminish.

**Keywords:** Food aid, developing countries, grain supplies, Africa, Asia, Latin America.

**This study of food aid needs and availabilities was undertaken by ERS in response to initiatives by, and a request, from the State Department, the Agency for International Development, and USDA's Foreign Agricultural Service.**

### **Acknowledgments**

Appreciation is extended to Pat O'Brien, Division Director, Commercial Agriculture Division, ERS/USDA for overall guidance during the preparation of this report. Ira Branson and his colleagues in the Foreign Agricultural Service/USDA and Len Rogers and his colleagues in the U.S. Agency for International Development provided critical support during the planning of this study. Their reviews as well as those of Lorna Aldrich, Cheryl Christensen, and others at ERS were very helpful. Ray Nightingale tracked down the latest data on food aid shipments. A special note of thanks goes to Birgit Meade who provided invaluable assistance during every phase of the work--from data collection to preparation of the final report.

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# Food Aid Needs and Availabilities Projections for 2005

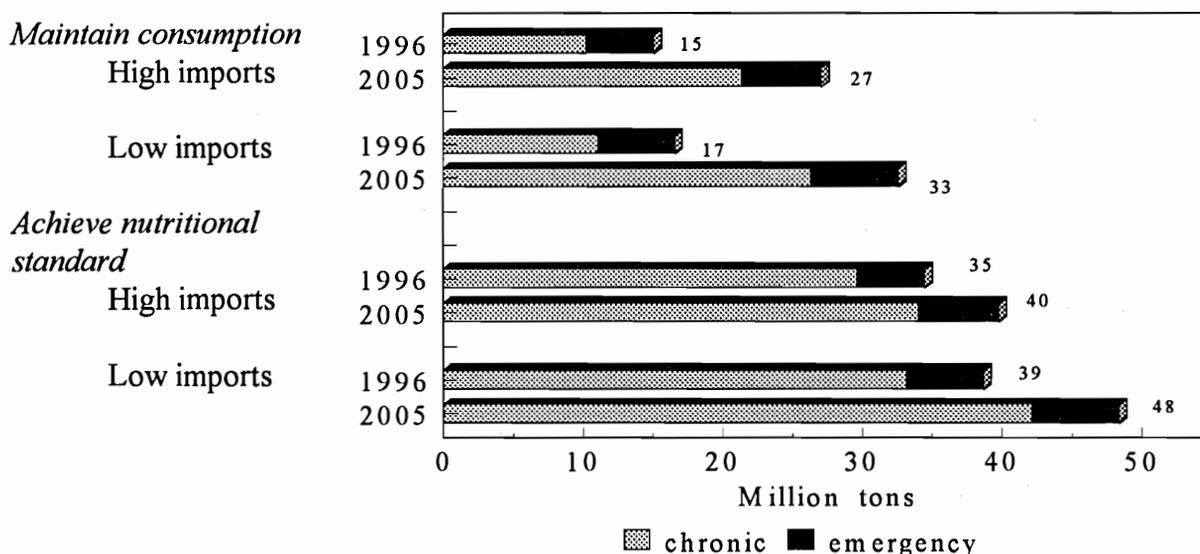
## Executive Summary

Food aid needs will nearly double over the next decade, even with reasonably optimistic assumptions about recipient countries' ability to produce their own food or to have the financial capacity to import food commercially. Total food aid needs to maintain consumption and meet emergency needs for refugees are projected at 15 million tons in 1996, increasing to 27 million tons by 2005. More food aid would be required if recipient countries' financial capacity to import food commercially lagged or if the consumption target was to meet minimum nutritional standards.

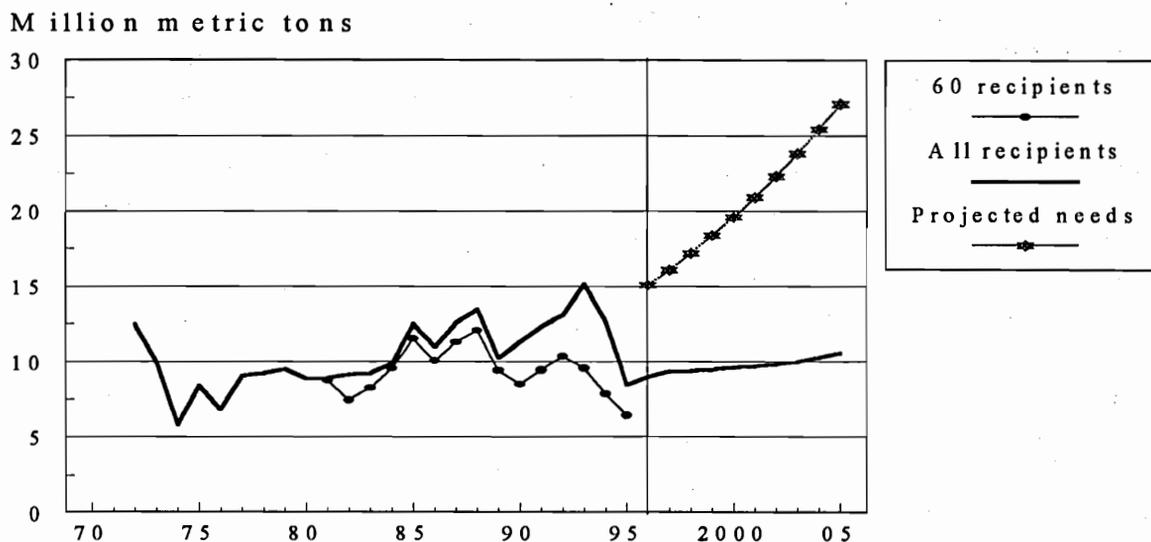
There is a looming mismatch between food aid resources and needs. In the past, food aid availability averaged about 70 to 80 percent of the needs. This will not be true in the future. If global food aid budgets are maintained at 1995 levels, the gap between needs and resources will grow rapidly. Factors limiting resources include changes in agricultural policies that will reduce surpluses and reductions in aid budgets in donor countries.

In this study, food aid needs are defined as the amount of grain needed to fill the gap between what a country can produce plus its financial capacity to import commercially, and a targeted consumption level. Both chronic and emergency food aid needs are considered. Projections are made for food aid needs under four alternative scenarios. The "benchmark" scenario maintains per capita consumption at current levels and assumes an optimistic financial capacity to import commercially. The other three scenarios (maintain consumption with low commercial imports and achieve nutritional standards with high and low imports) all result in higher food aid needs.

### World total grain food aid needs



## World total grain food aid, and food aid needs



Most food aid needs will be chronic (80 percent) and will be in Sub-Saharan Africa (55 percent). Food aid needs in Sub-Saharan Africa will double even under the most optimistic scenario. The food aid needs of the region by 2005 will exceed the projected global supply of food aid. Emergency needs, arising from production variability and political turmoil, which triggers refugees and displaced persons, are only 20 percent of total needs. However, these could grow to 30 percent if the increase in numbers of refugees follows the trend of the last decade.

The driving forces behind chronic needs are large population increases, slow growth in agricultural productivity, and slow overall economic growth. Looking at Sub-Saharan Africa, the most serious case, doubling the projected rate of increase in grain yields could cut food aid needs by half and total world needs by 25 percent in 2005. A similar result could be achieved by reducing projected Sub-Saharan Africa's population growth rate from 2.8 percent per year to 2.3 percent. On the other hand, the scenario for slower growth in export earnings could increase needs by 16 percent.

Projections for total food aid needs are built from a country-by-country analysis of chronic and emergency needs in 60 traditional food aid recipient countries and an aggregate estimate of emergency needs in the rest of the world. About a fifth of the 60 countries will have no food aid needs, even under the scenario that assumes meeting minimum nutritional standards and slow growth in commercial import capacity, primarily because of their strong economic performance. About half of the countries have food aid needs even under optimistic (high commercial import capacity) conditions. These countries generally have sustained economic and/or political problems, and all except Haiti, Nicaragua, and Afghanistan are in Sub-Saharan Africa. In the remaining one-third of the countries, food aid needs are more sensitive to economic and agricultural performance. Countries that have undertaken policy reform and adjustment are better positioned for improved economic growth. However, investments in infrastructure, soil and water management, and improved technologies are needed to make a significant improvement in agricultural performance.

The projected increasing gap between food aid needs and availabilities is caused primarily by the rapid growth in needs and secondarily by constrained food aid budgets of donor countries. For the benchmark scenario, global production capacity is projected to produce adequate supplies of grain; year-to-year variability is to be expected, however. This benchmark incorporates the impacts of the Uruguay Round and increases in demand from rapidly growing Asian economies.

The study has major implications for our thinking about food aid over the next decade. The need for food aid--both chronic and emergency--will not automatically diminish. The study also shows, however, that countries are not permanent wards of the food aid system. They graduate as their agriculture and economies improve. Terrible natural disasters (like the droughts in the Sahel and Southern Africa) have become more manageable when the combination of early warning systems and regional institutions make better responses to emergencies possible. Political emergencies remain more intractable, in part because we have neither the early warning systems nor the institutional setting to cope with the breakdown of peace and state structures. Even here, however, the Greater Horn of Africa Initiative (GHAI) offers an opportunity for improvement. The challenge is to find the most effective mix of food aid, development aid, and diplomatic resources to respond humanely and effectively to rising food aid needs, while creating the basis for reducing those needs over time.

### Summary of chronic and emergency food aid needs

	<i>Maintain status quo consumption</i>				<i>Meet minimum nutritional needs</i>			
	<u>High imports</u>		<u>Low imports</u>		<u>High imports</u>		<u>Low imports</u>	
	1996	2005	1996	2005	1996	2005	1996	2005
Million metric tons								
<b>60 countries:</b>								
Chronic needs	10.3	21.4	11.2	26.3	29.7	34.1	33.2	42.2
Emergency needs	2.0	2.9	2.7	3.4	2.0	2.9	2.7	3.4
Total	12.3	24.3	13.9	29.6	31.7	37.0	35.9	45.5
<b>Other countries:</b>								
Emergency needs <sup>1</sup>	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8
<b>Total:</b>								
Chronic + emergency	15.1	27.1	16.7	32.4	34.5	39.8	38.7	48.3
Emergency only	4.8	5.7	5.5	6.1	4.8	5.7	5.5	6.1

<sup>1</sup> For refugees and displaced persons only.

# **Food Aid Needs and Availabilities Projections for 2005**

## **Introduction**

This study examines the long-term prospects for global food aid needs and for food aid availabilities from donor countries.

The report begins with an overview of the 1996-2005 prospects for the global supply, demand, trade, and price environment. These "baseline" projections are not intended to be a forecast of what the future will be, but instead a description of what would be expected to happen under a very specific set of assumptions and circumstances. The projections represent one plausible longrun scenario that presumes a continuation of current agricultural and trade policies, with no major weather or political shocks, and with specific assumptions regarding the global macroeconomy, international developments, productivity growth, food aid budgets, and other factors affecting food production, consumption, and trade.

The analysis focuses on the grain sector because of the dominant role grain plays in food consumption in most food aid recipient countries and in food aid shipments from donor countries.

The next section provides projections for food aid availabilities from donor countries, and an assessment of the impact of large commercial food-importing countries on the global demand for grain and on world grain prices.

The report then assesses 1996-2005 food aid needs for grain in 60 low-income, traditionally food-importing countries (See *Appendix A* for a list of the countries). For each country, the "food aid need" is the gap between the amount of grain needed to achieve a targeted level of consumption and the country's ability to produce grain domestically and its financial capacity to import the rest commercially. (The methodology for estimating food aid needs is described in a later chapter.) Thus, the report provides projections for the increase in grain needed to either (1) maintain current levels of consumption, or (2) achieve a minimal nutritional standard (as defined by the Food and Agriculture Organization, FAO) for each nation's average consumer. In addition, two scenarios of commercial import capacity are analyzed, assuming a higher and a lower growth rate for exports and foreign exchange earnings. The impact of potential shocks arising from the production and demand variability caused by weather problems or by political unrest are also discussed.

The final section outlines some of the factors affecting food consumption and food aid needs and discusses the problems many countries face in trying to fill the gap between production and consumption.

## Global Overview

The following baseline projections for the global grain sector provide a supply, demand, and price environment that is used for assessing the long-term prospects for food aid needs and availabilities.<sup>1</sup>

Between 1996 and 2005, the exponential growth trend for total world grain production is projected at about 1.5 percent per year, down from the 1960-94 historical growth rate of 2.4 percent per year. The growth trend for yields (1.2 percent per year) accounts for most of the increase in production; area expands less than 0.3 percent per year. The global population growth rate is also expected to slow to 1.5 percent from a growth rate that exceeded 2 percent per year in the early 1960's. Since both production and population are projected to grow at about the same rate, per capita total use of grain (for food, feed, industrial use, and seed) is projected to remain relatively unchanged. Real world market prices for wheat, rice, and coarse grains, which experienced significant and sustained declines during the 1980's, are projected to decline slightly (1-2 percent per year). (*Figure 1* and *table 1* present historical developments and 1996-2005 projections for the world grain sector.)

Between 1960 and 1994, world grain production and average yields trended upward at 2.4 and 2.2 percent per year. The area harvested rose only 0.2 percent per year, primarily because of developments in the 1980's (U.S. set-aside programs, land shifted out of grain production in the former Soviet Union (FSU), and response to sustained falling prices in market-oriented countries). Since the population growth rate averaged 1.8 percent per year, average per capita grain use for food and feed rose 0.6 percent per year. World market prices (adjusted for inflation) for wheat, rice, and coarse grains declined 2-3 percent per year on average. The growth rates for area planted, average yields, production, and per capita use of grains and total food have slowed during the last 20 years.

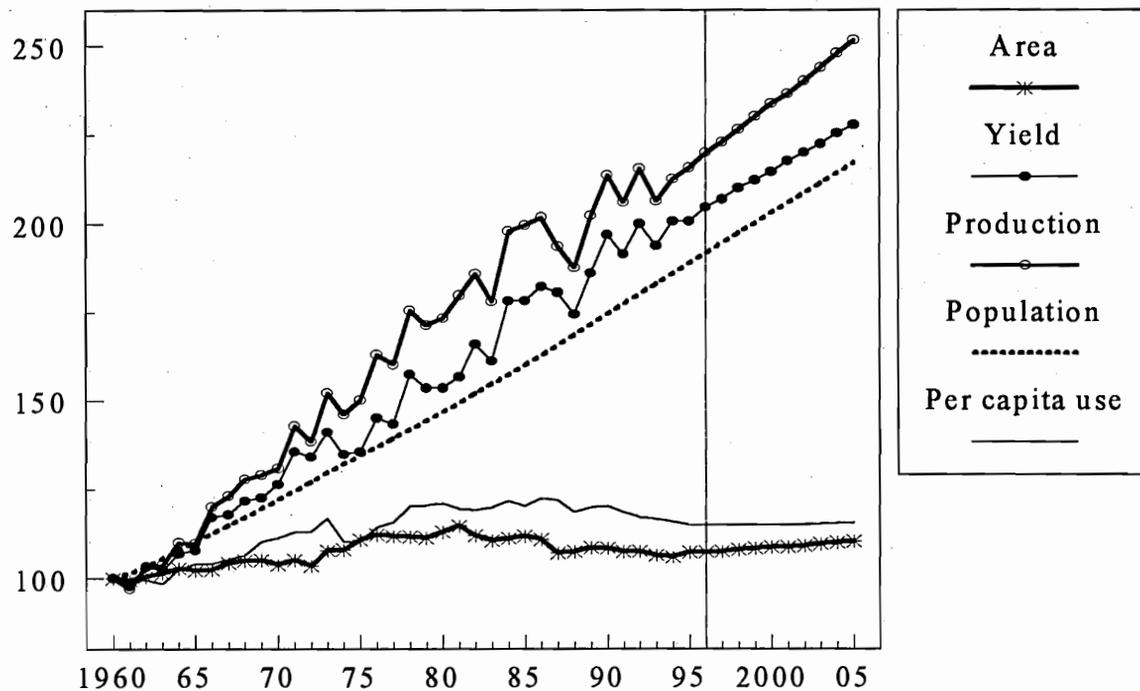
The picture for total agricultural production exhibits a pattern very similar to that for grains. The upward trend in world agricultural output was 2.3 percent per year (FAO production index). Expansion in total agricultural land contributed 0.24 percent per year to the growth, and productivity increased about 2.1 percent per year. The growth rates in production and per capita consumption of meat -- beef, pork, and poultry meat -- rose even more rapidly (4.1 and 2.3 percent per year) than for grains. Because of the increase in global consumer demand for livestock products, the use of grain for feed use grew faster than that for human consumption.

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<sup>1</sup> USDA. Long-term Baseline Projections, 1995-2005. WAOB-95-1, Feb. 1995.

**Figure 1 -- World population and total grain area, yield, production, and per capita use, 1960-2005**

Index: 1960=100



**Table 1 -- Global grain sector supply and demand indicators, 1960-2005**

Item	Levels		Annual growth rates <sup>1</sup>			
	1991-94 Avg.	2005	1960-70	1970-80	1980-94	1996-2005
	-----Percent-----					
Population (bill. )	5.5	6.6	2.0	1.8	1.7	1.4
Total grains:						
Production (bill. MT)	1.73	2.07	3.2	2.8	1.4	1.5
Area (Mil. Ha)	683	705	0.5	0.9	-0.5	0.3
Yield (MT/Ha)	2.54	2.94	2.7	1.9	1.8	1.2
<i>Per capita use:</i>	-kg per person-					
Coarse grains	150	149	1.0	0.7	-0.7	-0.1
Wheat	101	96	1.7	1.1	0.2	-0.1
Rice	64	61	1.2	0.7	0.3	-0.1
Total grains	315	306	1.2	0.8	-0.3	-0.1
Meat <sup>2</sup>	28	31	3.7	3.0	1.4	0.7

<sup>1</sup> Growth rate of exponential trend..

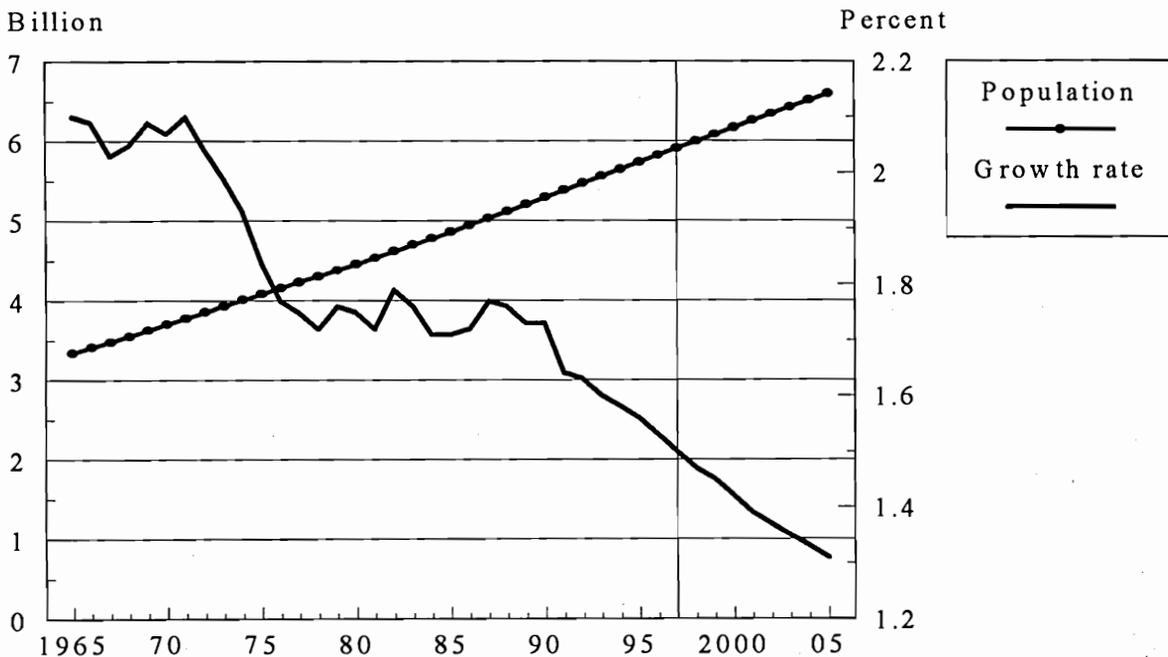
<sup>2</sup> Selected countries.

## Major Assumptions

The baseline scenario is guided by specific assumptions about factors affecting the U.S. and foreign agricultural sectors, including economic conditions and agricultural and trade policies. The key assumptions used in the projections in this report are as follows:

- Population growth rates decline over the projection period (*figure 2* and *appendix table 1*).
- The world economy gradually expands, with GDP generally rising at about historical long-term growth rates--although there is considerable variation among countries (*appendix table 2*).
- Real oil/petroleum prices also rise gradually (as projected by the U.S. Department of Energy).
- No major changes occur in existing global trade and agricultural policies or in current U.S. agricultural programs. Implementation of the Uruguay Round of GATT is incorporated into this analysis.
- The projected rate of increases in yields for wheat, rice, and coarse grains slows slightly from the 1970-94 exponential trend growth rates.
- Agricultural policies in effect in the United states and the European Union are assumed to be those of November 1994.

**Figure 2 -- World population and population growth rate, 1965-2005**



## Demand Factors

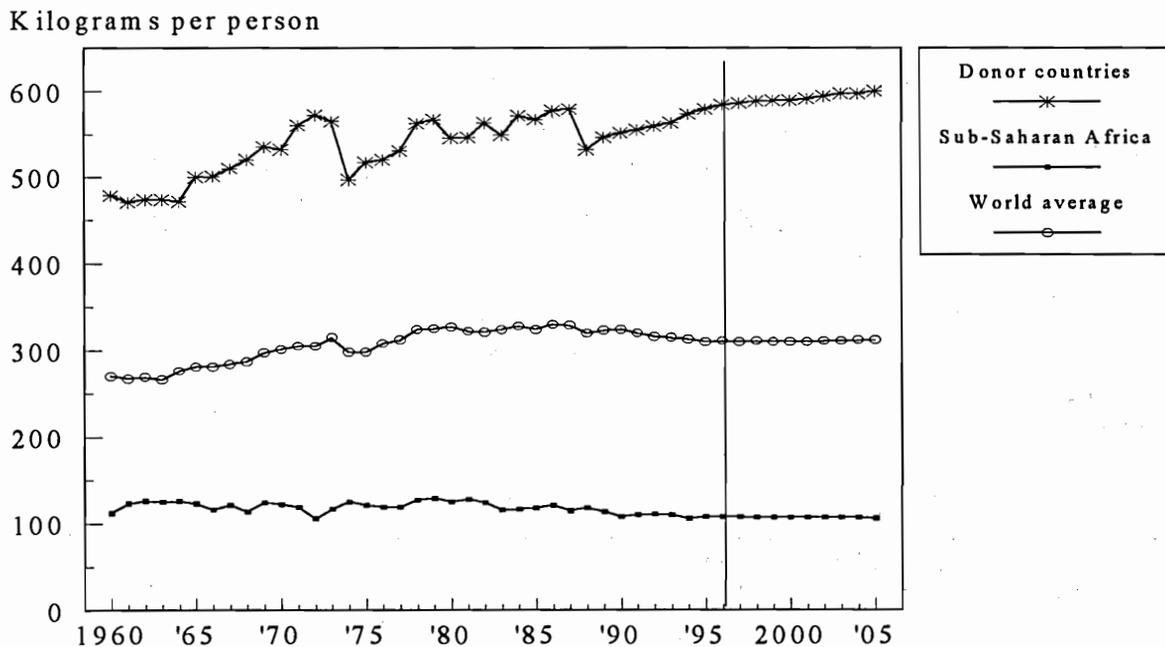
The increase in agricultural consumption since 1960 was the result not only of production gains, but also of income growth, declining real prices, efforts to improve diets, and the ability of many countries to finance imports. These factors are expected to continue boosting total consumption during the 1996-2005 projection period, although at slower growth rates.

For the grains (coarse grains, wheat, and rice) global per capita consumption gains are projected to be negligible during the next decade (*figure 3*). Small gains in per capita consumption in the grain-exporting nations will be offset by slight declines in the developing countries and formerly centrally planned economies. Although growth trends in grain used for both feed and food use are expected to slow, the increase in feed use of grain and soybean meal will enable per capita consumption of meat to continue to rise through 2005.

A common feature in world commodity markets is the growing importance of the developing countries and China as the main source of consumption and import growth. In contrast, demand in the FSU and Eastern Europe will continue to be weak.

The potential increase in demand from the developing countries reflects growth in incomes leading to changes and diversification in diets, along with continued population growth. Percentage gains in effective demand will be largest in areas with the strongest economic growth, such as East Asia, and weakest in regions where income growth and productivity gains are projected to lag, such as Sub-Saharan Africa.

**Figure 3 -- Global per capita total use of grain, 1960-2005**



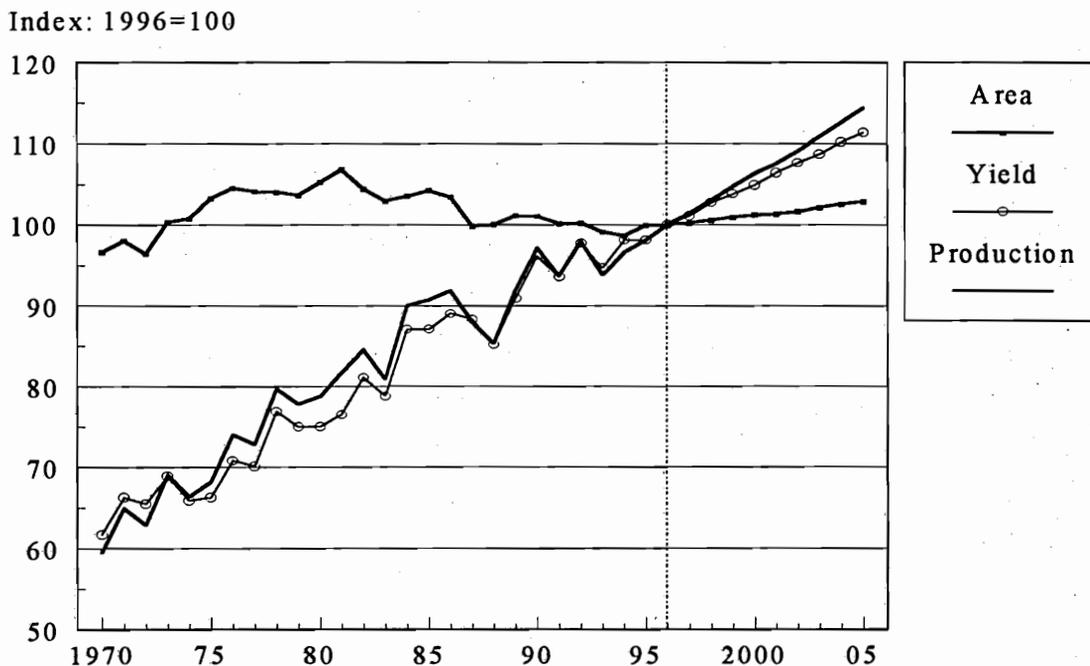
Demand changes in the developed regions are likely to be more subtle because of the likelihood of smaller dietary changes. Policy changes in the European Union (EU) could substantially alter the current balance of grains, oilseeds, and nongrain feed ingredients in animal feed. Demand growth for grains in the United States continues strong because of increased demand for feeds and meat, as well as for industrial processing, including ethanol.

### Supply Factors

Future additions to total cropland will be small, so increasing agricultural output will mostly depend on raising productivity. If productivity continues to climb at long-term trend rates, productivity increases alone--without any additional land--will exceed the lower anticipated population growth rates. If productivity growth slowly declines from the historical and current rates of 2.1 and 1.7 percent, to possibly 1.5 percent by the year 2005, then world average per capita consumption would still be maintained.

But, since 1980, the growth trend in world grain yields has declined to 1.7 percent per year and the trend in area harvested has turned downward (-0.5 percent) (*figure 4*). The resulting slowdown in growth in production occurred during a decade of excess production capacity and, for many major producing countries, the largest sustained decline in real prices and gross returns per hectare during the last four decades. These factors contributed to a large U.S. acreage set-aside program and reductions in grain area planted in several major producing countries.

**Figure 4 -- World total grain area, yields, and production, 1970-2005**



Crop yields will grow more slowly, largely because the Green Revolution's high-yielding rice and wheat varieties have been widely adopted and no similar major technological developments are anticipated during the projection period (*table 2*). (Note: The adaptation and adoption of the recently announced higher yielding varieties of rice have been factored into the baseline projections.) Some land that has been withdrawn from grain production in the 1980's is expected to return to grain during the projection period (particularly in the United States), even so, less land will be devoted to grain production through 2005 than in the early 1980's.

**Table 2 -- Land use and productivity**

Item	Annual growth rates <sup>1</sup>				Levels	
	1960-70	1970-80	1980-94	1996-2005	1991-94 Avg.	2005
	----- Percent -----				-- Million hectares --	
Area harvested:						
Coarse grains	0.2	0.7	-0.9	0.2	316	322
Wheat	0.7	1.2	-0.7	0.5	222	233
Rice	1.2	0.9	0.2	0.2	146	150
Total grain	0.5	0.9	-0.5	0.3	683	705
Yield:					Metric tons per hectare	
Coarse grains	2.7	1.9	1.7	1.3	2.6	3.1
Wheat	3.1	2.0	2.9	1.1	2.5	2.9
Rice	2.3	1.7	2.2	1.2	2.4	2.8
Total grains	2.7	1.9	1.8	1.2	2.5	2.9

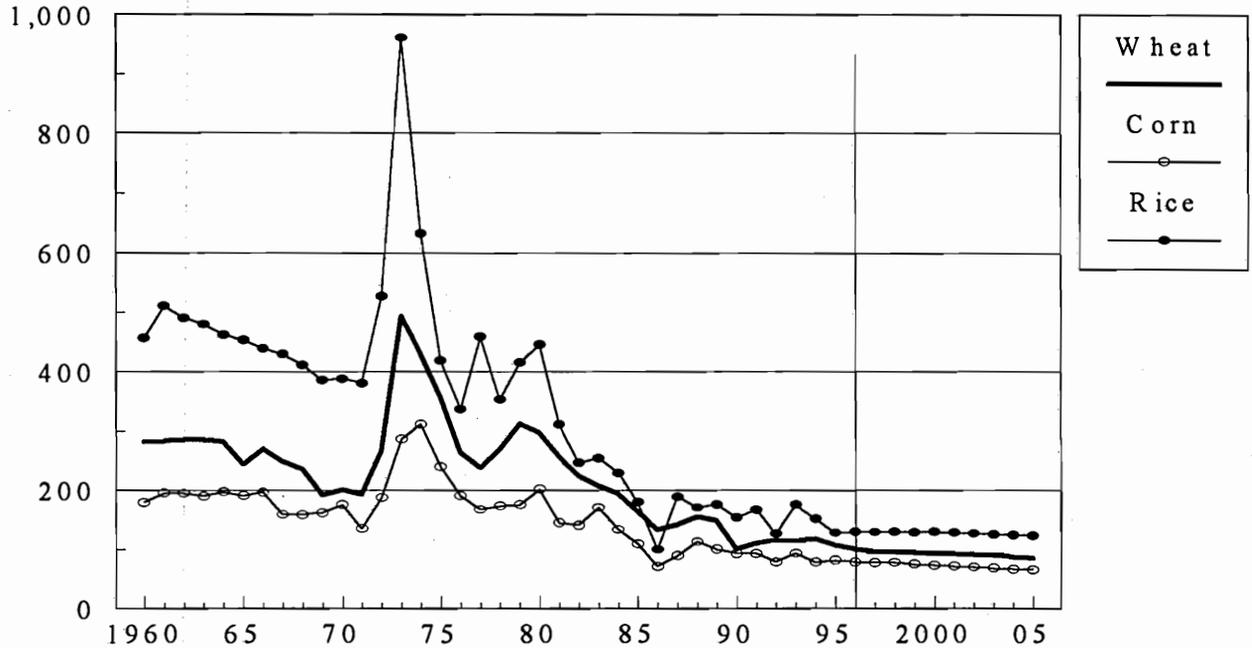
<sup>1</sup> Growth rate of exponential trend for 11-year period including beginning and end of decade.

## Prices and Trade

Real prices are projected to decline during the projection period, but at a considerably slower rate than occurred during the 1980's. The U.S. prices (adjusted for inflation) associated with the results of country and commodity market supply and demand analysis are presented in *figure 5* along with the rates of change. No single world commodity price is used in the projections because producers and consumers in many countries are not linked to world markets due to border policies (export or import taxes and/or subsidies). *Table 3* shows the changes in U.S. prices. They are consistent with a set of producer and consumer prices for each country and commodity combination used in the projections.

The sources of variability in world commodity markets are projected to change. Whereas in the 1980's the Soviet Union typically accounted for significant fluctuations in world grain trade prices, China is likely to be the major source of variability during the next decade. China has increased its importance in world agricultural markets in recent years, both as an importer and as an exporter, and its prominence as an importer is likely to increase even more. However, future economic and policy developments in China cause considerable uncertainty.

**Figure 5--Grain prices (U.S. prices associated with world baseline projections)**  
 Constant 1991 dollars per metric ton



**Table 3 -- U.S. prices associated with the international projections<sup>1</sup>**

Item	Annual growth rates <sup>2</sup>				Prices	
	1960-70	1970-80	1980-94	1996-2005	1991-94 Avg.	2005
	----- percent -----				- 1991 dollars per ton -	
Corn	2.3	-0.3	-5.5	-2.2	86.3	66.0
Wheat	-3.9	1.7	-6.8	-1.5	114.5	85.7
Rice	-3.2	-0.8	-6.0	-0.6	155.0	123.6
Soybeans <sup>3</sup>	0.0	-0.2	-5.0	-2.7	207.4	138.4
Beef	-1.4	-0.2	-2.6	-2.3	1,677	1,205
Pork	07	-0.0	-3.0	-2.2	1,085	816
Poultry meat <sup>3</sup>	-3.3	-2.1	-2.3	-1.1	1,173	849

<sup>1</sup> No single world commodity price is used in the projections because producers and consumers in different countries may not be linked to world markets because of taxes and/or subsidies. This table shows U.S. prices. They are consistent with a set of producer and consumer prices for each country and commodity combination used in the projections.

<sup>2</sup> Exponential trend growth rates. <sup>3</sup> 1960's = 1964-70 only.

## Food Aid Availabilities

Grain plays a dominant role in global caloric intake and in food aid. Grain consumption provides slightly over half of all calories consumed globally. In recent years, nearly 90 percent of the volume of global food aid shipments were of grain and grain products (*table 4*). For the United States, about 90 percent of the volume and 70 percent of the value of total food aid was grain and grain products.

World grain food aid has risen gradually since the early 1970's to a 1992/93 peak of about 15 million metric tons (July/June year). U.S. shipments rose from less than 5 million tons in the mid-1970's to 11 million tons in fiscal year 1992/93 (*table 5*). Since 1992/93, food aid from the United States and from other donors has declined. For 1994/95, grain food aid from the United States may be as low as 4 million tons; and as low as 8 million tons from all donors combined (*table 6*).

**Table 4--Commodity composition of food aid, 1991-93 average**

Type of food aid	All donors	United States	Non-U.S. donors
	1,000 metric tons		
Total volume of food aid	14,931	8,582	6,349
Cereals & products	13,293	7,749	5,544
Wheat & flour	7,318	3,633	3,685
Rice	1,033	490	543
Coarse grains	4,366	3,108	1,258
Blended foods with grain included <sup>1</sup>	418	361	57
Total noncereals	1,638	833	805
Total dairy products	249	85	163
Skim milk powder	141	22	119
Other dairy products	108	64	44
Vegetable oils	474	278	196
Pulses	334	124	210
Total meat & fish	110	6	104
Edible fat	12	0	12
Sugar	76	0	76

NA = not available.

<sup>1</sup> Includes corn-soya-milk, wheat-soya-milk, and various other blends.

Source: FAO Agrostat. FAO data for United States may not be exactly equal to official U.S. data.

FAO data is used for comparability with data of other donor countries.

In the future, funding will be the major factor affecting food aid shipments. Recent government-wide budget-cutting efforts in the United States and in some other countries have resulted in reduced commitments for future food aid funding. Other factors that will affect the volume of future grain food aid include:

1. Many countries are implementing increasingly more market-oriented agricultural policies. This will likely result in a reduction in agricultural surpluses and in less grain held in stocks, particularly in government-held stocks. Lower average stocks, in turn, may lead to more year-to-year volatility in grain markets--such as was experienced in the summer of 1995.
2. The General Agreement on Tariffs and Trade (GATT) calls on signatory nations to abide by internationally agreed upon rules regarding food aid. The GATT ministers also agreed to guarantee that the implementation of the Uruguay Round (UR) of the GATT would not adversely affect food aid commitments to meet the authentic needs of developing countries and stressed the continuing need for bona fide food aid. However, the UR agreement is not specific on how this is to be accomplished.
3. To the extent that the UR agreement results in slightly higher world grain prices than without the agreement, it will reduce food aid availabilities because a given budget will purchase less grain. Recent analyses of the UR agreement suggest impacts would be limited.

**Table 5--Programmed U.S. food aid of grain and grain products, fiscal years 1992-95<sup>1</sup>**

Fiscal year	Total U.S.	PL 480			Section 416	Food for Progress	
		Total	Title I	Title II			Title III
Volume:		Million metric tons					
1991/92	6.64	4.76	1.93	1.32	1.51	0.36	
1992/93	11.08	4.29	1.79	1.30	1.21	5.07	
1993/94	3.74	3.19	0.80	1.41	0.98	0.42	
1994/95 (p)	2.77	2.40	0.56	1.36	0.49	0.37	
Value:							
1991/92	915	710	271	230	209	59	
1992/93	1470	637	229	236	172	627	
1993/94	624	546	129	258	159	63	
1994/95 (p)	429	364	92	194	77	66	

Sources: PL 480, Title I: Based on Final PL 480, Title I Program Summary (FAS/EC/PAD).

PL 480, Title II: Based on Approved Program Summary/Country/Commodity Profile (AID). Includes World Food Program (WFP) : Program Summary Country/Sponsor/Commodity Profile (AID).

PL 480, Title III: Based on approvals scheduled for shipment (regular & emergency) (AID).

Section 416 (b): Regular 416: Based on Section 416 (b) Status Sheets. Includes WFP shipments (FAS/EC/PAD).

Food For Progress: Title I: Based on P.L. 480 Program Summary (FAS/EC/PAD).

<sup>1</sup> 1994/95 are proposed allocations, generally as of June or July, 1995. Totals exclude freight costs.

p = preliminary

**Table 6--Grain food aid shipments, by donor, 1971/72-94/95<sup>1</sup>**

Year	All Donors	Total U.S.	Total EU	Canada	Japan	Australia	Other Europe	Other Donors <sup>2</sup>
1,000 metric tons of grain and grain products (grain equivalents)								
1971/72	12,468	9,174	978	1,093	731	215	32	243
1972/73	9,956	6,948	978	808	528	259	113	322
1973/74	5,818	3,186	1,209	664	350	222	116	71
1974/75	8,399	4,722	1,413	612	182	330	368	773
1975/76	6,844	4,273	928	1,034	33	261	119	196
1976/77	9,042	6,066	1,131	1,176	68	230	198	172
1977/78	9,211	5,988	1,374	884	135	252	193	385
1978/79	9,500	6,238	1,159	735	352	329	154	533
1979/80	8,887	5,339	1,206	730	688	315	160	449
1980/81	8,942	5,212	1,292	600	914	370	210	344
1981/82	9,140	5,341	1,639	600	507	485	206	361
1982/83	9,238	5,375	1,639	843	517	349	214	301
1983/84	9,849	5,655	1,923	817	445	460	181	368
1984/85	12,511	7,536	2,508	943	295	466	205	558
1985/86	10,949	6,675	1,600	1,216	450	345	157	505
1986/87	12,599	7,861	1,896	1,240	529	368	236	470
1987/88	13,503	7,946	2,554	1,062	561	355	267	758
1988/89	10,249	5,286	2,175	1,170	441	353	274	550
1989/90	11,315	6,018	3,313	961	430	305	193	95
1990/91	12,357	7,260	2,608	1,149	512	349	336	142
1991/92	13,086	7,052	3,707	996	387	328	292	323
1992/93	15,184	8,466	4,114	702	358	232	307	936
1993/94	12,633	8,258	2,812	712	378	219	289	235
1994/95 <sup>3</sup>	8,436	4,190	2,735	525	402	240	238	106

Source: FAO Agrostat and Food Outlook, August/September 1995.

<sup>1</sup> FAO data (July/June year) are used for comparability, but for the United States, they are not equal to official USDA October/September year data.

<sup>2</sup> More prominent other donors, in recent years, include Turkey, World Food Program, Saudi Arabia, and Argentina.

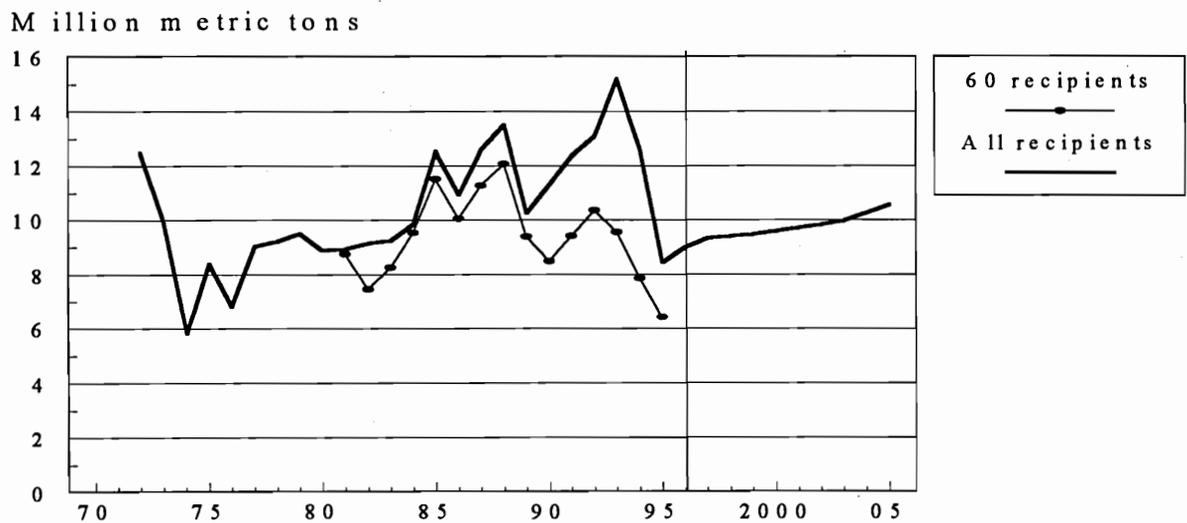
<sup>3</sup> Preliminary estimates.

For the analysis in this study, global grain food aid is projected to rise from 8.4 million tons in 1994/95 to 10.6 million tons in 2005 (*figure 6*). This increase is based on several assumptions:

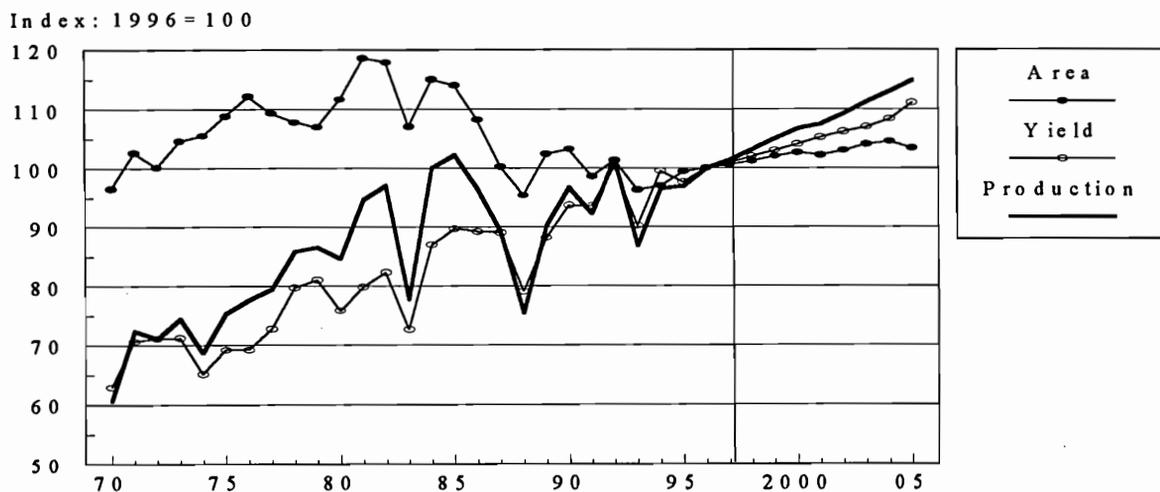
1. The combined food aid budgets of all donors will remain constant, after adjusting for inflation, at 1994/95 levels.
2. The volume of grain and grain products that can be purchased with the constant budgets will rise because of slowly falling real prices of grain.
3. Under the benchmark scenario, the agronomic ability of donor countries to produce sufficient grain to meet global demand from commercial importers is not projected to be a constraint in 2005 (*figure 7*).

4. For the donors who purchase food aid products from other countries, rather than donate their own domestic production, such as Japan, foreign exchange availabilities and the capacity to buy products on the world market are not expected to be a constraint.
5. Commercial demand from China and a few other importers is expected to rise during the projection period. If China seeks to increase its grain imports significantly, as some prognostications suggest, this will increase world grain prices and stifle consumption, stimulate production, and constrain use of scarce foreign exchange for imports.

**Figure 6--Food aid grain shipments of all donors to all recipients, and to 60 traditional recipient countries**



**Figure 7--Donor countries' grain area, yield, and production, 1970-2005**



## Food Aid Needs

A country's food aid need is defined as the amount of grain needed to fill the gap between a target level of consumption and what the country can produce plus what it can import commercially. The country's consumption, production, and commercial imports depend on many factors. These include population and income growth, natural resource and technology constraints on production, production incentives, foreign exchange availability for commercial imports, and international financial and commodity market conditions (*figure 8* depicts these factors, which are discussed in a later chapter).

### Overview

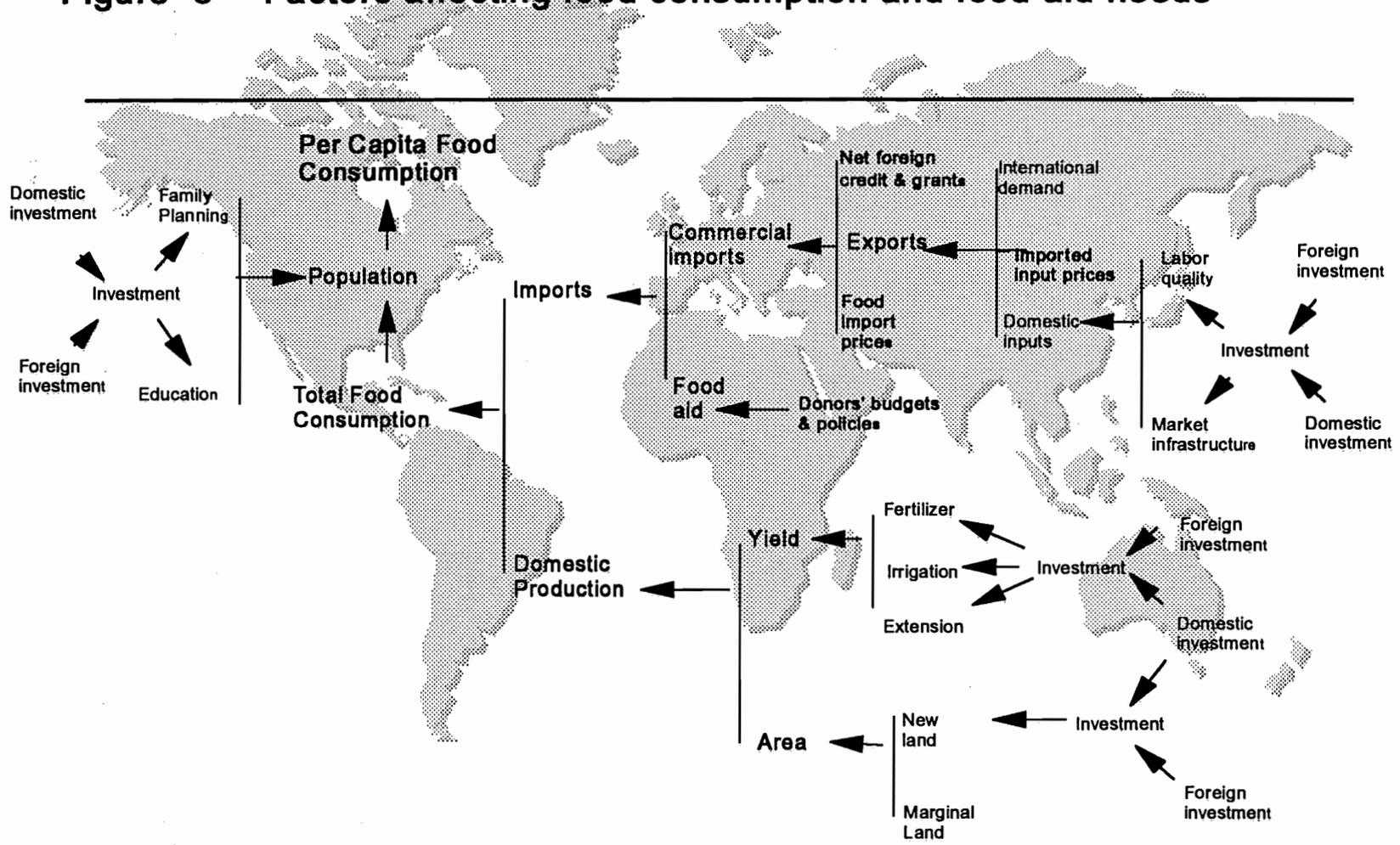
In this report, **chronic** and **emergency** grain food aid needs are estimated for 60 developing countries in Africa, Asia, and Latin America, with a combined population of 2.2 billion, or about 40 percent of the world's total population. An aggregate estimate of emergency needs for the rest of the world is also used to calculate global emergency needs. **Chronic needs** arise from a country's sustained inability to produce enough food for its population or to earn enough foreign exchange to commercially import the balance needed. Chronic needs are generally related to long-term structural, resource, or policy problems of the country. **Emergency food aid needs** are caused by short-term production shortfalls due to weather problems, sudden natural disasters, or political instability. Another component is the food needed to feed refugees and displaced people. During the last decade, a larger share of food aid has been allocated to emergency needs, and specifically for refugees and displaced persons.

The key variables influencing the outcome of the scenarios are alternative consumption targets and assumptions made about the commercial import capacity of the countries. Export earnings are the main determinants of commercial import capacity. Two sets of assumptions are used to compare the impact of different export growth rates.

**Commercial import capacity** is a measure of the foreign exchange a country has available to finance food imports. The "high-commercial-imports" scenario assumes relatively higher growth in a country's total exports, in foreign exchange earnings, and in its capacity to import food commercially. The alternative "low-commercial-imports" scenario assumes slower growth in commercial food imports, based on lower export earnings which are associated with slower growth in global exports. (See *table 16* in methodology section for export growth rates.)

**Consumption targets** are contrasted in the second set of scenarios. Maintaining current per capita grain consumption during the projection period is the "status quo" scenario. Achieving a minimum nutritional standard (defined by the Food and Agriculture Organization, FAO) is the "nutrition-based needs" scenario. The objective of the first is to stabilize consumption; the goal of the second is to achieve a nutritional standard. In some countries, average per capita consumption is currently higher than the minimum nutritional standard, suggesting that food aid might be reallocated to other countries in which current consumption is below the nutritional standard.

Figure 8 -- Factors affecting food consumption and food aid needs



A range of food aid needs is provided by the intersection of the two pairs of scenarios.

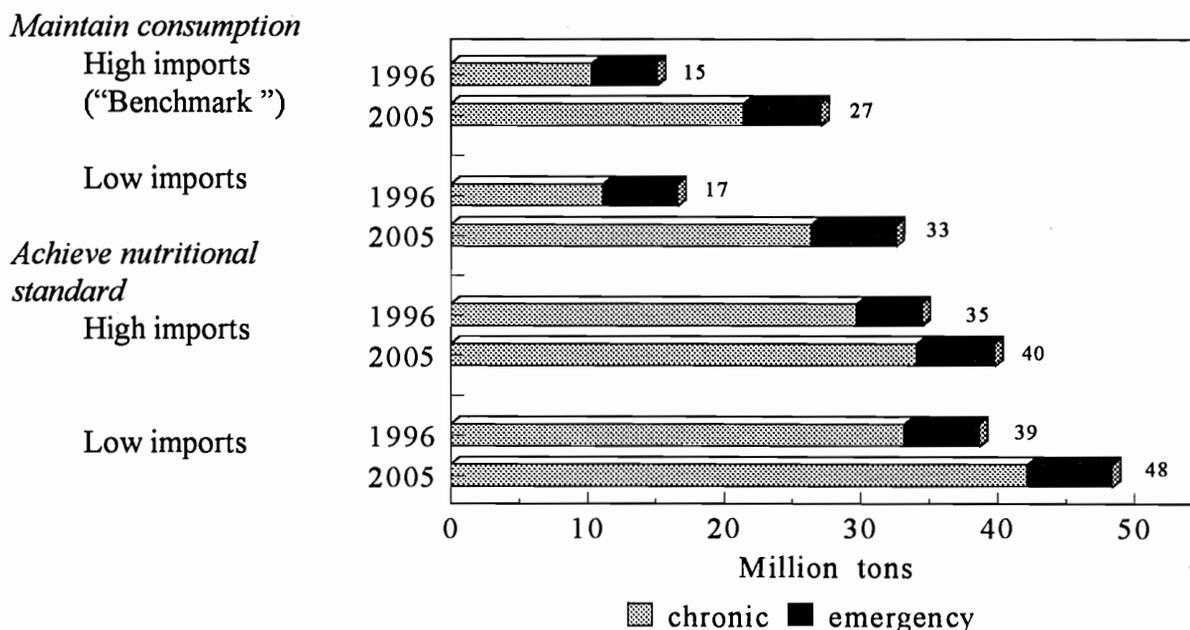
### Alternative scenarios for estimating total world food aid needs

	Status quo (maintain current consumption)	Nutrition-based needs (achieve a nutritional standard)
High-commercial-import capacity	This "Benchmark" scenario has the smallest estimate for total world food aid needs.	
Low-commercial-import capacity		This scenario results in the largest estimate for total world food aid needs.

The analysis focuses on grain, both for food aid needs and for food aid availabilities. Pulses, roots, tubers, vegetable oils, protein meals, and dairy products are omitted. This omission might affect the nutritional estimates of food aid needs, but it would not affect the estimated aid required to maintain grain consumption.

In many countries, grain is the basic staple consumed by the lower income segment of the population. In other countries, with more diversified agricultural sectors, different consumption patterns, or higher income levels, grain plays a less significant role in total per capita consumption. It should be noted that all assessments are based on national aggregate data and may mask acute needs resulting from uneven food distribution within individual countries. *Figure 9* shows food aid needs for each of the four scenarios.

**Figure 9 --Total food aid needs  
Alternative scenarios:**



**Estimated food aid needs**, worldwide, for grain will nearly double over the next decade, even with reasonably optimistic assumptions about recipient countries' ability to produce their own food or to have the financial capacity to import food commercially. Total food aid needs to maintain consumption and to meet emergency needs, about 15 million tons in 1996, will increase to 27 million tons by 2005 (*table 7*). More food aid will be required if recipient countries' financial capacity to import food commercially lags or if the consumption target is to meet minimum nutritional standards rather than to maintain per capita consumption at current levels.

**Chronic needs account for two-thirds of global food aid needs** and are limited to less than half of the countries studied. Chronic needs also account for much of the 12-million-ton increase in world grain food aid needs projected for the next decade. **Emergency needs of the 60 countries** will grow by 30 percent from 1996 to 2005 because of population growth and financial constraints.

**Global emergency needs have been growing more rapidly**, however. Between 1985 and 1994, the number of refugees grew by 11 percent per year and the number of displaced persons by 8.5 percent. If this trend continues, the emergency needs of the countries that are not included in the group of 60 will double to 5.4 million tons in 2005. However, because these high growth rates reflect the unusual occurrences in the former Soviet Union, the former Yugoslavia, and the Middle East, this analysis assumes a stabilization of emergency needs at the current high levels in the rest of the world.

**Table 7 -- Summary of chronic and emergency food aid needs**

	<i>Maintain status quo consumption</i>				<i>Minimum nutritional needs</i>			
	<u>High imports</u>		<u>Low imports</u>		<u>High imports</u>		<u>Low imports</u>	
	1996	2005	1996	2005	1996	2005	1996	2005
Million metric tons								
<b>60 countries:</b>								
Chronic needs	10.3	21.4	11.2	26.3	29.7	34.1	33.2	42.2
Emergency needs <sup>1</sup>	2.0	2.9	2.7	3.4	2.0	2.9	2.7	3.4
Total	12.3	24.3	13.9	29.6	31.7	37.0	35.9	45.5
<b>Other countries:</b>								
Emergency needs <sup>2</sup>	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8
<b>Total:</b>								
Chronic + emergency	15.1	27.1	16.7	32.4	34.5	39.8	38.7	48.3
Emergency only	4.8	5.7	5.5	6.1	4.8	5.7	5.5	6.1

<sup>1</sup> Calculation of emergency needs for the 60 countries is described in the Estimation Methodology section.

<sup>2</sup> Emergency needs for refugees and displaced persons only.

### **Chronic Food Aid Needs--Alternative Scenarios**

#### *Scenario 1: Benchmark Scenario--Status Quo Consumption with High Commercial Imports*

Food aid needs are projected to almost double from 1996 to 2005. The projected needs of 27 million tons are the lowest estimate for total world food aid needs. The projected food aid supply for 2005 is 10.6 million tons or only 40 percent of the total estimated needs under this scenario.

**Sub-Saharan Africa** is the most vulnerable region. The status quo needs (maintaining per capita consumption) of the region during the projection period are almost half of the total needs of the 60 countries, while its population is only 25 percent of the total (*table 8*). From 1996 to 2005, to maintain consumption, needs of the Sub-Saharan countries will increase from 5 million tons to 12 million tons. In 1996, 8 percent of total food use has to be supplemented by food aid to maintain per capita consumption. This could increase to as much as 15 percent by 2005.

In Sub-Saharan Africa, 26 of 36 countries are in need of food aid during the entire projection period, even under favorable financial conditions (*table 9*). Only seven countries in the region are projected to be able to use commercial imports to fill status quo food needs. Among the regions in Sub-Saharan Africa, East Africa, with 36 percent of the population, has the largest chronic food aid needs in 2005. Most of these countries are in the Greater Horn of Africa.

In **East Africa**, food aid needs to maintain status quo consumption are 1.9 million tons in 1996, increasing more than twofold to 4.7 million tons in 2005. This will account for 17 percent of their total food use.

**West Africa**, with one-third of Sub-Saharan Africa's population, is projected to have its food aid needs rise 2.5 million tons to 3.6 million tons in 2005 in order to maintain per capita consumption. This is about 4 percent of their food use in a given year.

**Southern Africa's** needs are about 30 percent of total Sub-Saharan needs and per capita needs are comparable with other Sub-Saharan regions. To maintain consumption, its needs will rise from 1 million tons in 1996 to 2.7 million in 2005, an amount equal to 20 percent of total food use in 2005.

**Central Africa** includes Cameroon, Central African Republic (CAR), and Zaire. Cameroon has adequate financial capacity to import food commercially, CAR has limited resources and needs food aid to support its consumption. Zaire has a vast natural resource base that includes the world's second largest rain forest. Nevertheless, because of the political and economic crisis in Zaire, Central Africa's food aid needs are expected to grow to 1 million tons to maintain per capita consumption by 2005.

In **North Africa**, food aid is required to maintain per capita consumption during the projected period. Of the four countries in the region, Algeria, Morocco, Egypt, and Tunisia, only Egypt requires food aid to maintain per capita consumption later in the projection period.

In **Asia**, Afghanistan is the only one of nine countries studied here that needs external support to maintain consumption through 2005. Food aid needs in Bangladesh, Nepal, and Sri Lanka will decline during the projection period, and these countries should be able to rely on commercial imports for their food imports by 2005. Although Asian food aid needs are projected to increase from 2.3 million tons in 1996 to 4.9 million tons by 2005, they account for less than 1 percent of total food use in the nine countries.

**Latin America's** status quo food aid needs for the 11 countries included in our study are 2 million tons. The growth in needs, 13 percent, is the slowest of all the regions. Many of the food aid recipients in Latin America are nearly self-sufficient in food production and have adequate financial resources. However, Haiti's and Nicaragua's food aid needs continue during the projection period, while El Salvador and Honduras are expected to gradually switch to commercial markets for their imports. No food aid will be required by the other seven Latin American countries.

**Table 8--Projected chronic grain food aid needs, status quo consumption**

Region	<u>High commercial imports</u>			<u>Low commercial imports</u>		
	Commercial imports	Food requirements	Food aid needs	Commercial imports	Food requirements	Food aid needs
Million metric tons						
<b>Sub-Saharan Africa:</b>						
1996	6.8	61.0	4.8	6.0	60.8	5.4
2005	7.1	79.6	11.8	3.6	79.5	15.2
<b>East Africa:</b>						
1996	1.4	21.6	1.9	1.4	21.6	1.9
2005	0.7	27.8	4.7	0.2	28.0	5.4
<b>West Africa:</b>						
1996	3.7	26.0	1.1	3.1	25.9	1.6
2005	4.8	34.6	3.6	2.5	34.6	5.9
<b>Southern Africa:</b>						
1996	1.2	10.5	1.6	1.1	10.5	1.7
2005	1.0	13.1	2.7	0.6	13.0	3.0
<b>Central Africa:</b>						
1996	0.5	3.0	0.2	0.4	2.9	0.2
2005	0.5	4.0	0.8	0.3	3.9	0.9
<b>North Africa:</b>						
1996	15.7	38.9	1.6	15.7	38.9	1.6
2005	20.1	46.5	2.9	19.6	46.5	3.4
<b>Africa total:</b>						
1996	22.5	99.9	6.4	21.7	99.7	7.0
2005	27.2	126.1	14.7	23.2	125.9	18.6
<b>Latin America total:</b>						
1996	3.7	12.2	1.6	3.6	12.2	1.7
2005	4.9	14.6	1.8	4.4	14.4	2.1
<b>Asia total:</b>						
1996	11.2	289.9	2.3	11.1	289.9	2.0
2005	15.6	360.3	4.9	14.8	360.3	5.7
<b>Total (60 countries):</b>						
1996	37.4	402.0	10.3	36.4	401.8	11.1
2005	47.7	501.0	21.4	42.4	500.7	26.4

**Table 9--Countries classified by aid needed to maintain consumption under high-imports scenario**

Country	Time frame for food aid needs				Country	Time frame for food aid needs			
	Entire period	1996	2005	No needs		Entire period	1996	2005	No needs
<b>East Africa:</b>					<b>North Africa:</b>				
Burundi	X				Algeria				X
Ethiopia	X				Egypt		X		
Kenya				X	Morocco				X
Rwanda	X				Tunisia				X
Somalia	X				<b>Asia:</b>				
Sudan	X				Afghanistan	X			
Tanzania	X				Bangladesh		X		
Uganda	X				India				X
<b>West Africa:</b>					Indonesia				X
Benin	X				Nepal		X		
Burkina Faso	X				Pakistan				X
Cape Verde			X		Philippines				X
Chad	X				Sri Lanka		X		
Cote d'Ivoire			X		Vietnam				X
Gambia				X	<b>Latin America:</b>				
Ghana			X		Bolivia				X
Guinea	X				Costa Rica				X
Guinea-Bissau	X				Dominican Rep.				X
Liberia	X				El Salvador		X		
Mali	X				Guatemala				X
Mauritania	X				Haiti	X			
Niger	X				Honduras		X		
Nigeria				X	Jamaica				X
Senegal				X	Nicaragua	X			
Sierra Leone	X				Panama				X
Togo	X				Peru				X
<b>Southern Africa:</b>					<b>Number of countries in each category:</b>				
Angola				X	Sub-Saharan				
Lesotho	X				Africa	26	0	3	7
Madagascar	X				North Africa	0	0	1	3
Malawi	X				Asia	1	3	0	5
Mozambique	X				Lat. America	2	2	0	7
Swaziland	X				Total	29	5	4	22
Zambia	X								
Zimbabwe				X					
<b>Central Africa:</b>									
Cameroon				X					
Central Afr.Rep.	X								
Zaire	X								

### *Scenario 2: Status Quo Consumption with Low Commercial Imports*

Lower commercial import capacity would have a large impact on food aid needs in the long term. Food aid needs compared with the benchmark scenario (high commercial imports) will increase by 9 percent in 1996 and 23 percent in 2005.

**In Sub-Saharan Africa**, 3.4 million tons of additional food aid are needed (compared with the benchmark scenario) to compensate for reduced capacity to import commercially (*table 8*). The number of needy countries increases from 26 to 29 (*table 10*). Only six countries in the region will be able to rely on commercial channels for their imports. West Africa shows the largest increase in needs, an additional 2 to 3 million tons by 2005. Senegal's commercial import capacity will be gradually exhausted. This is followed by East Africa with an increase of 0.7 million tons. Southern Africa's needs will increase by less than one-half million tons, and Central Africa's by only 0.1 million tons.

**In North Africa**, lower commercial import capacity causes Egypt to shift from occasional food aid needs to needing external support during the entire projection period.

For **Asia**, lower import capacity will increase the food aid needs by 0.8 million tons in 2005. Nepal will likely develop chronic food aid needs. Little change is projected for Bangladesh and Sri Lanka under the low-imports scenario--both will be commercial importers by 2005.

**In Latin America**, El Salvador and Honduras also shift from occasional food aid needs to needing external support during the entire projection period to maintain their consumption. Bolivia and Peru will require support in the early years but are expected to recover and rely on commercial imports by the end of the next decade.

### *Scenario 3: Minimum Nutritional Consumption with High Commercial Imports*

Moving from the status quo consumption scenario to a consumption target of achieving a minimum nutritional standard increases the number of countries needing sustained food aid assistance from 29 to 35, assuming high commercial import capacity. The quantity of food aid needs also increases significantly. Food aid needs in 1996 to support minimum nutritional standards is 30 million tons, while the benchmark scenario needs are only 10 million tons. The improvement in the nutritional condition of the countries will reduce the pace of growth in needs through time. By 2005, the gap under the nutritional scenario is 34 millions tons versus 21 million tons in the benchmark scenario (*table 11*).

**In Sub-Saharan Africa**, only 6 of the 36 countries will be able to satisfy their nutritional needs (*table 12*). The nutritional needs of the region are about 70 percent of total nutritional needs in 1996 and increase to 80 to 90 percent of the total in 2005. From 1996 to 2005, nutrition-based food aid needs in Sub-Saharan Africa will increase by 6 million tons.

**In Central Africa**, the political and economic crisis in Zaire is expected to raise the nutrition-based food aid needs deficit in 2005 to 2.3 million tons, much larger than the 1 million tons of aid required to maintain consumption. **In East Africa**, 14 million tons will be needed to provide minimum nutritional requirements at the end of the period.

**Table 10--Countries classified by aid needed to maintain consumption under low-imports scenario**

Country	Time frame for food aid needs			No needs	Country	Time frame for food aid needs			No needs
	Entire period	1996	2005			Entire period	1996	2005	
<b>East Africa:</b>					<b>North Africa:</b>				
Burundi	X				Algeria				X
Ethiopia	X				Egypt	X			
Kenya				X	Morocco				X
Rwanda	X				Tunisia				X
Somalia	X				<b>Asia:</b>				
Sudan	X				Afghanistan	X			
Tanzania	X				Bangladesh		X		
Uganda	X				India				X
<b>West Africa:</b>					Indonesia				X
Benin	X				Nepal	X			
Burkina Faso	X				Pakistan				X
Cape Verde	X				Philippines				X
Chad	X				Sri Lanka		X		
Cote d'Ivoire	X				Vietnam				X
Gambia				X	<b>Latin America:</b>				
Ghana	X				Bolivia		X		
Guinea	X				Costa Rica				X
Guinea-Bissau	X				Dominican Rep.				X
Liberia	X				El Salvador	X			
Mali	X				Guatemala				X
Mauritania	X				Haiti	X			
Niger	X				Honduras	X			
Nigeria				X	Jamaica				X
Senegal			X		Nicaragua	X			
Sierra Leone	X				Panama				X
Togo	X				Peru		X		
<b>Southern Africa:</b>					<b>Number of countries in each category:</b>				
Angola				X	Sub-Saharan				
Lesotho	X				Africa	29	0	1	6
Madagascar	X				North Africa	1	0	0	3
Malawi	X				Asia	2	2	0	5
Mozambique	X				Lat. America	4	2	0	5
Swaziland	X				Total	36	4	1	19
Zambia	X								
Zimbabwe				X					
<b>Central Africa:</b>									
Cameroon				X					
Central Afr.Rep.	X								
Zaire	X								

**Table 11--Projected chronic grain food aid needs, minimum nutritional consumption**

Region	<u>High commercial imports</u>			<u>Low commercial imports</u>		
	Commercial imports	Food requirements	Food aid needs	Commercial imports	Food requirements	Food aid needs
Million metric tons						
<b>Sub-Saharan Africa:</b>						
1996	6.8	77.9	21.7	6.0	79.0	23.6
2005	7.1	95.0	27.2	3.6	96.1	31.8
<b>East Africa:</b>						
1996	1.4	28.7	9.0	1.4	29.2	9.5
2005	0.7	36.9	13.8	0.2	38.0	15.4
<b>West Africa:</b>						
2005	3.7	32.7	7.8	3.1	33.1	8.8
2005	4.8	37.2	6.2	2.5	37.2	8.5
<b>Southern Africa:</b>						
1996	1.2	12.4	3.5	1.1	12.7	3.9
2005	1.0	15.3	4.9	0.6	15.6	5.6
<b>Central Africa:</b>						
1996	0.5	4.2	1.4	0.4	4.1	1.4
2005	0.5	5.5	2.3	0.3	5.3	2.3
<b>North Africa:</b>						
1996	15.7	37.3	0.0	15.7	37.3	0.0
2005	20.1	45.3	1.7	19.6	45.3	2.2
<b>Africa total:</b>						
1996	22.5	65.8	21.7	21.7	116.3	23.6
2005	27.2	79.5	28.9	23.2	141.3	34.0
<b>Latin America total:</b>						
1996	3.7	12.0	1.4	3.6	12.9	2.4
2005	4.9	13.2	0.4	4.4	14.5	2.2
<b>Asia total:</b>						
1996	11.2	294.3	6.7	11.1	294.7	7.2
2005	15.6	360.3	4.9	14.8	360.6	6.0
<b>Total (60 countries):</b>						
1996	37.4	421.5	29.8	354.3	423.9	33.2
2005	47.7	513.7	34.2	431.9	516.5	42.2

**Table 12--Countries classified by aid needed to meet nutritional standards under high-imports scenario**

Country	Time frame for food aid needs			Country	Time frame for food aid needs			
	Entire period	1996	2005		Entire period	1996	2005	No needs
<b>East Africa:</b>				<b>North Africa:</b>				
Burundi	X			Algeria			X	
Ethiopia	X			Egypt		X		
Kenya		X		Morocco			X	
Rwanda	X			Tunisia			X	
Somalia	X			<b>Asia:</b>				
Sudan	X			Afghanistan	X			
Tanzania	X			Bangladesh	X			
Uganda	X			India			X	
<b>West Africa:</b>				Indonesia			X	
Benin	X			Nepal	X			
Burkina Faso	X			Pakistan			X	
Cape Verde	X			Philippines			X	
Chad	X			Sri Lanka		X		
Cote d'Ivoire	X			Vietnam		X		
Gambia			X	<b>Latin America:</b>				
Ghana	X			Bolivia		X		
Guinea	X			Costa Rica			X	
Guinea-Bissau	X			Dominican Rep.			X	
Liberia	X			El Salvador		X		
Mali	X			Guatemala			X	
Mauritania	X			Haiti	X			
Niger	X			Honduras		X		
Nigeria	X			Jamaica			X	
Senegal			X	Nicaragua	X			
Sierra Leone	X			Panama			X	
Togo	X			Peru			X	
<b>Southern Africa:</b>				<b>Number of countries in each category:</b>				
Angola			X	Sub-Saharan				
Lesotho	X			Africa	30	1	0	5
Madagascar	X			North Africa	0	0	1	3
Malawi	X			Asia	3	2	0	4
Mozambique	X			Lat. America	2	2	2	5
Swaziland	X			Total	35	5	3	17
Zambia	X							
Zimbabwe			X					
<b>Central Africa:</b>								
Cameroon			X					
Central Afr.Rep.	X							
Zaire	X							

Nutritional needs in **West Africa** are projected to decline slightly between 1996 and 2005, primarily because of the improvement in the food situation in Nigeria. Nigeria has the largest population in Sub-Saharan Africa--19 percent of the total and about half of West Africa. Any changes in policies and financial situation of the country will have profound regional implications, particularly for the neighboring countries with trade ties.

The nutritional deficit in **Southern Africa** will increase by 1.5 million tons from 1996 to 2005. With the exception of Zimbabwe, all Southern African countries are in need of external nutritional support. Angola, which is projected to be able to maintain status quo consumption without food aid, will require support to achieve minimum nutritional levels.

In **North Africa**, slow growth in food availabilities in Egypt will create a need for external nutritional support. Nutritional needs of the country are projected to increase to 1.7 million tons by 2005. Government food subsidies over the years have improved Egypt's nutritional situation, but given the financial prospects of the country, maintaining consumption may not be possible. With a decline in per capita consumption, nutritional vulnerability will increase.

In **Asia**, with projected increases in food production, the nutritional needs of the region are projected to decline by 20 percent. Indonesia and Philippines are expected to have adequate financial capacity to import food commercially. In South Asia, nutritional problems persist, despite improved financial conditions. Bangladesh and Nepal, which should be able to maintain status quo consumption, will need food aid to achieve minimum nutritional requirements. Sri Lanka and Vietnam will need aid in the first few years of the projection period, but they are expected to eventually supply sufficient food to meet nutritional requirements from their own resources. India's success in increasing food production and its policy of supplying food at affordable prices have increased the level of average consumption above the minimum nutritional requirement. Despite this success, India's internal distributional problems persist, leading to severe undernutrition among low-income groups.

In **Latin America**, 6 of 11 countries will need some food aid, at some time during the projection period, to achieve minimum nutritional standards. Nutritional needs in Nicaragua and Haiti remain high. Bolivia and El Salvador will need aid in the early part of the projection period, and Honduras and Guatemala will require support in later years. Overall, the region's nutrition-based needs will decline through time. The countries in need of nutritional support during the entire period are Bolivia, El Salvador, Haiti, Honduras, and Nicaragua.

#### *Scenario 4: Minimum Nutritional Consumption with Low Commercial Imports*

High nutritional deficiencies combined with growing financial constraints in the countries, lead to this scenario's generating the highest level of food aid needs considered in this study. Chronic food aid needs are estimated at 33 million tons in 1996 or about triple the benchmark scenario, growing to 42 million tons by 2005 (*table 11*). When emergency needs are added, total food aid needs increase to 48 million tons, which is almost five times the projected food aid supply in year 2005. The number of countries needing sustained food aid assistance under this scenario increases to 41, 68 percent of the study countries (*table 13*). Even without any constraint in food aid supply, however, such large quantities of grains probably cannot be imported because of the poor import infrastructure of the countries.

**Table 13--Countries classified by aid needed to meet nutritional standards under low-imports scenario**

Country	Time frame for food aid needs			Country	Time frame for food aid needs			
	Entire period	1996	2005		No needs	Entire period	1996	2005
<b>East Africa:</b>				<b>North Africa:</b>				
Burundi	X			Algeria				X
Ethiopia	X			Egypt			X	
Kenya	X			Morocco				X
Rwanda	X			Tunisia				X
Somalia	X			<b>Asia:</b>				
Sudan	X			Afghanistan	X			
Tanzania	X			Bangladesh	X			
Uganda	X			India				X
<b>West Africa:</b>				Indonesia				X
Benin	X			Nepal	X			
Burkina Faso	X			Pakistan				X
Cape Verde	X			Philippines				X
Chad	X			Sri Lanka	X			
Cote d'Ivoire	X			Vietnam		X		
Gambia				X				
Ghana	X			<b>Latin America:</b>				
Guinea	X			Bolivia	X			
Guinea-Bissau	X			Costa Rica				X
Liberia	X			Dominican Rep.		X		
Mali	X			El Salvador	X			
Mauritania	X			Guatemala		X		
Niger	X			Haiti	X			
Nigeria	X			Honduras	X			
Senegal			X	Jamaica				X
Sierra Leone	X			Nicaragua	X			
Togo	X			Panama				X
<b>Southern Africa:</b>				Peru			X	
Angola	X			<b>Number of countries in each category:</b>				
Lesotho	X			<b>Sub-Saharan</b>				
Madagascar	X			Africa	32	0	1	3
Malawi	X			North Africa	0	0	1	3
Mozambique	X			Asia	4	1	0	4
Swaziland	X			Lat. America	5	2	1	3
Zambia	X			Total	41	3	3	13
Zimbabwe								
<b>Central Africa:</b>								
Cameroon								
Central Afr.Rep.	X							
Zaire	X							

In **Sub-Saharan Africa**, only three countries will be able to provide nutritionally adequate levels of food without external assistance (*table 13*). The food aid needs of the region will grow to almost three times that of the benchmark scenario. This also means that the total projected food aid supply in 2005, if is allocated entirely to the region, will satisfy only a third of the projected needs in this scenario.

In **North Africa**, the lower commercial import capacity will boost Egypt's food aid needs by a half million tons to 2 million tons. The other countries in the region will be able to satisfy their needs without external assistance.

In **Asia**, despite the decline in import capacity of the countries, nutritional aid needs are projected to decline. Only Sri Lanka will require food aid over the entire projection period. As a result, the number of countries needing food aid during the entire projected period rises to four.

In **Latin America**, lower commercial import capacity adds two more countries to the list of those needing food aid to achieve minimum nutritional standards. The Dominican Republic and Peru, which are expected to achieve nutritional standards in the high-imports scenario will require external support to meet minimum nutritional standards in the low-imports scenario.

### **Emergency Food Aid Needs**

The need for emergency food aid is generally due to production shortfalls (arising from weather problems, natural disasters, or political and/or economic instability). *Table 14* presents projections for emergency food aid needs in the 60 countries, based on historical trends in emergency aid as a proportion of total food aid.

In **East Africa**, the most vulnerable countries in terms of emergency food aid needs are Ethiopia, Somalia, and Sudan, which remain vulnerable. Their food situation could be worse than the projected levels if political instability continues.

In **West Africa**, the most expected emergency needs are in Liberia, Chad, and Sierra Leone with unstable political situations, and Cape Verde, Guinea, and Mauritania with high production variability and limited financial resources.

In **Southern Africa**, the vulnerable countries are Mozambique and Angola because of political problems, and Lesotho and Swaziland because of high production variability and limited financial resources.

The bulk of food aid emergency needs in **Asia** are in Bangladesh, Afghanistan, Nepal, and Sri Lanka, where political and weather variability cause economic and production disruptions. Emergency food aid needs of the region are the highest in 1996 (0.3 million tons) and decline to 0.2 million tons by 2005.

**Latin America's** vulnerable countries with prospects for emergency food aid needs are mainly Caribbean islands. In countries such as Haiti and Nicaragua, political problems are expected to add more pressure on the already fragile economic conditions.

## **Other Needs**

At the bottom of *table 14*, data on emergency food aid are presented for countries not included in the group of 60. This reflects emergency food aid for refugees and displaced persons principally related to developments in the republics of the former Soviet Union and in former Yugoslavia.

The chronic food aid needs of Eastern Europe and the Former Soviet Union are not covered in this study, because they are not traditional food aid recipients. Although these countries received more than 4 million tons of food aid in 1992/93 and 1993/94, their need for aid is expected to decline sharply as their economies stabilize. Food aid shipments in 1994/95 fell to an estimated 2 million tons. Average per capita grain consumption in these countries exceeds the minimum required to meet the nutritional standard. In the medium term, pockets of need will continue in Armenia, Georgia, and Tajikistan.

**Table 14--Projected emergency grain food aid needs, production shortfalls, by region**

Region / year	Population	Production	Shortfall Index <sup>1</sup>	Expected annual production shortfalls	High-imports scenario		Low-imports scenario	
					Increase in commercial imports	Emergency needs	Increase in commercial imports	Emergency needs
	Million	1,000 tons	Percent		-----1,000 tons-----			
<b>Sub-Saharan Africa:</b>								
1996	487	49,430	-6.3	3,094	1,368	1,726	1,169	1,925
2005	643	60,694	-6.3	3,795	1,196	2,599	954	2,841
<b>East Africa:</b>								
1996	174	18,278	-6.7	1,218	509	709	465	753
2005	225	22,408	-6.7	1,487	253	1,234	236	1,251
<b>West Africa:</b>								
1996	189	21,177	-6.0	1,270	486	784	383	887
2005	225	26,156	-6.0	1,567	653	914	446	1,121
<b>Southern Africa:</b>								
1996	69	7,713	-6.5	502	373	129	321	181
2005	88	9,401	-6.5	616	290	326	272	344
<b>Central Africa:</b>								
1996	56	2,262	-4.6	104	0	104	0	104
2005	75	2,729	-4.6	125	0	125	0	125
<b>North Africa:</b>								
1996	121	21,608	-7.3	1,577	1,458	119	1,458	119
2005	146	23,453	-7.3	1,769	1,389	380	1,389	380
<b>Total Africa:</b>								
1996	608	71,038	-13.6	4,671	2,826	1,845	2,627	2,044
2005	789	84,147	-13.6	5,564	2,585	2,979	2,343	3,221
<b>Latin America total:</b>								
1996	77	6,878	-4.7	324	317	7	272	52
2005	92	7,891	-4.7	370	340	30	300	70
<b>Asia total:</b>								
1996	1,514	276,423	-2.4	6,585	6,289	296	5,829	756
2005	1,805	339,818	-2.4	8,063	7,876	187	7,734	329
<b>Total (60 countries):</b>								
1996	2,079	354,339	-4.4	10,003	7,974	2,029	7,270	2,733
2005	2,631	431,856	-5.4	13,805	10,870	2,935	10,446	3,359
<b>Emergency food needs</b>								
				Daily food requirement (grams)	Number of people (1994), million			
Refugees:	1996		500		9	1,630		1,630
(not group of 60)	2005		500		9	1,630		1,630
Displaced persons:	1996		250		12	1,129		1,129
(not group of 60)	2005		250		12	1,129		1,129
<b>Total emergency needs:</b>								
	1996					<b>4,788</b>		<b>5,492</b>
	2005					<b>5,694</b>		<b>6,118</b>

<sup>1</sup> The shortfall index was calculated by summing a country's shortfalls in production in each year (1970-91) they occurred (when actual production fell below trend) and taking average of those as a proportion of actual production.

## Estimation Methodology

Food aid needs are estimated for 60 low-income countries. Some of the countries have no current needs for food aid and are projected to have no such needs during the next decade. For Sub-Saharan Africa, North Africa, Latin America, and Asia, food aid needs are projected for individual countries, aggregated for each region, and then summarized regionally.

### "Food Aid Needs" Defined

Food aid needs are defined as the gap between a target consumption level and the availability of grains for food use. The first step in assessing food aid needs is to project the availability of grains for human consumption. This is decomposed into two parts--supply of grains and allowance for nonfood use of grains. Supply is defined as production, plus stocks, plus commercial imports:

$$\text{Supply} = \text{production} + \text{beginning stocks} + \text{commercial imports} \quad (1)$$

Nonfood use includes exports, feed use, other nonfood uses (such as waste, seed use, and processing), and stock accumulation:

$$\text{Nonfood use} = \text{exports} + \text{feed use} + \text{other nonfood use} + \text{ending stocks} \quad (2)$$

The quantity of cereals available for food use is equal to supply less nonfood use:

$$\text{Food availability} = \text{supply} - \text{nonfood use} \quad (3)$$

Finally, food aid needs are computed as the gap between target food use and food availability:

$$\text{Food aid need} = \text{target food use} - \text{food availability} \quad (4)$$

This study assesses the food aid needed to meet grain consumption requirements. Because of data limitations, accurate estimates of the supplies of nongrain foods such as pulses, roots and tubers, vegetable oils, and milk are not available. The omission of nongrains from this analysis may misrepresent food aid needs in those countries where diets are largely based on root crops or other foods, and grains contribute a small share of total calories. However, in most low-income countries, grains account for at least 50 percent of all calories consumed. In addition, the bulk of international food aid is provided in the form of grains.

Historical supply and use data for 1980-94 for most variables are from the USDA PS&D data base. Food aid and commercial import data are from FAO, while financial data are from the International Monetary Fund (IMF). Historical nonfood-use data, including seed, waste, processing, and other use, are estimated from the FAO *Food Balance* series. Data from the U.S. Committee for Refugees are used to estimate emergency needs for refugees and displaced persons.

## Chronic Food Aid Needs

Chronic food aid needs are determined by calculating the gap between target consumption and the availability of grain for food use. Target consumption is derived from two objective measures of per capita food use.

**Targeted Level of Food Use** -- Two distinct levels of food use are analyzed:

(1) *Status quo food use target.* The objective of the first consumption target is to maintain average per capita consumption at recent levels. The most recent 5-year average is used in order to eliminate short-term fluctuations.

(2) *Nutrition-based food use target.* Nutrition-based grain needs are derived from the minimum daily caloric intake standards recommended by the United Nations. The caloric requirements used in this assessment are those necessary to sustain life with minimum food-gathering activity. They are comparable with the activity level for a refugee--they do not allow for play, work, or any activity other than food gathering. In addition, because of the weakness of the data, the caloric requirements represent regional averages for Sub-Saharan Africa but are country specific for North Africa, Asia, and Latin America.

The status quo measure embodies a "safety-net" criterion by supporting food use at recently achieved levels. The nutrition-based target assists comparisons of relative well-being. When status quo needs exceed nutrition-based needs, it is an indication of a relatively high standard of well-being and a less urgent need to support consumption with food aid. When status quo needs are below nutrition-based needs, it is an indication of a more urgent need to support consumption with food aid, if it can be effectively absorbed by the local economy.

## Food Availability Projections

The calculation of grain availability for human consumption is based on estimates of production, nonfood use (including exports, feed, seed, and waste), beginning and ending stocks, food aid, and commercial imports.

*Production.* Production projections are the results of annual USDA baseline projections used to support ongoing departmental activities. These baseline projections represent one plausible longrun scenario for the next 10 years and reflect a composite of model results and judgmental analysis.

*Nonfood use.* Historical nonfood use for seed and waste are estimated using the FAO *Food Balance* series. Export and feed use figures are USDA data. Except in the case of a country where internal structural change called for the use of a different base period, exports, seed, feed, and other nonfood use are projected using a 5-year average benchmark. Feed and exports are assumed to increase at the same rate as population growth.

*Stocks.* There is no change in stocks.

**Table 15--Projected growth rates for grain area, yield, and production, by region (baseline)**

Region	Well-managed economies			Poorly-managed economies		
	Area	Yield	Production	Area	Yield	Production
<b>South Asia</b>			Percent per year			
Bangladesh	0.35	1.72	2.07			
India	0.48	2.21	2.70			
Pakistan	0.90	1.40	2.31			
Others				0.75	0.51	1.22
<b>East Asia</b>						
Indonesia	0.20	1.55	1.74			
Philippines	0.50	0.65	1.16			
Vietnam	-0.01	1.15	1.15			
<b>North Africa</b>						
Egypt	-0.16	0.52	0.36			
Morocco	0.24	1.32	1.59			
Tunisia	0.68	0.71	1.40			
<b>Sub-Saharan Africa</b>	0.53	1.87	2.41	0.57	1.22	1.90
<b>Latin America</b>	0.70	1.12	1.87	-0.08	1.07	0.99

*Food aid.* Food aid needs are defined as the gap between consumption and production plus commercial imports of the countries. It should be noted that consumption, production, and commercial imports depend on growth of factors such as foreign exchange availability, policies, population growth, production incentives, and international financial and commodity market conditions (see *figure 8*). Therefore, estimation of food aid needs is the result of specific assumptions about the resources and policies of the countries. As shown in *figure 8*, in the long term, the main factor that could alter the situation is investment. Domestic policies are also crucial in encouraging both the level and efficient use of investment. For most low-income countries with limited financial resources, identifying investment with the highest long-term return is the most important challenge. Investment is assumed to remain constant at the base value.

*Commercial import projections.* To project commercial imports, total foreign exchange availability for each country is projected first (see *table 16*). Foreign exchange availability is defined as the sum of projected exports and net foreign credit and grant flows.

$$\text{Foreign exchange availability} = \text{Exports} + \text{Net foreign credit and grants} \quad (5)$$

Export growth projections are based on regional World Bank projections. The trade prospects in developing countries will be affected by changes in the external environment. The principal dimensions of the external environment are growth and inflation in the industrialized countries, interest rates, capital flows, trade, and commodity prices. A favorable global environment provides developing countries with prospects for sustained growth (high-imports scenario). Downside risks are several: policy slippages in industrialized and developing countries could lead to higher inflation, higher interest rates, and less productivity and trade (low-imports scenario).

**Table 16--Projected growth rates for total export earnings**

Regional estimates <sup>1</sup>	Well-managed economies		Poorly-managed economies	
	High imports	Low imports	High imports	Low imports
	Percent per year			
South Asia	8.2	6.7	6.7	2.7
East Asia	11.3	9.0	NA	NA
Sub-Saharan Africa	5.2	3.4	3.4	2.7
North Africa	4.2	4.2	4.2	2.5
Western Hemisphere	7.6	6.1	6.1	2.9

NA = not available.

<sup>1</sup> Projected average annual export growth rates--regional World Bank projections were used as a basis, but adjustments were made to reflect individual country performance.

The net foreign credit and grant flows are assumed to remain constant at the base level (5-year average 1989-93). This implies a decline in per capita foreign credit received by the countries over time. Foreign exchange availability is assumed to be equal to foreign exchange use, meaning that no change in cash reserves is allowed during the projection period. Projected foreign exchange use by countries is divided into two parts:

$$\text{Foreign exchange use} = \text{Non-food imports} + \text{Food imports} \quad (6)$$

The countries are allowed to import essential inputs (capital goods) that would permit them to maintain their current per capita income level, with adjustments as needed to incorporate input price changes. The projections of input prices are based on IMF projection for terms of trade for regions as well as developing country classification (classifications are based on financial criteria and structure of exports).

To estimate **commercial food imports**, the residual foreign exchange is allocated to food imports. The quantity of commercial grain imports is estimated using the projections of total grain import values and grain prices. From the base period (1989-93), the unit values (prices) are calculated by dividing the value of commercial grain imports by their quantity. For the projected years, a unit value for grains is calculated using the USDA-projected price. Using the unit values, the quantity of commercial grain imports for 1996 to 2005 is then calculated by dividing the total grain import value by unit value. It should be noted that commercial import estimates are a measure of **capacity to import** food commercially but may not reflect a country's willingness to **finance** the imports (see *table 17*).

**Table 17--Projected growth rates for imported input prices**

Regional estimate <sup>1</sup>	Annual growth	Country groups	Annual growth
	Percent		Percent
Asia	0.4	Diversified economies	0.3
Sub-Saharan Africa	0.9	Service exporters	0.6
Middle East and N. Africa	0.1	Mineral exporters	1.4
Western Hemisphere	0.7	Primary product exporters	1.2
		Manufactured prod. exporters	0.4
		Nonfuel exporters	0.5
		Fuel exporters	-0.1

<sup>1</sup> Projected nonfood import price is based on regional IMF projections for 1996, but adjustments were made to reflect individual country performance.

### Emergency Food Aid Needs

Emergency food aid is the sum of two types of needs: (1) emergency needs related to weather variability, and (2) emergency needs related to political instability. The measure used to estimate emergency needs for the 60 countries is the production shortfall index which measures the effect of weather and political turmoil. The index is derived from measuring the countries' shortfalls in grain production (when production fell below trend) and taking the average as a proportion of the actual average of production for 1970-91. These indices are the average over the historical period and as such do not reflect production shortfalls in a given year in these countries. To estimate average annual emergency needs, the projected production of each country is multiplied by the calculated shortfall index (see *table 18*). The method for estimating commercial imports is the same as the one used to calculate chronic needs (high- and low-imports scenarios). Again, countries with adequate financial capacity are expected to increase their commercial imports to compensate for production shortfalls, while food aid needs increase in countries with limited foreign exchange.

Relief operations for refugees and displaced persons have become a large part of international food aid programs. This type of need is different from country emergencies because these people depend almost exclusively on international or host country assistance. In most cases, refugees and displaced persons cannot find employment and receive little or no cash to cover food costs.

Data from the U.S. World Refugee Survey were used to estimate the number of refugees and displaced people in 1994. For the 60 countries, it is assumed that food aid needs of refugees and displaced persons within each country are implicitly included in the chronic and weather-induced emergency needs. To estimate needs due to political instability, the number of refugees in countries not included in the study's 60 countries is aggregated. It is assumed that the number of refugees and displaced persons will remain constant during the projection period (i.e., no increase in world political instability). The daily caloric requirement is based on a U.N. recommendation of 250 grams of grain per day for displaced persons and 500 grams per day for refugees.

**Table 18--Agricultural production shortfalls from trend<sup>1</sup>**

Region and country	Shortfall index	Region and country	Shortfall index	Region and country	Shortfall index
	Percent		Percent		Percent
<b>North Africa:</b>		<b>West Africa:</b>		<b>South Asia:</b>	
Algeria	-13.8	Benin	-5.6	Afghanistan	-5.5
Egypt	-3.1	Burkina Faso	-6.3	Bangladesh	-1.8
Morocco	-11.1	Cape Verde	-39.1	India	-2.3
Tunisia	-14.7	Chad	-11.2	Nepal	-2.9
<b>Average</b>	-7.3	Cote d'Ivoire	-2.6	Pakistan	-2.6
		Gambia	-8.8	Sri Lanka	-5.2
<b>Central Africa:</b>		Ghana	-7.9	<b>Average</b>	-2.4
Cameroon	-5.2	Guinea	-14.1		
Central African Rep.	-14.4	Guinea Bissau	-8.8	<b>East Asia:</b>	
Zaire	-3.2	Liberia	-3.0	Indonesia	-2.1
<b>Average</b>	-4.6	Mali	-6.1	Philippines	-2.3
		Mauritania	-17.5	Vietnam	-3.4
<b>Southern Africa:</b>		Niger	-8.2	<b>Average</b>	-2.3
Angola	-5.1	Nigeria	-4.1		
Lesotho	-10.7	Senegal	-9.1	<b>Latin America:</b>	
Madagascar	-1.6	Sierra Leone	-3.9	Bolivia	-4.3
Malawi	-3.9	Togo	-6.6	Costa Rica	-10.1
Mozambique	-7.6	<b>Average</b>	-6.0	Dominican Rep.	-4.8
Swaziland	-14.9			El Salvador	-4.9
Zambia	-9.1	<b>East Africa:</b>		Guatemala	-3.1
Zimbabwe	-10.0	Burundi	-3.2	Haiti	-7.2
<b>Average</b>	-6.5	Ethiopia	-5.8	Honduras	-4.8
		Kenya	-5.3	Jamaica	-23.3
		Rwanda	-4.5	Nicaragua	-6.4
		Somalia	-9.6	Panama	-3.6
		Sudan	-10.4	Peru	-4.7
		Tanzania	-6.6	<b>Average</b>	-4.7
		Uganda	-4.6		
		<b>Average</b>	-6.7		

<sup>1</sup> The shortfall index was calculated by summing a country's shortfalls in per capita production in each year (when actual production fell below trend) and taking those as a proportion of actual per capita production.

## Factors Affecting Food Consumption and Food Aid Needs

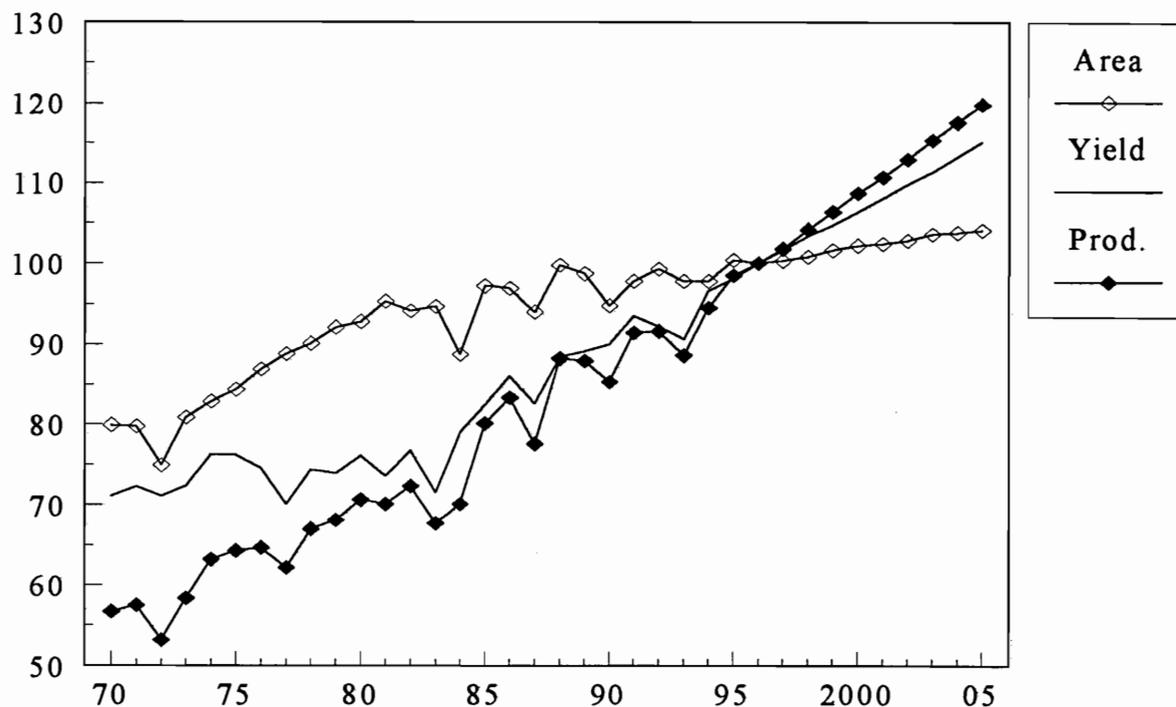
Many factors affect a country's food consumption and need for food aid. These include population and income growth, agricultural production, domestic policies, and foreign exchange availability. Performance of these variables in turn depends on the natural resource endowment of the country, level of technology, export earnings, and the state of the global economy. In the following section, some of the most important of these factors are discussed in a brief text followed by a table or graph and bullets that highlight the major conclusions.

### Food Production

Improvement in the performance of the agricultural sector of the study countries can dramatically reduce the projected food aid needs. In many countries, food production lagged behind population growth. During 1980-94, per capita food production declined in 35 countries--27 in Sub-Saharan Africa, 3 in Asia, and 5 in Latin America. The key factors that will influence future food production are agricultural technology, natural resource management, access to modern inputs, and rural infrastructure.

**Figure 10-- Food aid recipient countries' grain area, yield, production (baseline)**

**Index: 1996=100**



Source: FAO.

## Yields

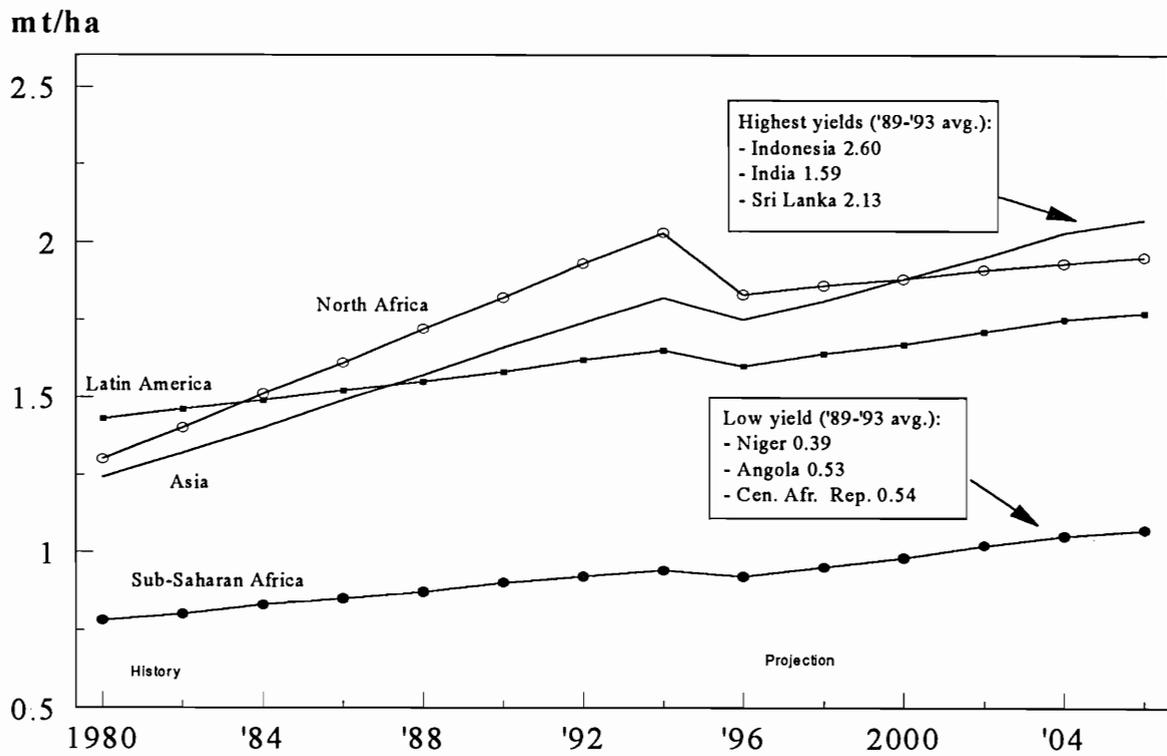
Yield growth is a key factor influencing food production performance and, in turn, the level of food aid needs of the 60 countries. A comparison of yield levels and growth in Asia, Latin America, and Africa reveals a wide disparity in the regions, suggesting a potential for improved yields, especially in Sub-Saharan Africa (*figure 11*). Projected growth in grain yields during the next 10 years shows higher growth rates for Asia than for Africa and Latin America, reflecting the differences in the state of agricultural development and policies of the countries.

In North Africa, particularly in Egypt, where grain yields are among the highest in the world, the expected yield growth rate is low. Large gains in production in Egypt in the 1980's were a result of the adoption of higher yielding varieties; these gains are expected to slow in the future. Average projected yield growth in Latin America is higher than in Sub-Saharan Africa (where there is significant variation in country performance) because of the general improvement in economic policies in the region. Grain yields in Sub-Saharan Africa are expected to grow more slowly than in the other regions, remaining about half of those in Asia. During 1980-93, yield growth contributed almost all of the production growth in Asia, followed by 80 percent in North Africa and 60 percent in Latin America. If yields grow more rapidly than projected, food aid needs will be reduced dramatically. In fact, if yield growth in Sub-Saharan Africa were assumed to be double that used in the current projections, the continent's needs would drop by 45 percent and world food aid needs would fall by 25 percent in 2005.

During the last two decades, most of the world's production gains came from "Green Revolution" technology, improved crop varieties, and improved cultivation practices. Asian countries saw the greatest benefit from these advancements. Grain production in India doubled between 1974 and 1994. Another factor behind the yield growth was irrigation, which expanded the amount of arable land. Use of improved inputs also contributed to yield growth. The improved crop varieties require high levels of fertilizer use to achieve potential yields, along with timely application of water and good drainage. In Asia, many governments made a package of technology (high-yielding varieties (HYV's), adequate fertilizer, and chemicals) available to farmers. In less desirable areas and in countries with limited support for inputs, the adoption rate was very slow.

In Africa, most crop production gains have been attributed to area expansion that occurred before the mid-1980's. The use of HYV's has been successful only in corn production and in limited geographical areas to which specific varieties were adapted (Zimbabwe, Zambia, and Kenya). In Sub-Saharan Africa, irrigated area is relatively small, as most agriculture in Africa is rainfed. In contrast to Asia, the ecology of the continent makes water control difficult to achieve. The problem of breeding new crop varieties under rainfed conditions is complex because of factors such as the length and intensity of the rainy season, intensity of solar radiation, and soils that are much more variable than they are in the irrigated areas of Asia. New varieties need to be resistant to both drought and the diseases prevalent during the rainy season. Even in the irrigated areas, adoption of Asia's high-yielding varieties is not possible because of plant disease. In addition to adaptability, an important contributing factor to the success of the Green Revolution in Asia was the existence of good networks of roads for supplying inputs. In Africa, by contrast, rural road networks are poor to nonexistent and cannot be relied on to provide these vital links.

Figure 11--Grain yield changes over time



Source: FAO and ERS.

- During the last two decades, most of the world's production gains came from "Green Revolution" technology.
- In Sub-Saharan Africa, most crop production gains have been attributed to area expansion.
- Projections for growth in grain yields for the next decade show higher growth rates for Asia than for Africa or Latin America.
- If projected yield growth rates were doubled in Sub-Saharan Africa, the continent's food aid needs would drop by 45 percent, and world needs would be 25 percent lower in 2005.

## Fertilizer Use

To increase per capita food intake and improve living standards in the absence of a slowdown in population growth, agricultural production needs to grow in all food aid recipient countries, especially in Sub-Saharan Africa. Expansion of cultivated area alone is unlikely to result in sustainable production growth. Substantial increases in crop yields will also be needed. Adequate soil fertility is one essential component of sustained yield growth. Without sufficient soil nutrients, crop yields cannot increase, be sustained over time, or respond to improved management practices or other inputs. Perhaps more important, a lack of adequate nutrients will hamper the ability to use other technologies effectively.

Fertilizer use in Sub-Saharan Africa is lower than in any other region in the world but varies by country, climatic zone, and farm size. Commercial farmers account for approximately 80 percent of all fertilizer consumption. Most fertilizer is used on cash crops such as coffee, cocoa, cotton, palm oil, sugarcane, and peanuts. In several countries, fertilizer is also used on corn.

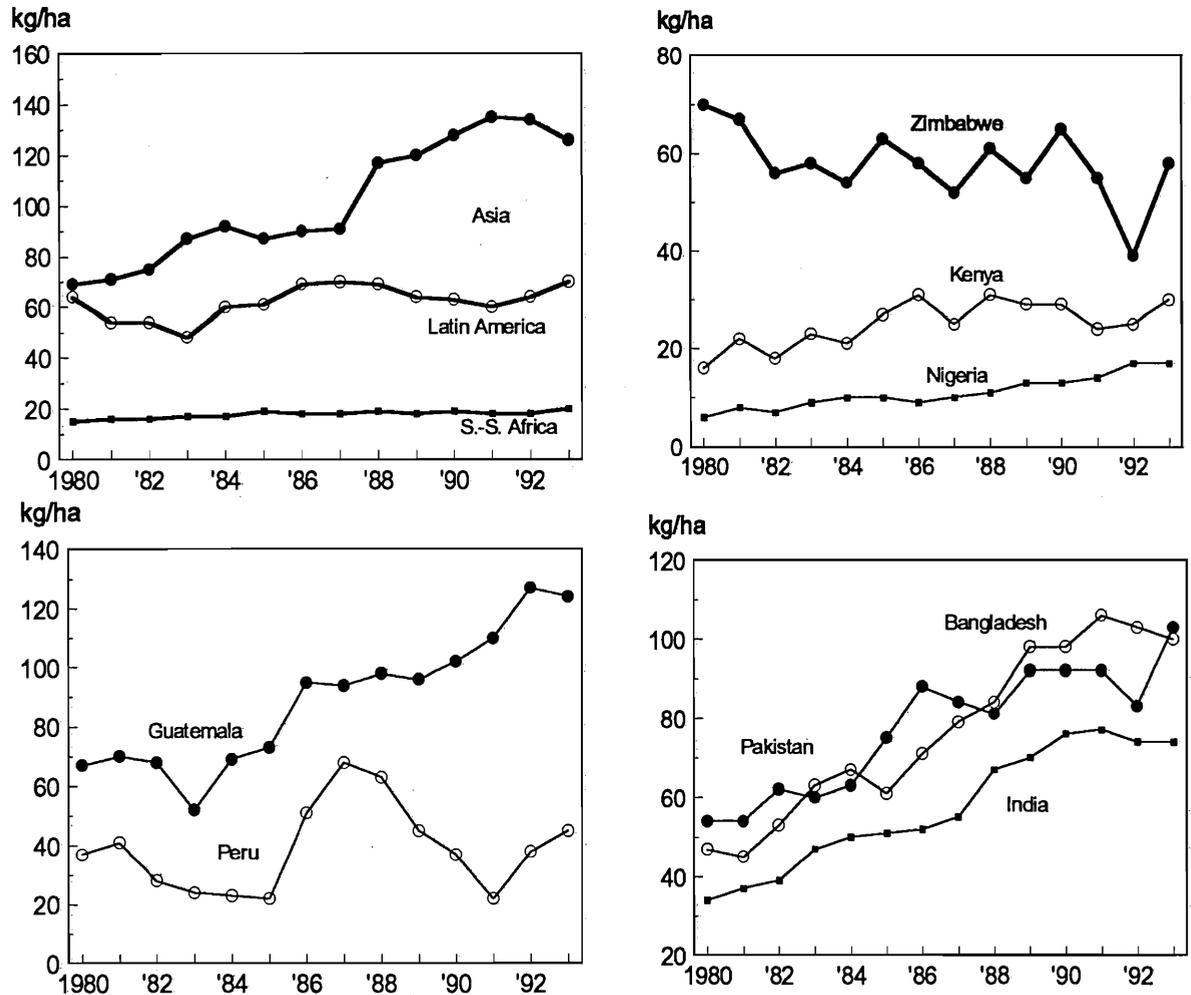
To provide adequate soil nutrients for sustained agricultural growth, the region's average fertilizer use needs to increase to 50 kilograms per hectare over the next 10 years. However, for the past 5 years, the region's fertilizer consumption has stagnated at about 10 kilograms per hectare or about 1.7 million tons. By comparison, 8 out of 10 developing Asian countries used 50 or more kilograms of fertilizer per hectare. For Sub-Saharan countries to reach the 50 kilogram per hectare goal, the region's fertilizer use must increase at an average annual rate of about 18 percent over the next 10 years. This is substantially higher than the current regional trend. Actual annual growth in fertilizer application rates from the early 1960's to the late 1980's was only 5 percent in Sub-Saharan Africa, compared with 13 percent in South Asia, and 9 percent in Southeast Asia.

During 1989-91, only 22 percent of all fertilizer used in the region was produced in Sub-Saharan Africa. The region's domestic fertilizer production is not only extremely limited but also concentrated in a few countries. During the same period, only 10 of the 40 countries in the region produced any fertilizer. Of these, Zimbabwe and Nigeria produced 86 percent of the total, with Senegal's output about 12 percent. Due to the region's limited production capacity, most Sub-Saharan countries are highly dependent on imports to meet their fertilizer needs.

Nonprice factors, such as inadequate supply, untimely local availability, and lack of credit, have been more responsible for constraining fertilizer demand than have high fertilizer prices. Transportation problems have hindered the availability of fertilizers. The combination of poor transportation infrastructure and the physical properties of fertilizers--they can easily be adversely affected by heat and humidity--complicates the timing and availability of farm-level supplies.

There is great potential to expand both phosphorous and nitrogen fertilizer production on the African continent. Phosphorous deposits exist in 36 Sub-Saharan African countries, and of these, 11 have deposits that have been classified as reserves that would be economically viable to mine. Building a large-scale fertilizer plant, however, requires substantial financial investment and has high accompanying maintenance costs. A processing plant needs constant supplies of energy inputs, labor, and processing elements. Securing these supplies is often problematic.

**Figure 12-- Fertilizer use by region and selected countries**



- Adequate soil fertility is one essential component of sustained yield growth.
- From the early 1960's to the late 1980's, fertilizer application rates grew 5 percent annually in Sub-Saharan Africa compared with 13 percent in South Asia.
- Nonprice factors, such as inadequate or untimely local availability of fertilizer and the lack of credit, have been more responsible for constraining demand than have high fertilizer prices.

## Land Constraints

Land is the main resource used in producing food. The amount and quality of land can be expanded by investment or improved management. This study projects that global cultivated crop area will expand slowly, accounting for only 20 percent of production growth. Area expansion in Asia and North Africa will come from increased irrigation, while in Latin America and Sub-Saharan Africa rainfed area is expected to increase. The projected growth in area will not occupy all of the land with crop production potential. However, land is unevenly distributed. Some countries, such as Sudan and Zaire, have vast areas of uncultivated rainfed land with crop potential, while other countries, such as Egypt and India, have none.

Although estimates indicate that, on a global scale, the quantity of land now in pasture and forest with potential for crop production is about equal to the land now in crops, these numbers overstate the feasibility of meeting future demands for food by bringing more land into production. Most of the potential cropland is in the developing countries. However, most of the potential land is in Sub-Saharan Africa and South America, while most of the demand increase will be in Asia. In addition, a large share of land with crop production potential is unfit for cultivation without major investments. According to FAO estimates, about half of the land with crop production potential in Sub-Saharan Africa and Latin America has poor soils. In Sub-Saharan Africa, the share of the soils with low fertility is twice that of other regions.

Relative to land now in production, much of the potential cropland in South America and Sub-Saharan Africa is distant from domestic and foreign markets. In both regions, the transportation and communications infrastructure necessary for trade between the areas of crop potential and elsewhere is poorly developed. Estimates of potential cropland do not take into account the opportunity costs of converting range and forest land to production. Studies of tropical soils have found that these soils are of lower inherent productivity than most temperate-zone soils.

Conversion of land to urban and other nonagricultural uses reduces the amount of land that might otherwise be available to agriculture. In Asia, the threat of urbanization to future cropland supply is greater than in Africa and Latin America. In India, as in other South Asian countries, there is little scope for increasing net cropped area--although gains in cropping intensity have driven growth in area harvested. Cropping intensity can be increased through the expansion of irrigated area, development of short-duration cultivars, and mechanization.

Some areas of Sub-Saharan Africa have a high degree of agricultural potential. Central Africa, humid West Africa, and Southern Africa, for instance, have substantial areas of arable land with relatively low population pressures. On the other hand, most of the Sahel, parts of mountainous East Africa, and the dry region spreading through Angola, Botswana, Lesotho, and southern Mozambique, have relatively little arable land and large populations and must rely on food imports.

Sub-Saharan Africa also faces myriad resource problems. Only 13 percent of Sub-Saharan Africa's total land area has no physical or chemical constraints. Physical constraints, such as steep slopes, shallow soils, poor drainage, and tillage problems, and chemical constraints, such as low nutrient retention, aluminum toxicity, phosphorous fixation hazard, and low potassium reserves, individually affect between 4 and 20 percent of the total Sub-Saharan African land mass.

During the dry season, many areas face severe soil drying which, when combined with strong winds, results in soil erosion. Heavy seasonal rains also cause soil erosion. Farming practices that include ineffective conservation measures can lead to soil degradation. Of the human-induced causes of soil degradation, overgrazing accounts for 49 percent and other farming activities for 24 percent. More than 20 percent of all vegetative land is degraded due to human causes, with water and wind erosion accounting for the majority of the affected hectares.

Sub-Saharan Africa faces inherent limits on its land resources. Demographic changes are placing increasing pressure on land. Historically, farmers adjusted to resource constraints by using shifting and fallow cultivation. However, population pressures have reduced the practice of these sustainable agricultural techniques, leading to rapid declines in land productivity.

Land use patterns respond to domestic policies and institutions. Distortions introduced by inappropriate policies can encourage farming on marginal lands. In a study in Rwanda, for instance, the promotion of annual rather than perennial crops has increased soil erosion. In Kenya, land adjudication policies have forced rural households to remain on a fixed land area, rather than taking advantage of different agro-ecological niches as they had formerly. The result has been increased cultivation of fragile lands. Similarly, policies that neglect rural transportation and infrastructure reduce diversification opportunities and increase pressure on natural resources. Food production problems stem from land use decisions of large numbers of geographically dispersed rural and urban inhabitants. These decisions are driven by a lack of agricultural development, stagnant urban economies, population growth, and political uncertainties.

These basic development problems are not easy to solve, and it is even difficult to set feasible targets for specific "food production" policies. Therefore, an integrated policy approach, factoring in economic development issues, population control, and political realities, has the most potential for addressing the efficient use of resources.

**Table 19--Currently uncultivated rainfed land with crop production potential**

Land class	Sub-Saharan Africa	Latin America/ Caribbean	Near East/ North Africa	East Asia	South Asia	Total
Million hectares						
A1	259	338	30	45	62	734
A2	749	717	49	104	182	1801
A1 + A2	1008	1055	79	149	244	2535
Total	2214	2038	1223	380	489	6344
(A1 + A2)/Total	46%	52%	6%	38%	50%	40%

Land class A1: Attainable yields are 20-40 percent of potential constraint-free yields.

Land class A2: Attainable yields are more than 40 percent of potential constraint-free yields.

Source: FAO.

## Water and Irrigation

The quality and availability of water resources affect crop and livestock choices. The supply of water depends on precipitation--for both rainfed and irrigated production. Depletion and degradation of water resources are the major resource problems facing low-income countries, particularly in Sub-Saharan Africa. Water is a critical resource for both human survival and agricultural production, but its use faces increasing conflicts due to rising populations and economic development. Within 10 years, if the population growth rates continue as projected, (assuming precipitation and temperature means and variances remain the same) per capita water availability will decrease by an average of 20 percent in the 60 countries and by 34 percent in African countries. By the year 2000, 10 countries will confront serious water depletion: Burundi, Kenya, Mauritania, Niger, Somalia, Rwanda, Malawi, Zimbabwe, Namibia, and Lesotho.

The agricultural sector consumes over half of the annual freshwater withdrawals in most of those countries, and could face greater competing demands from household and industrial uses. Water for livestock is already in short supply in many parts of arid and semi-arid Africa. Water resources are also facing various and increasing forms of degradation: sediment runoff, siltation, agro-chemical runoff, and industrial and household pollution. The causes include deforestation, cropland expansion, soil erosion, improper drainage, inadequate irrigation planning, poor enforcement of environmental regulations, and destruction of shoreline vegetation.

Drought is a chronic problem for rainfed producers, particularly in Sub-Saharan Africa. Large areas of the continent outside the forest zone have short growing seasons and highly variable rainfall. Soils are low in organic matter, which limits their moisture-retention capabilities and further reduces the supply of water to growing plants. Droughts affect food crops in the short term and tree crops and livestock in the longer term. For example, after a severe drought has reduced cattle numbers, it may take 5-10 years of plentiful rainfall to stimulate regrowth of pastures to return livestock populations to their original level. Given that rainfall in these countries can be highly variable, irrigated area could reduce production variation and food insecurity of the countries. However, limited water resources and capital mean that only about 6 percent of arable land in Sub-Saharan Africa is irrigated (primarily in Madagascar, Nigeria, and Sudan). In Latin America, 12 percent of arable land is irrigated and nearly 38 percent is irrigated in Asia.

Salinization and waterlogging may constrain future gains in production from irrigated land. The salts rise from shallow groundwater and are deposited on the soil surface as the water evaporates. Salinization also occurs because the water used for irrigation tends to pick up salts from the land irrigated, so that the concentration of salts in water leaving the irrigated fields tends to be higher than when the water was applied.

The greatest potential for expanding irrigation is in Sub-Saharan Africa. However, to realize this potential would require a large increase in investment in these countries. Given the high cost of bringing additional land under irrigation, the returns on this type of investment would be very low. A number of related issues including use of hybrid seeds and fertilizer, education of farmers, and land tenure would have to be addressed--creating a lengthy and costly process. Even in Asia, which has 85 percent of the irrigated land in developing countries, the rate of growth in irrigated area has slowed since 1980. In India, irrigated area expanded 2.5 percent annually in the 1970's, but has slowed to 1.6 percent since then.

**Table 20--Irrigated land in less developed countries**

Region	Irrigated area	Share of LDC <sup>1</sup> total	Potential increase
	1,000 ha.	Percent	Percent
Africa	11,025	5.9	165
North Africa	7,560	4.1	22
Sub-Saharan Africa	3,465	1.8	477
Latin America	16,235	8.7	141
North and Central America	7,035	3.8	41
South America	9,200	4.9	217
Asia	158,380	85.3	44
Far East	140,065	75.4	28
Near East	18,315	9.9	46

<sup>1</sup> The data presented here refers to all LDC's, not only the 60 countries included in our study.

Source: World Bank. Resources and Global Food Prospects. 1992.

- Depletion and degradation of water resources are major resource problems facing low-income countries, particularly in Sub-Saharan Africa.
- Within 10 years, if the population grows as projected, per capita water availability will decrease by an average of 20 percent in the 60 countries and by 34 percent in all African countries.
- The agricultural sector consumes over half of the annual freshwater withdrawals in most of the countries and could face greater competing demands from household and industrial uses in the future.
- Salinization and waterlogging may constrain gains in production from irrigated land.
- Expansion of irrigated area will be limited in the future by the high cost of large-scale irrigation projects.

## Population Growth

High population growth rates are a driving force behind growing food aid needs. By 2005, chronic food aid needs are projected to reach 21 million tons, 12 million of which will go to Sub-Saharan Africa. If population growth in this region were to decline immediately by 0.5 percentage point to 2.3 percent, world food aid needs would fall by 20 percent to 17 million tons. Sub-Saharan Africa's food aid needs in 2005 would be 7.5 million metric tons, 36 percent less than projected by the actual population growth scenario. Given a constant food aid base, Sub-Saharan Africa's *additional* needs would be 54 percent lower. If population growth of all 60 countries went down by 0.5 percent, food aid requirements would total 16 million tons, 40 percent less than the base scenario. North Africa would then no longer need any food aid and Asia's and Latin America's needs would increase to a lesser extent.

World population is estimated to increase by 1.5 percent per year between 1992 and 2005. While a general decline in population growth is expected for all countries, Sub-Saharan Africa's projected growth rate of 2.8 percent, down from the current 3.2 percent, is still extremely high, especially since there is little hope that the economic performance of this region will compensate for the large increase in population. The situation looks much better in North Africa, where the projected population growth of 2.5 percent is almost as high, but where per capita grain production is projected to be more than 80 percent higher than in Sub-Saharan Africa, and commercial import capacity is also much higher. The population growth rate of Asia is estimated at 1.5 percent, which compares with that of upper- and middle-income countries.

Sub-Saharan Africa's population more than doubled to an estimated 527 million between 1960 and 1990, and by the year 2005 it will exceed 700 million. Religious and cultural traditions that encourage large families and discourage family planning contribute to the persistence of the region's high birth rates. With the exception of successful family planning initiatives in Botswana, Kenya, and Zimbabwe, there is no indication of a sustained decline in Sub-Saharan Africa's population growth rate. The present age composition will also lead to continued high population growth. Between 35 and 50 percent of the region's population is 15 years old or younger. With such a large percentage of the region's inhabitants about to enter their reproductive years, population growth is likely to remain high even if average fertility rates decline.

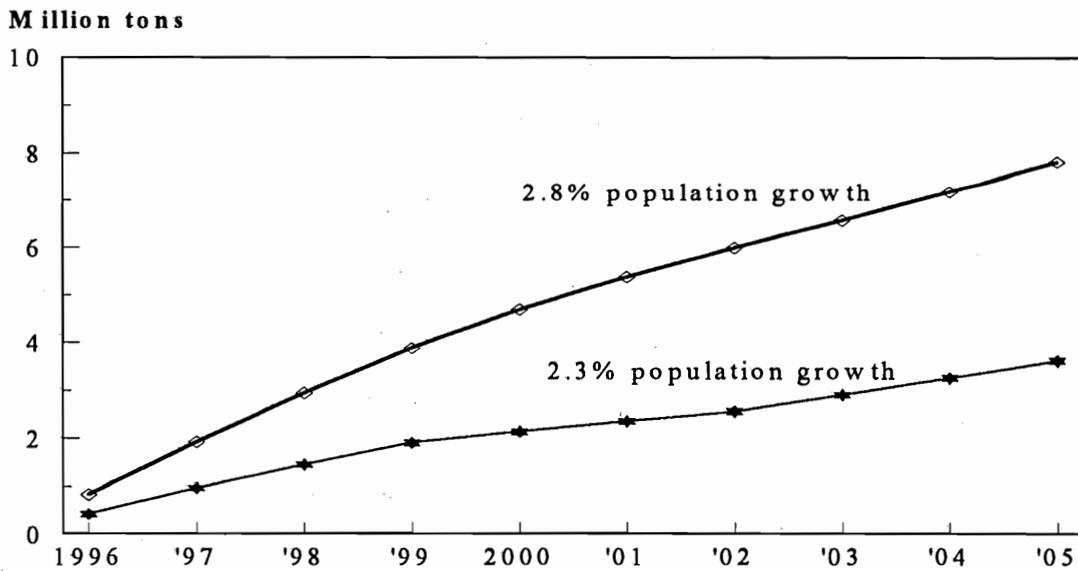
Continued population growth sets in motion a chain reaction that will ultimately lead to a further decline in per capita consumption. By putting pressure on land resources without simultaneous investments in changing technologies, continued rapid population growth will have severe implications for food consumption and the nutritional status of the population. This in turn reduces labor productivity, which is a primary factor behind declining agricultural growth in Sub-Saharan Africa. Population growth affects agricultural productivity also through its impact on the health of women who provide a large portion of the agricultural labor and child care within rural households. Subsequently, ill health of one or more family members can affect not only the current household income, but may hamper the future income-earning potential and fertility rates of the next generation. Ill health caused by malnutrition, unexpected illness, disease, and accidents hinders a country's development potential and traps it in a vicious cycle of high population growth, falling per capita food production, and insufficient health care.

**Table 21--Population growth and demographic characteristics<sup>1</sup>**

Region	Population growth (group of 60)		Population younger than 15 Percent	Total fertility rate	
	1980-1995	1995-2005		1993	2000
Sub-Saharan Africa	3.2	2.8	48	6.2	5.6
North Africa/Middle East	2.6	1.9	44	4.7	4.1
East Asia	2.1	1.8	36	2.3	2.2
South Asia/ Pacific			44	4.3	3.6
Latin America/ Caribbean	2.3	1.9	41	3.1	2.7

<sup>1</sup> Growth rates in the first two columns refer to our group of 60, all other data to all countries in that region .  
Source: Census Bureau and World Bank, Development Report 1995.

**Figure 13-- Population growth impact on additional food aid needs of Sub-Saharan Africa**



Source: ERS calculations.

- High population growth rates are a driving force behind food aid needs
- If population growth in Sub-Saharan Africa were to decline 0.5 percentage point, Sub-Saharan Africa's food aid needs would fall 36 percent, and world needs would decline by 20 percent.
- Sub-Saharan Africa's projected population growth rate of 2.8 percent is down from the current 3.2 percent but is still high given the continent's resource base.

## **Food Consumption and Nutrition**

Global food supplies have increased faster than population growth, but supplies are unevenly distributed. Poorer countries--many in Africa--are expected to face severe food shortages in the next decade unless their rapid population growth is accompanied by increased food production and/or growth in purchasing power. If not, then chronic food shortages will develop because such countries cannot produce or import enough food to feed their people.

Uneven food supplies in the world mean unequal food consumption--and nutritional problems--in poor countries. While the share of the developing world's population that is chronically undernourished has dropped from 36 percent in 1970 to 20 percent in 1990, that figure represents almost 800 million people. Chronically undernourished people are those whose food supplies provide fewer than 2,200 calories per day.

While Asia has the largest number of chronically undernourished people (over 500 million), its share declined by half in the last 20 years from 40 percent in 1970 to 19 percent in 1990. Latin America and the Near East have also increased their food supplies, but the rate of nutritional improvement has slowed in the last decade. The share of the population that was chronically undernourished in Latin America had dropped from 19 percent in 1970 to 13 percent in 1980, where it has remained. Because of population growth, however, the chronically undernourished population increased from 47 million in 1980 to 59 million in 1990. In the Near East, the share of the population that was chronically undernourished fell from 22 to 12 percent during 1970-80. However, the nutritional situation of the population failed to improve in the 1980's.

In South Asia, the number of underweight children, 108 million in 1990 and an estimated 112 million in 2005, exceeds that of any other region by far. Sub-Saharan Africa, however, is the only region in the world with growing chronic nutritional problems. The proportion of Sub-Saharan Africa's population that is chronically undernourished has remained practically unchanged at one-third since the 1970's. But with high population growth (3 percent per year), the number of chronically undernourished people increased from 101 million to 168 million between 1970 and 1990.

Extremely low weight (weight below the normal range for height and age) is one of the first, and most visible, signs of chronic undernutrition in young children. Worldwide, the percentage of severely underweight children has declined from 48 percent in 1975 to 41 percent in 1990--but the absolute number has declined only slightly. About 62 percent of children are underweight in South Asia, as are 26 percent of children in Sub-Saharan Africa.

Undernutrition is prevalent among several identifiable groups. The most susceptible include landless rural laborers and small or marginally subsistent farming households, which are often headed by women. Many such farmers do not produce enough food to meet the minimum nutritional needs of their families in normal years. And when production is lowered further because of drought or war, food relief must be provided to prevent famine.

**Table 22--Prevalence and number of underweight children under 5 years, by region**

Region	Underweight children					
	1975	1990	2005	1975	1990	2005
	Percent			Million		
<b>Africa</b>	26	24	22	19.7	27.4	36.5
North Africa	20	13	11	3.1	3.0	2.7
East Africa	25	24	22	5.7	8.7	12.4
Central Africa	24	22	19	1.8	2.7	3.6
Southern Africa	16	13	10	.7	.7	.7
West Africa	35	32	29	8.3	12.2	17.0
Sub-Saharan Africa	28	26	24	17.4	25.4	34.9
<b>Latin America</b>						
Caribbean	18	15	14	.6	.5	.5
Central America	14	12	8	2.0	1.6	1.5
South America	15	11	10	4.4	4.3	3.9
<b>Asia</b>	49	44	41	163.1	154.7	149.3
East Asia	33	21	17	47.4	25.4	18.5
Southeast Asia	48	38	32	24.6	21.6	18.4
South Asia	68	62	57	91.0	107.6	112.3

Source: FAO/WHO, 1992.

- Poorer countries--many in Africa--are expected to face severe food shortages in the next decade unless their rapid population growth is accompanied by increased food production and growth in purchasing power.
- The share of the developing world's population that is chronically undernourished has dropped from 36 percent in 1970 to 20 percent in 1990, but the latter figure represents almost 800 million people.
- Sub-Saharan Africa is the only region in the world with growing chronic nutritional problems, though absolute numbers continue to rise in South Asia, where the total number of underweight children will be nearly three times the total in Africa even in 2005.

## Domestic Policies

Domestic agricultural policies of the study countries vary widely. In many countries, especially in Sub-Saharan Africa, policies that favored urban consumers over rural producers held down domestic commodity prices and farm incomes and slowed production growth. Macroeconomic and trade policies encouraged import substitution and reduced efficiency and growth. In the 1980's, to reverse these trends, many developing countries, with the support of the IMF and the World Bank, enacted economic reforms under broad-based structural adjustment measures, which included exchange rate adjustments, liberalization of agricultural marketing, decontrol of producer and consumer prices, and removal of input subsidies. These measures are expected to stabilize the macroeconomy but may not improve the nutritional status in the poor countries.

These policy reforms influence food purchasing power through changes in income, access to food-producing resources, and food prices. In many countries, particularly in Sub-Saharan Africa, structural adjustment policies have increased food prices through the reduction or elimination of food subsidies, and farmer incomes through changes in producer prices and input costs and availability. The exchange rate devaluations undertaken by governments to increase export growth and reduce imports have, in many cases, resulted in sharply higher food prices. Real increases in producer prices associated with structural adjustment can improve nutritional status by increasing farmer incomes. But because most producers in the poorer countries are net purchasers of food, this positive effect may be offset by higher retail food prices.

To cushion the short-term impact of higher food prices on the poorest households, some middle- and upper-middle-income developing countries have begun to incorporate nutritional factors into agricultural, social, and macroeconomic policies. These measures have linked macroeconomic adjustments designed to improve long-term economic growth with social "safety net" measures to improve nutritional status. These include providing direct income support to vulnerable households, targeting food subsidies by geographic region or socio-economic group, reducing prices for foods most frequently consumed by the poor, and improving conditions associated with poverty including housing, sanitation, and access to clean water. Direct nutritional intervention, such as feeding centers, food rationing, fair-price shops, and food stamps, can improve food intake in certain cases. However, in most low-income countries, budget constraints and lack of administrative capacity limit the implementation of such policies.

Investment is the key to successful policies. Although many of the Asian countries that have been successful in increasing food production have limited natural resources, their investments in education have overcome this constraint. Some argue, in fact, that the lack of natural resources drove the focus on education. In agriculture, education of producers is essential for the adoption of new technologies. However, long-term sustainable agricultural growth requires other investments, such as research, market infrastructure, and irrigation. Many of these investments, which paid high dividends in Asia, will be difficult to replicate in Africa, where countries are already burdened with debt and the supply of foreign capital is diminishing. While prices are important in providing producer incentives, there is a need for a judicious blend of improvements in nonprice factors such as infrastructure, technology, delivery systems, and services. The conclusions drawn from work done on the impact of infrastructure and financial institutions on agricultural output and investment in India show that prices really do matter, but so do markets, banks, infrastructure, and training and education efforts, especially for women.

**Table 23--Exchange rates: Local currency per dollar, selected countries**

Country	1985	1990	1991	1992	1993	1994
<b>Asia</b>						
Bangladesh	28	35	37	39	40	40
India	12	18	23	26	30	31
Nepal	18	29	37	43	49	49
Pakistan	16	22	24	25	28	31
Philippines	19	24	27	26	27	26
<b>Latin America</b>						
Dominican Republic	3	9	13	13	13	13
El Salvador	3	8	8	9	9	9
Guatemala	1	4	5	5	6	6
Honduras	2	2	5	6	7	9
Peru <sup>1</sup>	NA	188	773	1246	1988	2195
<b>North Africa</b>						
Algeria	5	9	18	22	23	35
Egypt	1	2	3	3	3	3
Morocco	10	8	9	9	9	9
Tunisia	1	1	1	1	1	1
<b>Sub-Saharan Africa</b>						
Cameroon	449	272	282	265	283	555
Ethiopia	2	2	2	5	5	6
Nigeria	1	8	10	17	22	22
Senegal	449	272	282	265	283	555
Uganda	7	429	734	1134	1195	979
Zimbabwe	2	2	3	5	6	8

<sup>1</sup> New Soles per thousand US\$.

- During the 1980's, many developing countries adjusted their policies to promote economic efficiency and growth.
- In many countries, particularly in Sub-Saharan Africa, structural adjustment policies have increased food prices through the reduction or elimination of food subsidies.
- While prices are important in providing incentives to increase production, there is a need for a judicious blend of improvements in nonprice factors, such as infrastructure, technology, delivery systems, and services.

## **Foreign Exchange Availability**

To have food security, a country need not produce its own food, but it must have other economic activities that earn money to pay for food imports. In this estimation of food aid needs, it was assumed that total foreign exchange available for countries to use for imports is the sum of their export earnings and net foreign credit inflows and grants. Net credit is assumed to remain constant at the base period levels (1989-93 average). This is an optimistic assumption since the net flow of external financing to developing countries declined by 43 percent from 1993 to 1994 and no rebound is projected by the IMF.

Economic growth and financial stability have eluded most low-income countries over the past decade. The worst situation is in Sub-Saharan Africa where average per capita income has fallen every year since 1981 to \$520 in 1993 (including South Africa). Savings and investment rates, which have significant implications for economic growth, are also headed down (-2.8 percent per year, compared with +5.5 percent annual growth in South Asia and +0.1 percent in Latin America). Political and social instability are associated with low rates of economic growth. More than half of the countries in Sub-Saharan Africa have a poor record with respect to these factors and have experienced falling income growth rates from the 1960's to the 1980's. On the other hand, stable countries achieved higher economic growth.

The future financial stability of the low-income countries remains uncertain. Many countries have taken economic and/or political steps that should help provide a more financially stable future. The reforms were proposed and supported by the IMF, the World Bank, and food aid donors. Policies undertaken in these programs emphasized demand management, currency devaluation, privatization, and reduction of market distortions. The benefits of such policy reforms have, so far, been remarkable in the developing countries of Asia. But fundamental change in economic policies have also occurred or are underway in Africa and Latin America. Significant progress has also been made in political liberalization. Since 1990, many countries have held presidential and/or parliamentary elections, some for the first time.

With success come new challenges and risks. In many countries, domestic investment remains very low. Countries with high investment and greater success in managing capital inflows are generally less vulnerable to changes in the world's financial market. Improvements in economic policies are recent in most countries and can be derailed by external forces. In the low-income African countries, policy progress is uneven, and there are risks and uncertainties linked to political instability. For a number of highly indebted countries, such as Nigeria and Cote d'Ivoire, the debt burden continues to dampen growth prospects, and risks of setbacks are considerable as financial conditions remain difficult.

Figure 14-- Net external financing

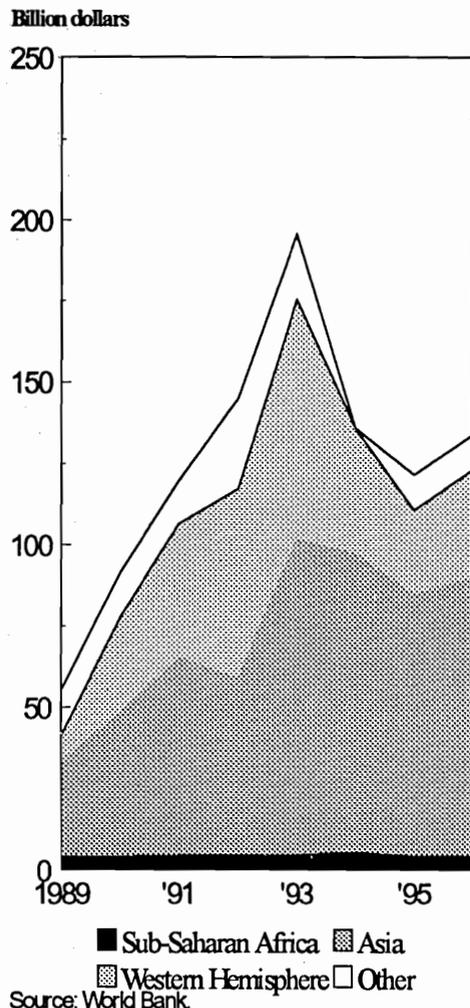
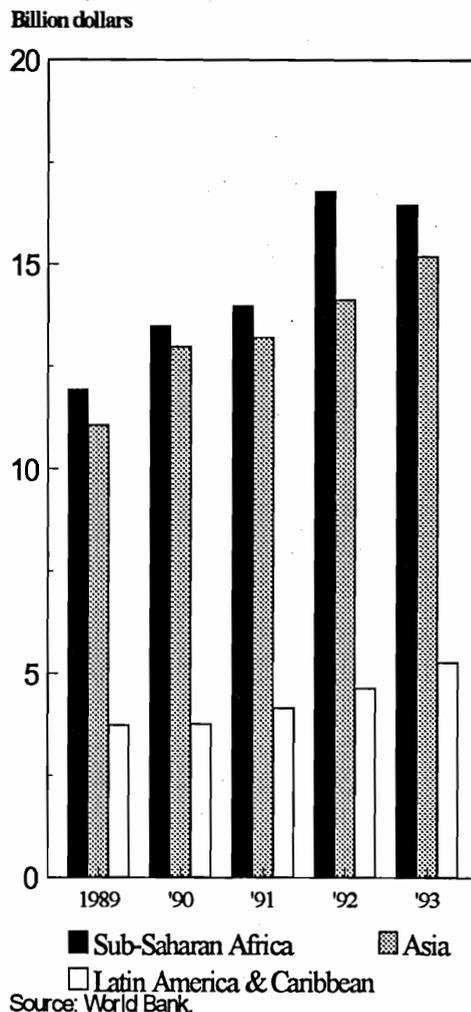


Figure 15-- Net official development aid



- To have food security, a country need not produce its own food, but it must have other economic activities that earn money to pay for food imports.
- Net credit is assumed to remain constant at the level of the base period; this is an optimistic assumption, however, since the net flow of external financing to developing countries has declined sharply since 1993, and no rebound is projected by the IMF.
- In many countries, domestic investment remains very low.
- For a number of highly indebted countries, such as Nigeria and Cote d'Ivoire, the debt burden continues to dampen growth prospects, and risks of setbacks are considerable as financial conditions remain difficult.

## Exports

According to World Bank projections, the current surge in nonoil commodity prices will generate large gains for many developing countries. This windfall is expected to boost income growth during the next decade. The projected export growth for the study countries in the "high-imports" scenario is the highest for East Asia, 11.3 percent per year, followed by South Asia, 8.2 percent, Latin America, 7.6 percent, Sub-Saharan Africa, 5.2 percent, and North Africa, 4.2 percent. Slower export growth is expected for the mismanaged economies of Afghanistan, Nepal, and Sri Lanka in South Asia; Haiti and Nicaragua in Latin America; and Liberia, Zaire, Central African Republic, Sudan, Somalia, Rwanda, Burundi, and Angola in Sub-Saharan Africa. In the "low-imports" scenario, export growth rates are also slower by 1.5 to 5 percent per year, depending on the region and economic management of the countries.

Projected export earnings are, in general, higher than historical rates. During 1980-93, annual export growth was 10.8 percent in East Asia, 7.3 percent in South Asia, 3.4 percent in Latin America, 2.5 percent in Sub-Saharan Africa, and -0.1 percent in North Africa and the Middle East. Future growth could be worse than the historical level depending on country responses to the windfall gains of the recent commodity boom. The policy choice for countries is between consumption and investment. The long-term trend for commodity prices, however, remains one of gradually declining real prices. According to the World Bank, in real terms, nonoil commodity prices are projected to decline on average by 2 percent per year in 1996-2004, minerals by 1 percent, agricultural commodities by 2.5 percent, and beverages by 5 to 6 percent.

Internal market conditions (demand, supply) of individual low-income countries generally have no significant influence on world market prices. Therefore, their export earnings are influenced by fluctuations in world commodity prices and by changes in the domestic output of export commodities. Production of agricultural commodities, which are exported by the lowest income group, is subject to shortrun variation because of uncontrollable factors such as weather. On the demand side, shifts in foreign demand are the primary source of earnings variation.

Efforts to diversify exports will help stimulate earnings growth. Diversification would improve export performance because a decline in the price or the volume of one commodity would have a less disruptive impact on the country's overall receipts. Examination of structural factors (such as export composition, commodity diversification, and export market diversification) showed that commodity diversification is the most important variable that could significantly improve export earnings growth and reduce export instability. In Sub-Saharan Africa, exports of primary commodities contribute 70 to 80 percent of foreign exchange earnings in contrast to South Asia (except in Afghanistan) where manufactured commodities contribute more than 60 percent of earnings.

**Table 24--Structure of merchandise exports in selected countries, 1993**

Country	Fuels, minerals, and metals	Other primary commodities	Machinery and transport equip.	Other manufacturing
<b>Asia</b>				
	Percent			
Bangladesh	0	18	0	81
India	7	18	7	68
Nepal	0	16	0	84
Pakistan	1	14	0	85
Philippines	7	17	19	58
<b>Latin America</b>				
Dominican Republic	6	41	2	50
El Salvador	3	49	3	45
Honduras	3	83	0	13
Nicaragua	3	90	0	7
Peru	50	33	1	16
<b>North Africa</b>				
Algeria	96	1	1	2
Egypt	55	12	1	32
Morocco	14	29	6	51
Tunisia	13	12	10	66
<b>Sub-Saharan Africa</b>				
Cameroon	51	35	8	6
Ethiopia	1	95	0	4
Nigeria	94	4	0	2
Senegal	25	54	2	19
Uganda	0	95	0	4
Zimbabwe	16	48	3	33

Source: World Bank. World Development Report, 1995.

- The projected export earnings are, in general, higher than the historical rates.
- Future growth could be worse than the historical level depending on country responses to the windfall gains of the recent commodity boom.
- Production of agricultural commodities, which are exported by the lowest income group, is subject to shortrun variation because of uncontrollable factors such as weather.
- Diversification would improve export performance because a decline in the price or the volume of one commodity would have a less disruptive impact on the country's overall receipts.

## **Import Prices**

Government policies and economic performance in industrial countries play a key role in the financial situation of low-income countries. Economic growth and inflation, protectionism, and changes in interest rates and exchange rates are the most significant factors at play. Reduced economic activity in industrial countries results in downward pressure on primary commodity prices. Accelerated growth in industrial economies improves terms of trade for the exporters, particularly those of primary products, as opposed to manufacturers. Faster growth of real incomes in industrial countries raises the demand for developing country exports. According to the IMF, a 1-percent increase in real GNP in industrial nations increases the purchasing power of nonoil developing countries by 3.4 percent.

During the last decade, most developing countries faced deteriorating terms of trade. African countries experienced a 20-percent decline in terms of trade between 1990 and 1994. South Asia and Latin America also saw a decline, but to a lesser extent. Policy reforms in those regions offset some of the adverse effects of the decline.

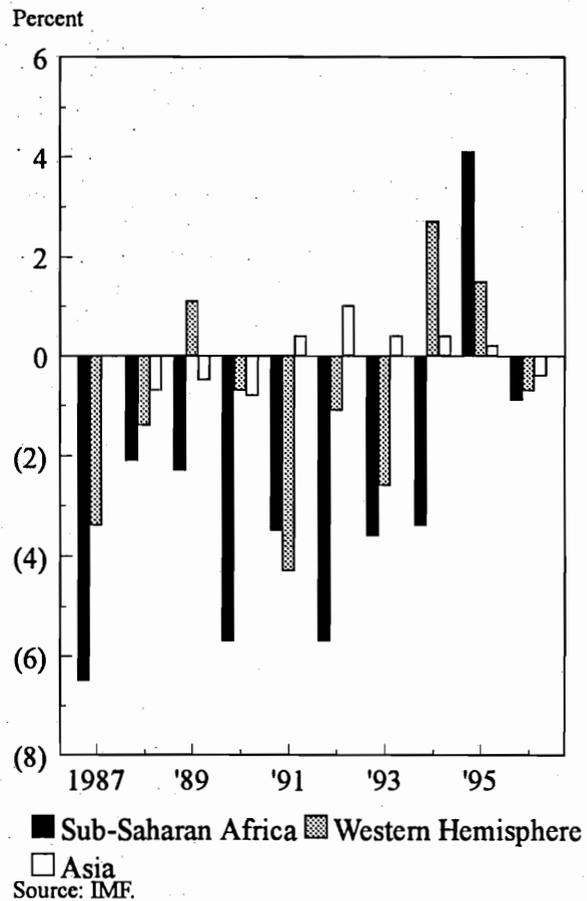
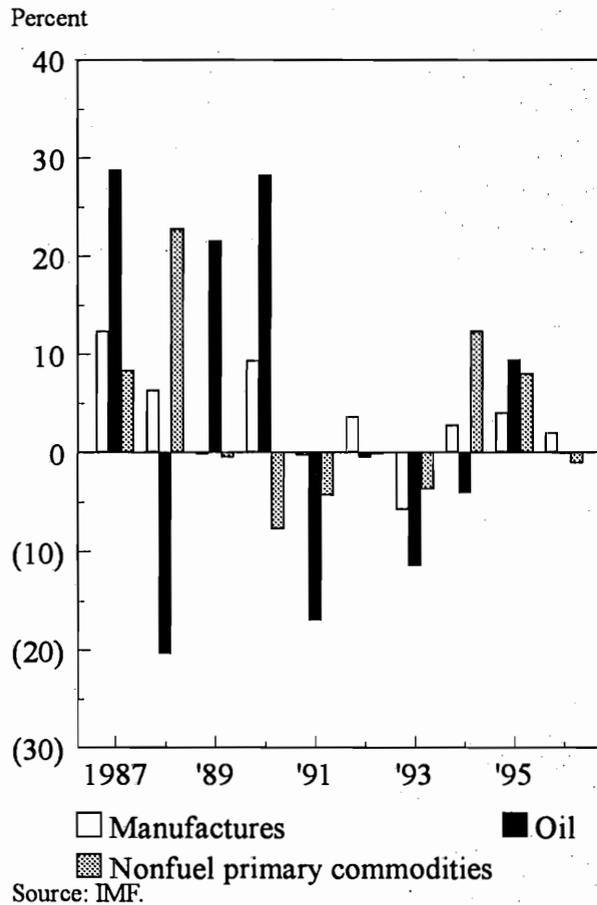
An important factor leading to a favorable future trading environment is the successful conclusion of the Uruguay Round. This far-reaching trade agreement will have major implications for financial prospects of both developing and developed countries over the next decade. Among traded commodities, manufacturers will benefit the most because of agreements on tariff reduction.

However, low-income countries are concerned that the agreement will erode their margins of preference in the industrial markets and, for net food-importing countries, increase food import costs. Developing countries over the years benefited from trade preferences provided by the industrial countries under the Generalized System of Preferences (GSP). The EU supplements GSP with the Lome Convention and gives 68 developing countries additional preferential access to its market. Although the bulk of GSP is offered to a limited number of countries and commodities, there will be trade losses due to its elimination. So far, there has been no comprehensive study to quantify the trade effect of GSP, but according to the World Bank, the overall consequences of the agreement will be small and should be easily offset through minor domestic policy adjustments to improve efficiency.

Possible increases in food import prices due to the agreement are a concern for low-income food-deficit countries, particularly in Africa, and can lead to further deterioration of their terms of trade. The industrial countries' historical intervention in agricultural markets has reduced world prices for foods. Industrial countries have used a variety of policies to support their agricultural sectors and increase output. The surplus production is then subsidized and exported in the world market. To the extent that the Uruguay Round reduces these interventions, world food prices are expected to increase above what they would have been otherwise. This will benefit the low-income food-exporting countries but the net importing countries will face higher import costs. To address this concern, food aid was excluded from the cuts in export subsidies. Whether the agreement will affect the volume of food aid is not clear. If the volume of donors' food surplus falls, as expected, there will be less incentive for transfer to developing countries.

**Figure 16-- Year to year price changes**

**Figure 17-- Year to year change in terms of trade**



- Government policies and economic performance in industrial countries play a key role in the financial situation of low-income countries.
- During the last decade, most developing countries were faced with deteriorating terms of trade. African countries experienced a 20-percent decline in terms of trade between 1990 and 1994.
- Increases in food import prices are a major concern for low-income food-deficit countries, particularly in Africa, and can lead to further deterioration of their terms of trade.
- With the decline in the volume of donors' food surpluses, there will be less incentive for the transfer of food to developing countries.

**Appendix table 1-- World population baseline growth assumptions, percent change**

Region/country	Historical			Projections		
	1970-79	1980-89	1990-92	1993	1995-2000	2000-05
	Percent change per year					
World	1.9	1.7	1.7	1.6	1.5	1.4
Less U.S.	1.9	1.8	1.7	1.7	1.5	1.5
Africa	2.8	2.9	3.0	3.1	3.0	2.9
Asia	2.1	1.9	1.7	1.6	1.4	1.3
Southern Asia	2.3	2.3	2.1	2.1	1.8	1.7
East Asia	1.8	1.4	1.3	1.1	0.9	0.7
Southeast Asia	2.4	2.1	1.8	1.7	1.6	1.4
Latin America & Caribbean	2.5	2.2	2.0	1.9	1.7	1.5
South America	2.4	2.1	1.9	1.8	1.6	1.5
Eastern Europe	0.8	0.5	0.2	0.2	0.3	0.4
Industrial economies	0.8	0.6	0.7	0.6	0.5	0.4
Australia	1.4	1.5	1.5	1.4	1.1	0.9
Canada	1.2	1.0	1.3	1.2	1.0	0.8
Japan	1.1	0.6	0.4	0.4	0.4	0.3
European Union (EU)	0.4	0.3	0.4	0.4	0.3	0.2
Other Western Europe	0.3	0.3	0.6	0.5	0.2	0.1
Developing economies	2.1	2.0	1.8	1.8	1.7	1.6
Argentina	1.7	1.3	1.2	1.1	1.1	1.1
Bangladesh	2.7	2.7	2.4	2.4	2.3	2.2
Brazil	2.5	2.2	1.9	1.8	1.6	1.5
China	1.8	1.4	1.3	1.1	0.9	0.7
Egypt	2.2	2.6	2.4	2.3	2.2	2.1
Former Soviet Union (FSU)	0.9	0.9	0.7	0.7	0.7	0.7
Hong Kong	2.5	1.5	0.8	0.6	0.5	0.4
India	2.2	2.1	2.0	1.9	1.7	1.5
Indonesia	2.4	2.0	1.7	1.7	1.5	1.4
Iran	3.0	3.9	3.6	3.6	3.1	3.3
Iraq	3.5	3.4	1.4	3.8	3.7	3.5
Malaysia	2.4	2.5	2.4	2.4	2.2	2.0
Mexico	2.7	2.2	2.1	2.0	1.8	1.6
Pakistan	2.6	3.1	2.9	2.9	2.5	2.8
Philippines	2.8	2.4	2.1	2.0	1.8	1.6
Saudi Arabia	5.2	5.1	2.2	3.3	3.3	3.3
South Africa	3.0	2.7	2.7	2.7	2.6	2.6
South Korea	1.7	1.3	1.0	1.1	1.0	0.8
Taiwan	2.0	1.4	1.1	1.0	0.9	0.8
Thailand	2.4	1.8	1.5	1.4	1.2	1.1

Source: Bureau of the Census, U.S. Department of Commerce.

**Appendix table 2--Real GDP baseline growth assumptions**

Region/country	Historical				Projections	
	1970-79	1980-89	1990-92	1994	1995-2000	2000-05
	Percent change per year					
Africa	4.2	1.6	1.3	1.2	2.9	3.1
N. Africa & Mid East	--	--	--	4.0	4.2	4.0
Asia	5.7	6.9	6.2	6.0	6.0	5.8
Southern Asia	3.2	5.6	3.7	5.5	5.6	5.5
East Asia	7.4	8.5	7.3	5.3	6.2	5.9
Southeast Asia	7.1	5.6	6.8	7.1	6.6	6.5
Latin America	5.8	1.2	1.6	3.0	4.8	5.2
Central Am. & Caribbean	--	--	--	1.1	2.2	2.3
Central and East Europe	--	--	--	5.0	4.4	4.2
Industrial economies	3.2	2.9	1.7	3.0	3.0	2.7
Australia	3.2	3.0	-0.1	3.6	2.9	2.8
Canada	4.5	3.0	-0.1	3.4	3.1	2.8
Japan	4.5	4.2	4.2	1.2	3.0	2.4
European Union (EU)	3.1	2.3	1.8	1.3	3.0	2.4
Developing economies	7.7	3.2	1.5	3.3	5.2	5.2
Argentina	2.7	-1.1	4.4	5.1	6.0	7.0
Bangladesh	1.7	4.7	4.4	4.1	4.3	4.3
Brazil	8.6	1.6	-1.4	2.8	4.7	4.9
China	5.9	8.7	8.1	10.0	7.8	6.8
Egypt	8.1	5.0	2.6	2.0	3.7	4.0
Burma	--	--	--	2.0	2.1	2.3
Former Soviet Union (FSU)	na	3.1	-9.9	-9.3	2.8	3.5
Hong Kong	9.5	6.7	3.9	5.3	4.5	4.2
India	3.1	5.6	3.4	5.6	5.7	5.5
Indonesia	7.2	5.6	6.8	6.8	6.7	6.8
Iran	1.5	4.1	8.7	3.8	4.0	4.0
Iraq	2.2	-2.4	-26.1	14.9	8.5	4.0
Malaysia	7.9	6.0	8.9	8.8	7.6	7.5
Mexico	6.6	1.7	3.4	2.6	5.9	5.9
Morocco	--	--	--	4.7	4.4	4.4
Pakistan	4.7	6.3	5.1	5.6	5.8	5.8
Philippines	5.9	1.7	0.9	3.0	4.2	4.3
Tunisia	--	--	--	5.1	5.5	5.6
Turkey	--	--	--	3.8	4.4	4.2
Saudi Arabia	10.6	0.2	9.7	3.7	3.6	4.1
South Africa	3.4	1.4	-1.2	2.5	3.1	3.3
South Korea	8.7	9.3	7.5	6.5	6.6	6.0
Taiwan	9.8	7.8	6.4	5.9	6.3	6.0
Thailand	6.7	7.9	8.8	8.4	6.9	6.3
Vietnam	--	--	--	9.0	6.5	6.5

-- = not calculated. Source: Project Link, DRI Inc., and ERS.

## Appendix A: Countries Included in the Study

The following countries were included in the study's systematic assessment of food aid needs. Some of the countries received food aid in the past but no longer need it, nor are expected to need it in the future. Other countries continue to have chronic food aid needs.

Other countries not included in the list have emerged as food aid recipients in recent years (such as republics of the former Soviet Union and former Yugoslavia); still others may become candidates for food aid in the future. These countries were not included in the study because of data limitations and because some of them would not merit food aid based on meeting minimum nutritional standards for the average citizen.

	<b>North Africa</b>	31	Guinea
1	Algeria	32	Guinea-Bissau
2	Egypt	33	Liberia
3	Morocco	34	Mali
4	Tunisia	35	Mauritania
	<b>Central Africa</b>	36	Niger
5	Cameroon	37	Nigeria
6	Central African Republic	38	Senegal
7	Zaire	39	Sierra Leone
	<b>East Africa</b>	40	Togo
8	Burundi		<b>East Asia</b>
9	Ethiopia	41	Indonesia
10	Kenya	42	Philippines
11	Rwanda	43	Vietnam
12	Somalia		<b>South Asia</b>
13	Sudan	44	Afghanistan
14	Tanzania	45	Bangladesh
15	Uganda	46	India
	<b>Southern Africa</b>	47	Nepal
16	Angola	48	Pakistan
17	Lesotho	49	Sri Lanka
18	Madagascar		<b>Latin America</b>
19	Malawi	50	Bolivia
20	Mozambique	51	Costa Rica
21	Swaziland	52	Dominican Republic
22	Zambia	53	El Salvador
23	Zimbabwe	54	Guatemala
	<b>West Africa</b>	55	Haiti
24	Benin	56	Honduras
25	Burkina	57	Jamaica
26	Cape Verde	58	Nicaragua
27	Chad	59	Panama
28	Cote d'Ivoire	60	Peru
29	Gambia		
30	Ghana		

## Appendix B: Major Assumptions

### Population Growth

Overall, world population growth is projected to slow slightly during the projection period. The developing economies will account for some 90 percent of the world's population growth (*appendix table 1*).

### International Macroeconomic Outlook

Global economic activity is expected to rise faster than population during the projection period, with most countries' economies improving from the 1980's and early 1990's (*appendix table 2*). Many developing countries are expected to show stronger growth than the average developed economy.

Real oil prices will gradually rise with the expected tightening in world oil markets.

Because of similar expectations for industrial country productivity growth and inflation, the real value of the dollar is expected to remain stable.

The debt crisis for many middle-income developing countries has been relieved, and most now have access to global capital markets. While continued access depends on favorable interest rate terms and domestic policies, it is assumed that these countries' debt situation will gradually improve over the projection period. Debt continues to be problematical for lower income developing countries. The FSU debt situation is also assumed to improve over the projection period. By the end of the period, the FSU is expected to achieve a positive trade balance and be in position to reduce its debt burden.

The FSU is expected to continue struggling toward a market-based economy. The region's economic growth rate is assumed to decline in the early projection period and begin to recover toward the end of the decade.

Several countries in Eastern Europe, particularly Poland, Hungary, and the Czech Republic, will recover more rapidly than the FSU as market reforms and lower wage costs vis-a-vis the EU continue to attract investment.

In the developed economies, Japan's growth is expected to be about 1 percent below the roughly 4.5-percent average it achieved over the 1970-90 period. Growth in the EU is expected to remain below 3 percent as fiscal restraint continues throughout the region. Moderate growth, low inflation, and stable interest rates are projected for the United States.

Latin American growth during the next decade will strengthen, particularly when viewed in per capita terms. There is a growing sentiment that struggling Latin American economies may have reached a turning point. Reforms in some countries have opened the economies to trade and competition. Falling interest rates and successful debt negotiations have reduced interest payments. Investment and capital inflows have improved in many Latin American economies.

In China, real GDP growth is projected to slow from its current high level, but remains high compared with growth in the rest of the world. Savings and investment are expected to continue expanding. However, the capacity to sustain high growth rates is threatened by emerging fiscal constraints and the uncertain outcome of current economic reform efforts.

Growth in many other Asian economies is also projected to slow between 1995 and 2005 compared with the very rapid growth of the 1980's. Despite this slowdown, the projected growth rates for these countries is still strong compared with the rest of the world. Somewhat slower growth in South Asia is expected, but structural reforms, particularly in India, will enable the region to continue a moderate growth path. In contrast, higher growth in Southeast Asia is indicative of the improved environment for growth and trade established by policy adjustments in those countries.

North Africa and the Middle East are projected to register moderate growth during the projection period. The economies of oil-producing countries are expected to benefit from the gradual increase in oil prices and recent adoption of structural adjustment programs. The economies of non-oil-producing countries are also expected to experience moderate growth, particularly in North Africa, where structural adjustment programs and market reforms are being implemented.

Only modest economic growth in Sub-Saharan Africa is projected. However, while GDP growth is expected to rise somewhat, per capita income is not projected to increase significantly. Debt is expected to remain a severe drag on these economies.