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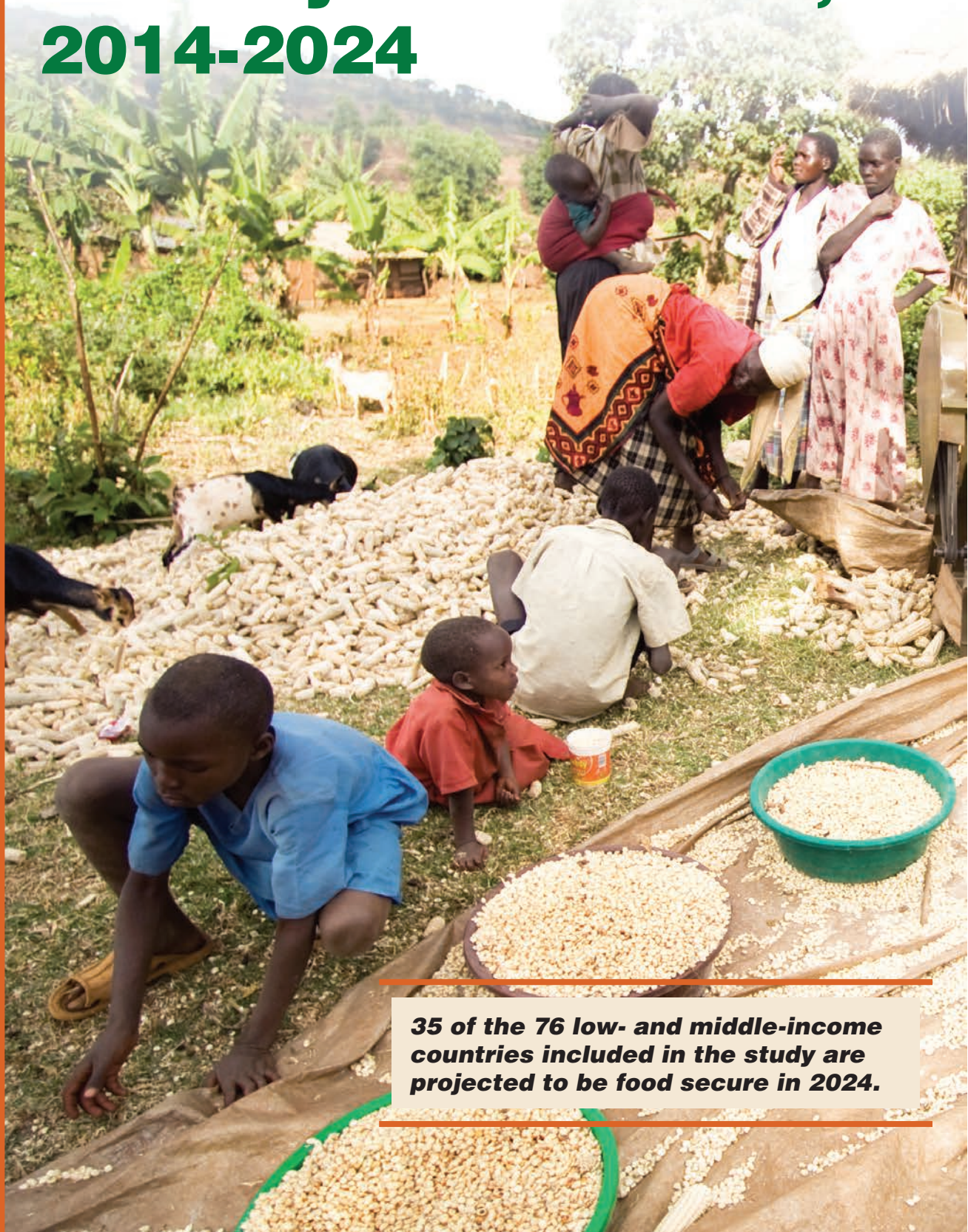
Economic  
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GFA 25

June 2014

# International Food Security Assessment, 2014-2024



**35 of the 76 low- and middle-income countries included in the study are projected to be food secure in 2024.**



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GFA-25

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# International Food Security Assessment, 2014-2024

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## Abstract

Food insecurity in the 76 low- and middle-income countries included in this report is expected to improve between 2013 and 2014. The 76 countries are classified by the World Bank as receiving or have received food aid and are experiencing or have experienced food insecurity. The number of food-insecure people is projected to fall 9 percent, from 539 million in 2013 to 490 million in 2014. Over the longer term, the food security situation is projected to deteriorate as the share of population that is food insecure moves from 13.9 percent in 2014 to 14.6 percent in 2024. Food-insecure people are defined as those consuming less than the nutritional target of roughly 2,100 calories per day per person. Despite improvements over the years, Sub-Saharan Africa is projected to remain the most food insecure region in the world.

**Keywords:** Food security, production, area, yield, commercial imports, export earnings, food aid, calories, commodity food prices, agricultural productivity, Sub-Saharan Africa, North Africa, Asia, Latin America and the Caribbean.

## Acknowledgments

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## Preface

This report continues the series of food assessments in developing countries begun in the late 1970s by USDA's Economic Research Service. *Global Food Assessments* were done from 1990 to 1992, hence the GFA series. In 1993, the title was changed to *Food Aid Needs Assessment* to more accurately reflect the contents of the report, which focuses on selected developing countries with recent or ongoing food deficits. In 1997, we widened our analysis beyond the assessment of aggregate food availability to include more aspects of food security. We therefore changed the title to *Food Security Assessment*. Starting with the report published in July 2011, we changed the name to *International Food Security Assessment* to clarify that this is not an assessment of U.S. food security.

# Contents

<b>List of Figures and Tables</b> .....	iv
<b>Summary</b> .....	v
<b>Overview</b> .....	1
2014 Outlook .....	1
Box: How Food Security Is Assessed: Methods and Definitions .....	2
2024 Projections .....	5
Food Price Developments .....	8
Food Aid .....	9
References .....	9
<b>Food Security: Regional and Country Perspectives</b> .....	10
Sub-Saharan Africa .....	10
A Few Countries Drive Projected Decline in Food Security Over Next Decade .....	12
Ethiopia and Lesotho Show Biggest Projected Food Security Gains .....	13
The Central African Republic, the Democratic Republic of Congo, Burundi, Eritrea, and Somalia Remain the Most Food Insecure SSA Countries .....	13
Food Prices, Economic Growth, and Farm Productivity Are Keys to Food Security .....	14
References .....	15
Asia .....	15
References .....	18
Latin America and the Caribbean .....	18
References .....	21
North Africa .....	22
References .....	24
<i>Special Article</i>	
<b>Productivity Impacts on Food Security in Sub-Saharan Africa</b> .....	26
Box: Total Factor Productivity .....	27
Scenario analysis .....	28
References .....	33
<b>Appendix—Food Security Model: Definition and Methodology</b> .....	34
Structural framework for estimating and projecting food consumption in the aggregate and by income group .....	34
Data .....	36

# List of Figures and Tables

## Figures

1. In 52 (out of 76) developing countries, 20 percent or less of the population is projected to be food insecure in 2014 . . . . .	4
2. Intensity of food insecurity in study countries, 2014 . . . . .	5
3. Total and food insecure population share and distribution gap share by region in 2014. . . . .	6
4a. Regional <i>composition</i> of food-insecure population in 2014 versus 2024 . . . . .	7
4b. Regional <i>number</i> of food-insecure population in 2014 versus 2024 . . . . .	7
5. World food and oil prices remain high relative to historical levels. . . . .	8
6. Sub-Saharan Africa’s food aid share is increasing over time . . . . .	9
P-1. Food security improves as countries devote more crop area to modern varieties . . . . .	32

## Tables

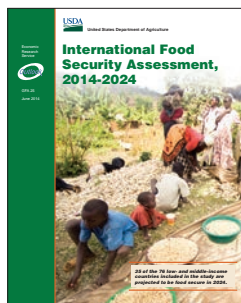
1. Estimates and projections of food-insecure people. . . . .	3
2a. Estimates and projections of total food distribution gaps . . . . .	3
2b. Estimates and projections of food distribution gaps per capita. . . . .	3
3. Food availability and food gaps for 76 countries . . . . .	4
4. Food availability and food gaps for Sub-Saharan Africa . . . . .	11
5. Food Availability and food gaps for Asia . . . . .	17
6. Food availability and food gaps for Latin America and the Caribbean . . . . .	19
7. Food availability and distribution gaps in North Africa . . . . .	23
P-1. Percent of crop area devoted to modern varieties, 2006-10 average . . . . .	28
P-2. Results summary for Scenario 1 . . . . .	30
P-3. Results summary for Scenario 2 . . . . .	31

## Appendix tables

Appendix table-1a—List of countries and their food gaps in 2014. . . . .	38
Appendix table-1b—List of countries and their food gaps in 2024 . . . . .	39
Appendix table 2—Number of food-insecure people, 2014 and 2024 . . . . .	40
Appendix table 3—Country indicators. . . . .	41

### ***Errata***

On July 8, 2014, the title for Figure 1 on page 4 was corrected to read: “In 52 (out of 76) developing countries, 20 percent or less of the population is estimated to be food insecure in 2014.”



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# International Food Security Assessment, 2014-2024

Stacey Rosen, Birgit Meade, Keith Fuglie, and Nicholas Rada

## What Is the Issue?

This report assesses and projects food security of 76 low- and middle-income countries based on two key determinants: food production and import capacity. Domestic food production performance plays the most critical role in the food security of these countries, particularly for those in the Asia and Sub-Saharan Africa regions that depend primarily on locally produced grain supplies. Conversely, the capacity to pay for imports is significant in regions like Latin America and the Caribbean and North Africa that import a large share of their food supplies. To understand how food production and import capacity affect food security, ERS researchers estimated and projected the number of food-insecure people regionally and in each of the 76 developing countries covered in this report for 2014-24.

## What Did the Study Find?

Between 2013 and 2014, ERS projects food insecurity for the 76 countries analyzed to improve. The number of food-insecure people is projected to fall 9 percent, from 539 million in 2013 to 490 million in 2014. The share of the population that is food insecure in these countries is expected to decrease from 15.5 percent in 2013 to 13.9 percent in 2014. The distribution gap (the amount of food needed to raise consumption in each income decile to the nutritional target of roughly 2,100 calories per person per day) is projected to decline nearly 23 percent in 2014 to 12.5 million tons, grain equivalent. The distribution gap is a measure of the intensity of food insecurity—the extent to which consumption falls below the nutritional target. The decline in this gap is projected to be much steeper than that of the number of food-insecure people, indicating that the intensity of food security in these countries will lessen in 2014.

The number of food-insecure people in *Sub-Saharan Africa (SSA)* is projected to fall by nearly 13 percent, the greatest decline of all the regions in the study. As a result, the share of population projected to be food insecure falls to 29.2 percent. The biggest changes are projected for Tanzania, Chad, and Madagascar, where 2014 grain production is expected to return to trend levels following below-average output in 2013.

After *North Africa (NA)*, *Asia* is the most food-secure region as 8.8 percent of the population, on average, was food insecure in 2013. The intensity of food insecurity is projected to decrease significantly in 2014 as the decline in the distribution gap, 40 percent, is projected to

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far outstrip the decline in the number of food-insecure people, 3 percent. This result is principally driven by Afghanistan and India.

The food security situation is expected to improve in the *Latin America and Caribbean (LAC)* region as the projected share of population that is food insecure declines from 25.5 percent in 2013 to 22 percent in 2014. Also, a 30-percent projected decline in the distribution gap indicates an improvement in the intensity of food insecurity. Gains in the LAC region are driven by continued strong economic growth, overall positive conditions for crop production, and declining food prices. The countries in the *North African (NA)* region are expected to remain mostly food secure.

Over the next decade, the number of food-insecure people in the 76 countries is projected to grow as the share of population that is food insecure moves from 13.9 percent in 2014 to 14.6 percent in 2024, primarily due to prospects for slow growth in supplies in a few countries. LAC's food security situation, on the whole, is projected to improve as the share of population considered food insecure falls from 22 percent in 2014 to less than 17 percent in 2024. In the LAC region, higher crop production and grain imports are projected to continue to allow more income groups to meet and/or exceed the nutritional target.

Asia's share of population that is food insecure is quite low, projected at 8.5 percent in 2024. However, food insecurity among the population that is considered food insecure is projected to intensify. The distribution gap is projected to jump 66 percent over the next decade. This result is principally driven by Yemen—where the combination of high population growth and import constraints lead to a projected decline in per capita grain availability—and India—where above trend supplies in the 2014 base period lead to slower projected growth through 2024.

The food security situation in SSA is projected to deteriorate, but not severely, as the share of population that is food insecure is projected to rise from 29.2 percent in 2014 to 31.2 percent in 2024. The increases in the number of food-insecure people and the distribution gap nearly match, meaning that there is little measurable intensification in food insecurity, on average. Most SSA countries are projected to continue their path of maintaining or improving food security because of strong growth in agricultural production, and the projected deterioration in the region's overall food security is driven by prospects for insufficient gains in production and import capacity in only a handful of countries.

## **How Was the Study Conducted?**

The International Food Security Assessment model used in this report projects food consumption, food access, and food gaps in low- and middle-income countries through 2024. Food security of a country is evaluated based on the gap between projected domestic food consumption (domestic production plus imports minus nonfood uses) and a consumption target.

All historical and projected data are updated relative to the *International Food Security Assessment, 2013-23* report. Food production estimates for 2013 are based on data from FAO as of March 2014. Historical production data are from FAO and food aid data from the UN World Food Programme (WFP). Financial and macroeconomic data are based on World Bank data as of March 2014. Projected macroeconomic variables are either based on calculated growth rates for the 1990s through 2012 or are taken from International Monetary Fund (IMF) and World Bank projections. Projections of food availability include food aid, with the assumption that each country will receive the 2010-12 average level of food aid throughout the next decade.



# International Food Security Assessment, 2014-2024

## Overview

Food security in the 76 countries included in this report (low- and middle-income countries as classified by the World Bank that are or have been receiving food aid and are experiencing or have been experiencing food insecurity) is projected to improve between 2013 and 2014. The number of food-insecure people, defined as those consuming less than the nutritional target of roughly 2,100 calories per day per person, is expected to fall 9 percent, from 539 million in 2013 to a projected 490 million in 2014, with the share of the total population that is food insecure falling from 15.5 percent to about 14 percent. The distribution gap, an intensity measure of the extent to which consumption falls below the nutritional target, is projected to decline nearly 23 percent in 2014 to 12.5 million tons, grain equivalent. The decline in this gap is estimated to be steeper than the decline in the number of food-insecure people, indicating that the intensity of food security in these countries will lessen in 2014.

In the longer term, food security is projected to deteriorate at the aggregate level. The share of the population that is food insecure is projected to increase from roughly 14 percent in 2014 to 14.6 percent by 2024. The increase in the distribution gap is projected to outstrip that of the number of food-insecure people indicating a rise in the intensity of food insecurity. Most of this is due to changes in Asia. Sub-Saharan Africa (SSA) will continue to be the most food-insecure region as more than 30 percent of its population is projected to consume below the nutritional target.

## 2014 Outlook

The estimates indicate that Sub-Saharan Africa is still the most food-insecure region in the world, although the region shows significant improvement. The number of food-insecure people in the region is projected to fall by nearly 13 percent in 2014, the greatest decline of all the regions in the study. As a result, the share of the population projected to be food insecure falls to under 30 percent. This is a significant improvement compared with 50 percent or more of the population that was estimated to be food insecure in the late 1990s. While 15 of the 39 countries covered in the SSA region are projected to become more food secure, the biggest changes are estimated for Tanzania, Chad, and Madagascar. In all three cases, 2014 grain production is expected to return to trend levels following below-average grain output in 2013. Overall, the distribution gap for the SSA region is projected to fall as much as 17 percent.

Improvement in the Latin America and Caribbean (LAC) region is expected to nearly match that of SSA in 2014, with the number of food-insecure people projected to decline 12.4 percent. A significantly larger projected decline in the LAC region's distribution gap of 30 percent indicates a substantial reduction in the intensity of food insecurity in that region in 2014. The share of the population that is food insecure is projected to fall from 25.5 percent to 22 percent. The results are driven by improvements in several countries within the region, including the Dominican Republic, Ecuador, Guatemala, Haiti, and Nicaragua.

The North Africa (NA) region, made up of four countries, is considered food secure. Less than 10 percent of the population of each country in the region is projected to consume below the nutritional

## How Food Security Is Assessed: Methods and Definitions

The International Food Security Assessment model used in this report is based on 2012 or 2013 data (updated in March 2014), and therefore does not reflect any subsequent changes that may have transpired related to the food security of these countries. This annual update includes revisions of historical data, as sometimes new information leads to changes in historical data series. Updates can therefore change food-security estimates for past years. Food-security indicators for 2013 are estimates; subsequent years are projections. Commodities covered in this report include grains, root crops, and “other”—the remainder of the diet. These three groups account for 100 percent of all calories consumed in the study countries and are expressed in grain equivalent. The conversion is based on calorie content. For example, grain has roughly 3.5 calories per gram and tubers have about 1 calorie per gram. One ton of tubers is, therefore, equivalent to 0.29 ton of grain (1 divided by 3.5), and 1 ton of vegetable oil (8 calories per gram) is equivalent to 2.29 tons of grain (8 divided by 3.5).

It should be noted that food security cannot be fully characterized by any single indicator. For this reason this report provides several indicators to capture different dimensions of food insecurity. Food consumption and food access are projected for 76 low- and middle- income countries—39 in Sub-Saharan Africa, 4 in North Africa, 11 in Latin America and the Caribbean, and 22 in Asia. (See Appendix—Food Security Model: Definition and Methodology for a detailed description of the methodology and definitions of terms and appendix table 1 for a list of countries.) The 2013 estimates are based on FAO production and import assessments, and the longer term projections are based on 2011-13 grain production and 2010-12 root and tuber production data from FAOSTAT and 2010-12 macroeconomic data from the IMF and World Bank. The periods covered include 2013 (estimate) and 2014 and 2024 (projection). The model analyzes the gap between projected food availability (production plus commercial and food aid imports minus nonfood use) and two alternative consumption standards. The nutritional standard is the per capita nutritional target (NR) of roughly 2,100 calories per capita per day, depending on the region. The *nutritional gap* measures the difference between projected food availability (domestic production plus net imports) and the amount of food needed to support a per capita nutritional standard for the entire population.

The estimated *distribution gap* measures the food needed to raise consumption in each income decile to the nutritional target. In many countries, consumption in the lower income deciles is significantly below average (per capita) consumption for the country as a whole. In these countries, the distribution gap provides a measure of the intensity of hunger—the extent to which the food security of already hungry people deteriorates as a result of income or economic conditions. When our estimates show no distribution gap for the poorest 10 percent of the population, however, we consider the country food secure despite the fact that food insecurity may exist (but only for less than 10 percent of the population). Similarly, when our estimates show a distribution gap for all deciles, we consider 100 percent of the population to be food insecure despite the fact that less than 10 percent of the population may be food secure. Finally, based on total population data and the population share that consumes below the nutritional target, the projected number of people who cannot meet the target consumption level is calculated.

The common terms used in this report:

- **Domestic food supply**—the sum of domestic production and commercial and food aid imports.
- **Food availability**—food supply minus nonfood use, such as feed and waste, and exports
- **Import dependency**—the ratio of food imports to food supply.
- **Food consumption**—equal to food availability.
- **Food access**—depends on individual purchasing power. Food consumption is estimated by income group within each country based on an income-consumption relationship.
- **Food insecurity**—occurs when per capita food consumption for a country or income decile falls short of the nutritional target of roughly 2,100 calories per person per day.

target. After the NA region, the Asia region is found to be the most food-secure region, with 8.5 percent of the population, on average, projected to be food insecure in 2014. The intensity of food insecurity in the Asia region is expected to decrease significantly between 2013 and 2014, with a projected 3-percent decline in the food insecure population and a 40-percent decline in the distribution gap. The Asia results are principally driven by developments in Afghanistan and India.

Table 1

**Estimates and projections of food-insecure people in 76 countries**

	Region				
	Total	Asia	LAC	NA	SSA
	<i>Millions of people</i>				
2013	539	201	42	0	296
2014	490	195	36	0	258
2024	598	220	31	0	346

LAC = Latin America and the Caribbean, NA = North Africa, SSA = Sub-Saharan Africa.

Source: USDA, Economic Research Service.

Table 2a

**Estimates and projections of food distribution gaps in 76 countries**

	Region				
	Total	Asia	LAC	NA	SSA
	<i>Million tons</i>				
2013	16.1	2.7	0.8	0	12.5
2014	12.7	1.6	0.6	0	10.5
2024	17.8	2.7	0.5	0	14.6

LAC = Latin America and the Caribbean, NA = North Africa, SSA = Sub-Saharan Africa.

Source: USDA, Economic Research Service.

Table 2b

**Estimates and projections of food distribution gaps, per capita**

	Region				
	Total	Asia	LAC	NA	SSA
	<i>Kilograms per capita per year</i>				
2013	4.6	1.2	3.6	0	14.6
2014	3.6	0.7	3.5	0	11.8
2024	4.3	1.0	2.8	0	12.9

LAC = Latin America and the Caribbean, NA = North Africa, SSA = Sub-Saharan Africa.

Source: USDA, Economic Research Service.

Table 3

**Food availability and food gaps for 76 countries**

Year	Grain production*	Root production (grain equivalent)	Commercial imports	Food aid receipts (grain equivalent)	Aggregate availability of all food	
			1,000 tons			
2005	522,480	87,346	84,957	9,009	836,517	
2006	534,703	91,974	96,469	7,399	866,402	
2007	552,907	90,536	92,654	6,282	884,346	
2008	575,804	97,347	102,700	6,736	904,034	
2009	588,792	95,637	100,922	6,592	920,936	
2010	615,926	103,863	109,542	7,513	943,694	
2011	633,024	111,315	116,287	5,122	956,983	
2012	650,697	114,562	106,022	4,982	975,907	
2013(e)	658,171	113,403	115,148	5,599	1,003,762	
<b>Projections</b>				<b>Food gap**</b>		
				NG	DG	
2014	663,208	114,736	121,514	<b>8,565</b>	<b>12,669</b>	1,034,684
2019	714,752	122,120	144,902	<b>9,368</b>	<b>14,679</b>	1,104,822
2024	770,067	129,895	154,511	<b>11,943</b>	<b>17,773</b>	1,166,458

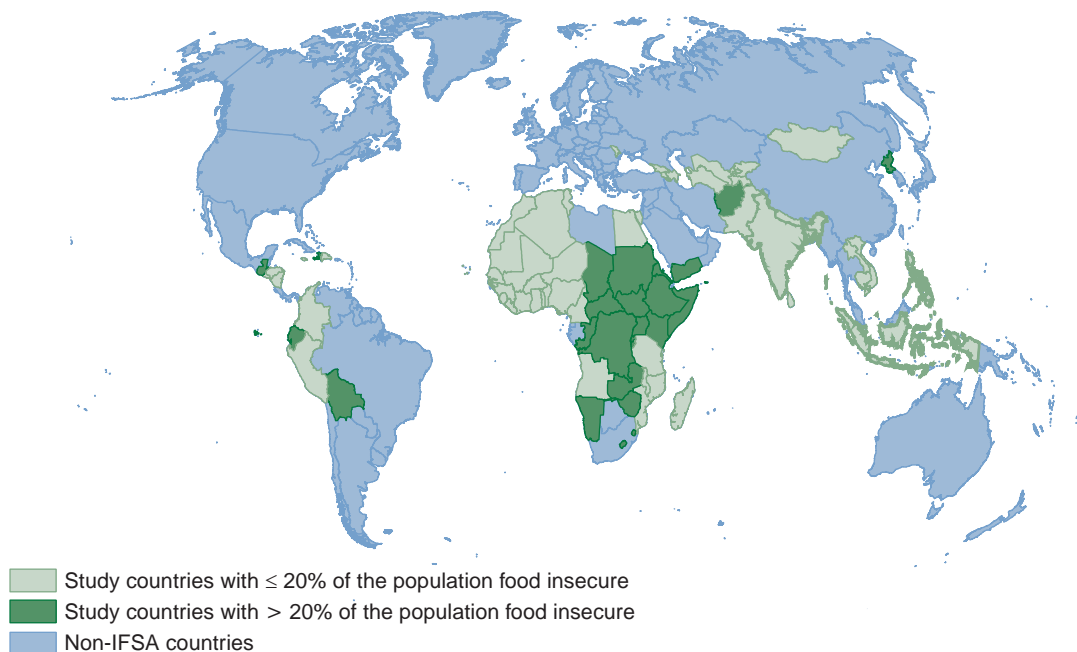
(e) estimate.

\*Grain production includes rice expressed in milled-rice equivalent.

\*\*NG stands for nutritional gap and describes the amount of grain equivalent needed to support nutritional standards on a national average level. DG stands for distribution gap, and it describes the amount of grain equivalent needed to allow each income quintile to reach the nutritional target.

Sources: USDA, Economic Research Service, using data from FAOSTAT, UN Food and Agriculture Organization, and World Food Programme, Rome.

Figure 1

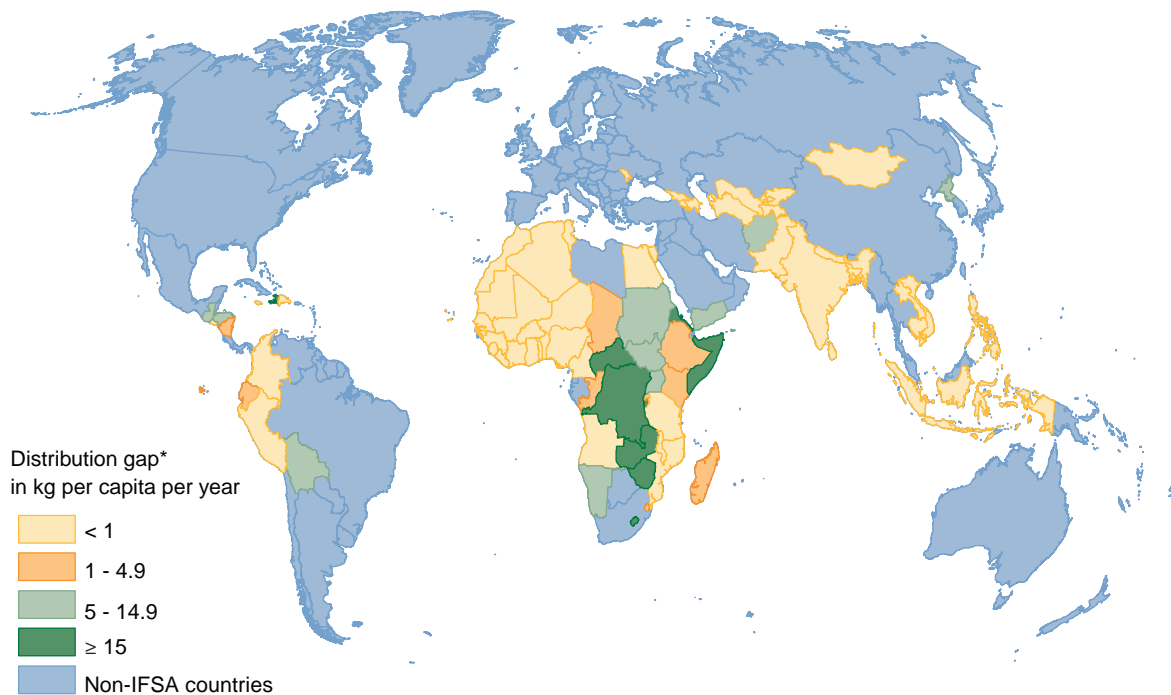
**In 52 (out of 76) developing countries, 20 percent or less of the population is estimated to be food insecure in 2014**

IFSA = International Food Security Assessment.

Source: Calculations by USDA, Economic Research Service.

Figure 2

### Intensity of food insecurity in study countries, 2014



\*The difference between projected food availability and the food needed to increase consumption in food-deficit income groups within individual countries to meet the nutritional target.  
IFSA = International Food Security Assessment.  
Source: Calculations by USDA, Economic Research Service.

## 2024 Projections

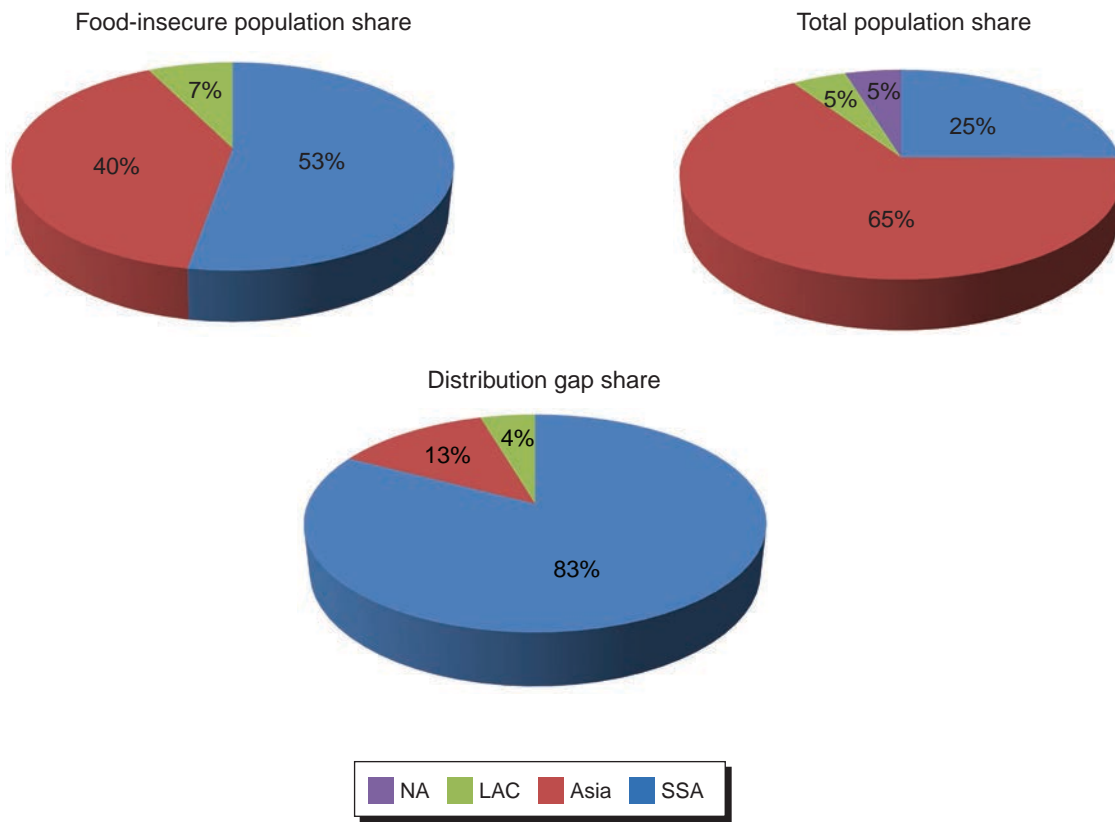
Over the next decade, food security in the 76 study countries is projected to deteriorate as the share of population that is food insecure moves from 13.9 percent in 2014 to 14.6 percent in 2024.

SSA is projected to continue to be the most vulnerable region. The 39 SSA countries included are projected to account for 28 percent of the total population of the 76 countries covered in the study in 2024. However, they make up an estimated 58 percent of the total food-insecure population. The intensity of food insecurity is projected to be the greatest in SSA, with the region accounting for 82 percent of the total distribution gap of the 76 countries studied. In contrast, Asia, which is projected to account for 63 percent of the total population of the study countries, accounts for an estimated 37 percent of the food-insecure people and 15 percent of the distribution gap. By 2024, the LAC region is projected to account for less than 5 percent of the total population and roughly similar shares of the total food insecure population and distribution gap.

By 2024, the food security situation in SSA is projected to deteriorate with the share of population that is food insecure rising from 29.2 percent in 2014 to 31.2 percent in 2024. The projected increases in the number of food-insecure people and the distribution gap nearly match, indicating little measurable intensification in food insecurity, on average. This means that the income groups consuming below the threshold level are not suffering any further declines. On a positive note, in 22 of the SSA region's 39 countries covered, 20 percent or less of the population is projected to be food insecure in 2024. Most of these countries are in West Africa where production growth (and at times,

Figure 3

**Total and food-insecure population share and food gap share by region, 2014**



LAC = Latin America and the Caribbean, NA = North Africa, SSA = Sub-Saharan Africa.

Source: USDA, Economic Research Service.

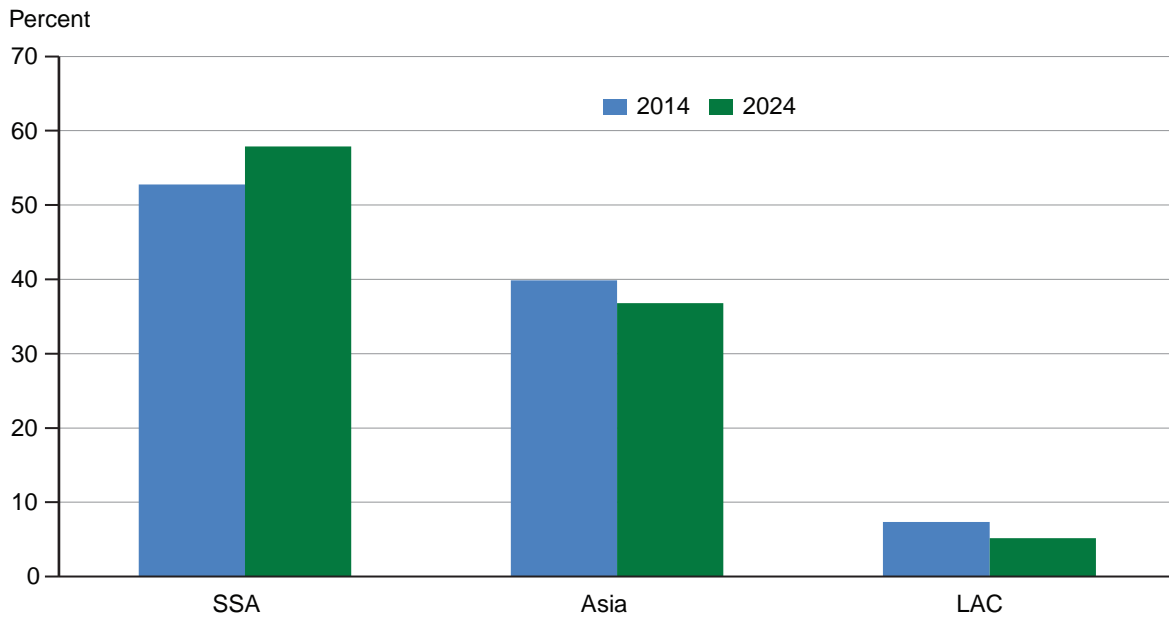
import growth) has far outpaced population growth in the last decade, and where per capita supplies are projected to remain above the nutritional target during the projection period. Conversely, countries such as the Central African Republic, the Democratic Republic of Congo, Burundi, Eritrea, and Somalia are projected to remain highly food insecure due to factors such as civil strife, climate that is not suited to agricultural growth, and limited financial capacity to import.

After the North African region, Asia is projected to remain the most food-secure region studied by 2024. The share of population that is food insecure is projected at 8.5 percent in 2024. However, the degree of food insecurity within the food-insecure population is projected to intensify, with the distribution gap projected to jump 66 percent during the next decade. This result is principally driven by the results for Yemen and, to a lesser extent, India. Yemen imports the bulk of its grain supplies and import capacity is projected to be limited and population growth to remain high. In India, results stem primarily from relatively high per capita food supplies during the recent base period for the projections; although per capita supplies are expected to remain relatively high through 2024, they are projected to decline slightly from the base period highs.

LAC's food security situation, on the whole, is projected to improve as the share of the region's population considered food insecure falls from an estimated 22 percent in 2014 to less than 17 percent in 2024. This result is principally driven by improvements in Bolivia and Ecuador, where

Figure 4a

**Regional composition of food-insecure population in 2014 versus 2024**

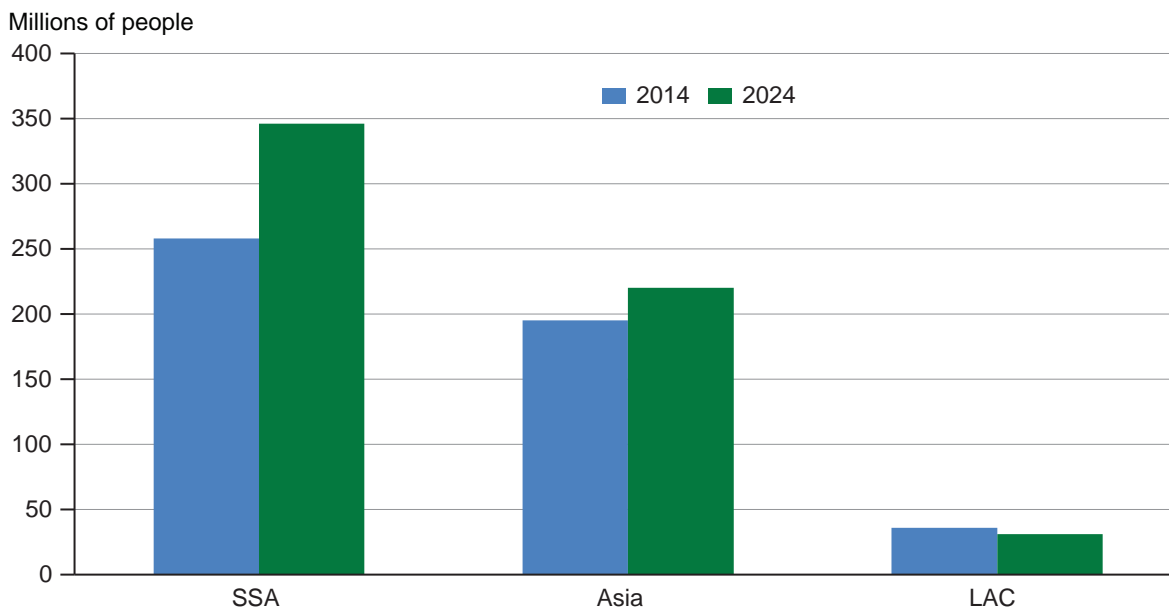


SSA = Sub-Saharan Africa, LAC = Latin America and the Caribbean.

Source: USDA, Economic Research Service.

Figure 4b

**Regional number of food-insecure population in 2014 versus 2024**



SSA = Sub-Saharan Africa, LAC = Latin America and the Caribbean.

Source: USDA, Economic Research Service.

growth in grain production and imports is projected to more than keep pace with slowing population growth. In Bolivia, population growth averaged well over 2 percent per year in the 1990s, slowed to just under 2 percent per year in the first decade of the 2000s, and is projected to slow even further to roughly 1.5 percent per year through 2024. Ecuador has had a similar pattern, albeit with slightly lower growth rates, and the growth rate through 2024 is projected to average just over 1 percent per year.

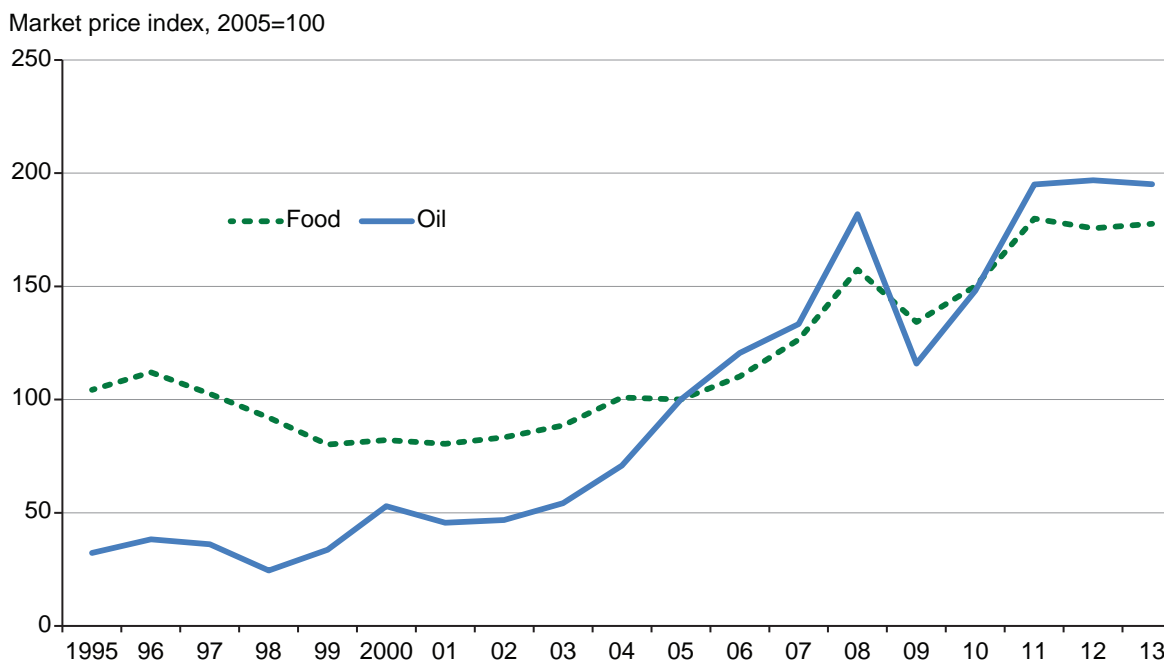
## Food Price Developments

While prices of many food commodities have declined from their peak of 2011-12, they remain well above recent historical levels. The global food price index in 2013 was 78 percent higher than its 2005 level, according to the IMF. For countries where imports are a significant portion of consumption, as in North Africa and LAC and some SSA countries, higher global prices affected local markets. The FAO consumer food price index indicates that prices in Angola, Burundi, Ghana, Jamaica, and Nicaragua more than doubled during this time. Prices jumped more than 50 percent in Algeria, the Republic of Congo, the Dominican Republic, Ecuador, Guatemala, Haiti, Honduras, Mauritania, and Tunisia. Consumers in the poorer countries in this study spend about half of their income on food, so these high prices weaken food security.

Another commodity of importance to many of these countries and their food security situation is oil. While a few of the study countries are oil exporters, most are net oil importers. Moreover, high oil prices contribute to higher transportation and energy costs, thereby raising costs of production and import bills. Oil prices in 2013 fell only 1 percent from their peak of \$105 per barrel in 2012. For some historical perspective, these prices are nearly double the 2005 level.

Figure 5

### World food and oil prices remain high relative to historical levels



Source: International Monetary Fund, *International Financial Statistics*, 2014.



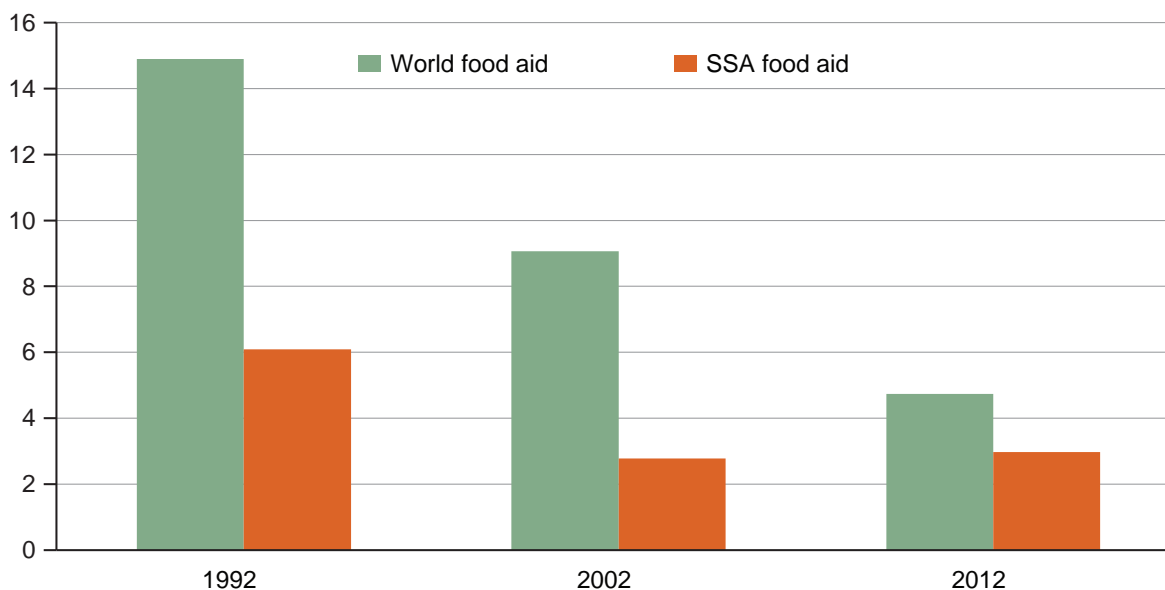
## Food Aid

The countries included in this study currently are, or have been, food aid recipients. Food aid has played a role in augmenting food supplies and compensating for shortfalls in emergency situations to prevent loss of life. Over time, the amount of food aid declined significantly and the composition has shifted away from program aid and toward emergency assistance. In 1990, 13 million tons, grain equivalent, were provided as food aid. By 2000, this had fallen to 11.3 million tons and, by 2010, to less than 7 million tons. In 2012, total food aid was less than 5 million tons. Emergency food aid is now the largest form of food aid. In the early 1990s, about a quarter of food aid was emergency aid, while program food aid accounted for more than half of the total. By 2000, these shares had switched. Since that time, emergency food aid has continued to rise and its share of the total was 70 percent in 2012 (the most recent data available). SSA's food aid receipts have declined, although not nearly as sharply as for other regions. As a result, the SSA region's share of global food aid has risen from roughly a third in the 1990s to nearly 63 percent in 2012. Although the SSA region has received an increasing share of available food aid, food aid is still a small part of the region's imports. In 2012, SSA received about 3.1 million tons of food aid, while its commercial grain imports totaled 25 million tons.

Figure 6

### Sub-Saharan Africa's food aid share is increasing over time, 1992-2012

Food aid, million tons



SSA = Sub-Saharan Africa.

Source: World Food Programme.

## References

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## Food Security: Regional and Country Perspectives

Food security in the regions studied is projected to improve in 2014 compared to 2013 when less favorable crop production outcomes, combined with high food prices, led to an uptick in food insecurity breaking an otherwise downward trend. In 2014, the number of food-insecure people is projected to decline in Sub-Saharan Africa, Asia, and Latin America and the Caribbean, while North Africa continues to be mostly food secure.

### Sub-Saharan Africa

Food security in many of the region's countries is as good, or better, than it has been in the last two decades. In 22 of the region's 39 countries that are analyzed in this report, 20 percent or less of the population is estimated to be food-insecure in 2014. The projected improvements stem from the gains that the SSA region continues to make in food production. Production of grains in SSA, which account for roughly half of the region's diet, has increased nearly 50 percent since 2000. For the first time, most production growth was due to gains in yields. From 1980-1999, 90 percent of grain output growth was driven by area expansion. During 2000-2013, only 40 percent was due to area growth. Yields in SSA continue to be low by world standards, but have grown nearly 3 percent per year since 2000, outstripping yield growth in all other regions included in this study. For the projection period, grain output is projected to slow to roughly 2.5 percent per year, higher than the growth projected in all of the other regions.

The number of food-insecure people in 39 SSA countries included in the USDA-ERS analysis is projected to decline nearly 13 percent to 258 million between 2013 and 2014. The share of the region's population that is food-insecure is projected at 29.2 percent for 2014. The region's distribution food gap (the amount of food needed to raise consumption in each income decile to the nutritional target of roughly 2,100 calories per person per day) is projected to decline about 16.5 percent, to 10.5 million tons, grain equivalent, in 2014. The distribution gap measures the depth, or intensity, of food security. Therefore, these results indicate that not only did food security improve between 2013 and 2014, the intensity of food insecurity declined.

The improvement in SSA food security in 2014 is largely driven by a projected return to trend production in 2014 following below-average grain output in 2013, particularly in Chad, Madagascar, and Tanzania. Chad's 2014 grain output is projected to return to trend levels following below average grain output in 2013 due to delayed rains and prolonged dry periods. Chad suffers from highly variable production. The coefficient of variation in grain production (the degree to which production varies from trend levels) in Chad is estimated at 53 percent over the last 2 decades. This means that in any given year, production can be 53 percent above or below trend levels.

Madagascar's grain production in 2013 was nearly 20 percent below the recent 3-year average due to erratic rains and locusts. Output in 2014 is projected to return to trend thereby improving food supplies and food security. Since 2010, grain production in Tanzania has been markedly higher than in the prior decade, driven by higher acreage and yields. Production in 2013 fell slightly from the recent average, but projections for 2014 are back on trend, resulting in improved food security.

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

Year	Grain production	Root production	Commercial imports	Food aid receipts (grains)	Aggregate availability of all food
<i>1,000 tons</i>					
2005	90,464	59,763	20,412	5,191	204,222
2006	96,867	63,157	19,109	4,463	210,397
2007	93,748	61,225	19,683	3,560	214,702
2008	101,151	64,691	22,729	4,561	222,079
2009	106,500	62,637	23,322	4,469	229,135
2010	122,460	68,949	22,494	4,527	237,342
2011	115,179	73,936	25,338	3,288	242,397
2012	119,900	75,617	24,647	3,218	248,230
2013(e)	120,724	75,376	25,983	3,405	254,505
<b>Projections</b>				<b>Food gap*</b>	
				NG	DG
2014	127,515	76,255	26,997	<b>8,222</b>	<b>10,474</b>
2019	142,372	81,234	32,733	<b>9,368</b>	<b>12,080</b>
2024	159,458	86,502	35,306	<b>11,414</b>	<b>14,571</b>
					(w/o food aid)

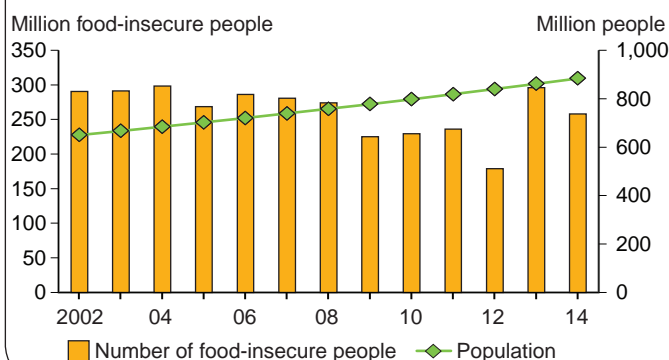
\*See table 3.

**Sub-Saharan Africa**  
 (884 million people in 2014)

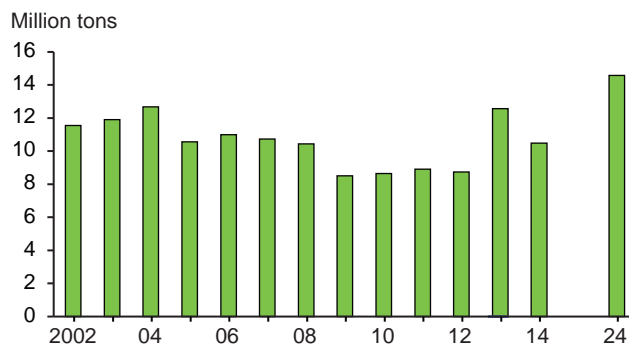
Sub-Saharan Africa (SSA) remains the most food-insecure region as 29 percent of its population is estimated to be food insecure in 2014. This is a great improvement from the near 44-percent share in 2004.

Grain production growth exceeded that of all the other regions in the study at nearly 4 percent per year during the last decade. However, grain production growth varies widely in the region, with some countries achieving average annual growth of over 10 percent while other countries are facing declines.

**SSA: Trend in number of food-insecure people versus population**



**SSA: Distribution gaps**



**Sub-Saharan Africa: Growth in grain production, area, and yields in selected countries**

	Grain production		Grain area		Grain yields		Average yields 2010-12
	1993-2003	2003-2013	1993-2003	2003-2012	1993-2003	2003-2012	
<i>Average annual growth, percent</i>							<i>MT/ha</i>
Ethiopia	5.3	8.3	4.7	1.2	0.6	6.9	2.0
Kenya	0.7	2.3	1.5	3.6	-0.7	-1.1	1.6
Rwanda	6.5	12.9	10.6	2.8	-3.7	11.1	2.0
Tanzania	1.1	5.7	1.6	2.8	0.8	2.6	1.3
Uganda	3.2	4.2	1.6	1.2	1.5	4.0	2.0
Malawi	2.8	9.9	2.7	1.0	0.1	10.1	2.1
Ghana	1.6	4.9	2.0	2.3	-0.4	3.0	1.6
Liberia	9.2	14.4	11.2	11.3	-1.8	6.0	1.0
Mali	2.4	8.2	1.4	4.3	1.1	5.4	1.3
<b>SSA</b>	<b>3</b>	<b>3.8</b>	<b>1.5</b>	<b>1.9</b>	<b>0.8</b>	<b>2.4</b>	<b>1.2</b>

\*Most recent data for grain production is for 2013 while area and yields are available through 2012.

MT/ha = Metric tons per hectare.

Source: USDA, Economic Research Service calculations based on data from United Nations, Food and Agriculture Organization, Global Information and Early Warning System for grain production and FAOSTAT for area and yields.

## *A Few Countries Drive Projected Decline in Food Security Over Next Decade*

Over the next decade, SSA's food security situation is projected to deteriorate as the share of population that is food insecure is projected to rise from 29.2 percent in 2014 to 30.7 percent in 2024. The total number of food-insecure people is projected to reach 346 million in 2024, a 34-percent increase from 2014. The region's distribution food gap is projected to rise slightly faster, 39 percent (reaching 14.6 million tons), indicating some increase in the intensity of food insecurity.

The projected deterioration in SSA food security between 2014 and 2024 is driven by only a handful of countries. Most SSA countries are projected to continue on their path of improving food security, or to maintain their relatively high levels of food security, because of strong growth in agricultural production. The greatest deterioration of food security is projected to occur in Uganda and the Republic of Congo. In these two cases, the number of food-insecure people projected to grow significantly and the distribution gaps are projected to rise at a much faster rate, indicating an increase in the depth of food insecurity.

In Uganda, the share of population that is food insecure is projected to rise from 50 percent in 2014 to 80 percent in 2024. A major factor driving the longer term result is the country's high population growth, 3.2 percent in 2014, which is expected to remain high over the next decade. Grains and root crops account for about half of the country's diet. Imports, while growing, are very small compared to total grain availability and, as a result, Uganda's food security is highly sensitive to domestic production performance. Since 2000, growth in grain output in Uganda has been among the highest of all the study countries, well over 4 percent per year, but production of roots and tubers has stagnated during that time. In the projection period, grain production growth is expected to match that of population growth, but gains in root crops are projected to fall well short of population growth. As a result, per capita consumption is projected to decline and food insecurity to rise. A larger than expected increase in crop area devoted to modern varieties (MVs) could alter this outcome. Uganda has seen a sharp increase in MVs in recent years, from 5.6 percent of crop area in 1996-2000 to 22.3 percent in 2006-10. A continuation of this trend could accelerate yield growth, thereby boosting production, and reducing food insecurity.

The share of the population that is food-insecure in the Republic of Congo is projected to increase from 30 to 60 percent over the next decade. Grains and root crops account for roughly two-thirds of the diet, and the availability of both has barely kept pace with population growth of 2.4 percent per year. Most of the country's grain consumption is met through imports, while root crop supply is met through domestic production. For the projection period, population growth is expected to outstrip supplies because of slow growth in root crop production and import constraints due to limited availability of foreign exchange.

Other countries in the region where food security is projected to deteriorate include Rwanda, Tanzania, Madagascar, Malawi, Mozambique, Burkina Faso, Gambia, Niger, Senegal, and Togo. It is important to note, however, that in all cases with the exception of Rwanda, Madagascar, and Senegal, these countries are relatively food secure, with the share of population that is food insecure at a 20-percent level or less. The greatest deterioration among this group of countries is Senegal, where the share of population that is food insecure is projected to rise from less than 10 percent to 30 percent. However, per capita consumption is projected to decline only 0.7 percent per year during 2014-24 and the income groups that are food insecure fall short of nutritional requirements by less

than 10 percent. Therefore, despite modest deterioration, food insecurity in Senegal is not projected to be widespread or deep. In most of the remaining countries where food security is projected to deteriorate, the key factor is projected population growth near or greater than 3 percent per year: Rwanda, Tanzania, Madagascar, Malawi, Burkina Faso, and Niger. In these cases, food supplies are indeed rising, and in some cases, at high rates relative to all the study countries, but the rate does not keep pace with the population growth.

### *Ethiopia and Lesotho Show Biggest Projected Food Security Gains*

Over the next decade, the greatest improvements in food security are projected to occur in Ethiopia and Lesotho. Ethiopia's food security has improved markedly since the mid-1990s, when nearly all of the population was considered food insecure. Between 1995 and 2012, per capita consumption increased more than 30 percent. Grains account for two-thirds of the country's diet and, since imports are very low, supplies depend on domestic production performance. Grain output has doubled over the last decade, with yield growth contributing more than area expansion in recent years. Over the next decade, this growth is projected to slow, but it will exceed the rate of population growth which, at about 2 percent per year, is lower than the regional average. As a result, food supplies, on a per capita basis are projected to rise and food security to improve. The share of the population that is food-insecure is projected to fall from 40 percent in 2014 to 20 percent in 2024.

In Lesotho, the share of population that is food insecure is projected to fall from 90 percent in 2014 to 40 percent in 2024. Unlike Ethiopia, where strong growth in food output is the key factor, improvement in food security in Lesotho is driven by relatively low projected population growth. Grain output in Lesotho has virtually stagnated during the last decade, varying only with weather conditions, while imports, which account for about two-thirds of grain supplies, are constrained by limited foreign exchange availability. Therefore, per capita food supplies are expected to improve only because of projected population growth of less than 1 percent per year.

### *The Central African Republic, the Democratic Republic of Congo, Burundi, Eritrea, and Somalia Remain the Most Food Insecure SSA Countries*

On a consistent basis, the most food-insecure SSA countries are the Central African Republic, the Democratic Republic of Congo (DR Congo), Burundi, Eritrea, and Somalia. Almost all of the population of these countries is projected to be food insecure over the next decade. The Central African Republic is one of the most food-insecure countries in the world and the share of food-insecure population is projected to rise from 90 to 100 percent. Despite relatively slow population growth of less than 2 percent per year, grain and root crop production gains have not been sufficient to allow for gains in per capita consumption. A major constraint to a productive agricultural sector is civil strife, which has continued for about a year and a half and has resulted in large numbers of deaths and displaced people. The food security situation is not expected to change in the projection period.

DR Congo continues to suffer the effects of long-term civil strife that has disrupted agricultural activities. Area expansion has been limited and yields have stagnated and are below the regional average. As a result, per capita grain output continues to decline. Burundi's grain and root crop output growth has fallen well short of population growth. Eritrea has some of the lowest grain yields in the world and agricultural output is characterized by wide swings due to rainfall variability.

## *Food Prices, Economic Growth, and Farm Productivity Are Keys to Food Security*

Higher retail grain prices have the potential to intermittently derail the progress some of these countries have made toward achieving food security. As the import share of grain supplies rises, so does a country's sensitivity to higher world prices. Imports account for roughly 20 percent of SSA grain supplies, on average. However, for a third of the SSA countries included in this study, imports account for 40 percent or more of grain supplies. Again, this growing reliance is an issue when prices rise, as they did in 2008 and 2011. While they have softened since then, prices remain high relative to recent historical levels. Rice, and to a lesser extent, wheat, are the principal grains imported by SSA. Real global prices of these commodities in 2013 were roughly 1.8 times higher than their 2000 level. A trade-weighted grain price derived from USDA's long-term projections has real grain prices declining in 2014-17, followed by level prices through 2024. However, many of the factors that have contributed to recent periods of relatively high prices—including global income and population growth and high energy prices—remain threats to food price stability.

The positive results that are projected for most of the countries in SSA are supported by continued strong economic growth and commitments to the agricultural sector on the part of the countries themselves and international organizations. SSA's real gross domestic product (GDP) growth has recently been among the most robust in the world. The World Bank's Global Economic Prospects calls for 6.4 percent annual growth in 2014, with similarly strong growth projected through 2016. These estimates are driven by strong domestic and global demand, and investment in infrastructure and natural resources. Net foreign direct investment is estimated at \$41 billion in 2014 and is projected to rise to more than \$44 billion in 2015 and nearly \$47.8 billion in 2016. Export volumes continue to rise and, while prices for the region's major exports (agricultural raw materials and metals) have leveled off from their highpoints a few years ago, they remain well above levels of a decade ago.

Commitment continues to raising productivity of agriculture, the most important sector of the region's economy. The Comprehensive Africa Agriculture Development Programme (CAADP) has been central to this effort. This initiative was established in 2003 by the African Union's New Partnership for Africa Development (NEPAD) and is African-owned and African-led. The over-riding goals are to eliminate hunger and reduce poverty through sustained agricultural growth. To achieve the goals, participating African governments commit at least 10 percent of their national budgets to the agricultural sector with an objective of achieving a 6-percent-per-year growth in the sector by 2015. Rwanda was the first country to sign a CAADP agreement in 2007. As of January 2014, 34 African Union (AU) member countries had signed agreements. On average, public agricultural spending has increased more than 7 percent per year since the establishment of CAADP. At the same time, agricultural GDP growth has averaged nearly 4 percent per year, far outstripping growth of previous decades.

International support for the region's agricultural success is highlighted in the New Alliance for Food Security and Nutrition, which was established at the 2012 G8 Summit. Efforts by African governments, donors, and private companies aim to accelerate the implementation of country food security strategies under CAADP in order to sustain investment in agriculture. During its first year, the New Alliance leveraged more than \$3.7 billion in private investment in agriculture in SSA. Ten SSA countries have signed up to the New Alliance: Benin, Burkina Faso, Côte d'Ivoire, Ethiopia, Ghana, Malawi, Mozambique, Nigeria, Senegal, and Tanzania. This is significant in that, together,

these countries account for half of the population and 60 percent of the grain output of the SSA study countries. Therefore, increased investment in agriculture in these countries has the potential to significantly improve food security in the region.

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## Asia

Seventeen of the 22 Asian countries included in this study are projected to be mostly food secure in 2014, meaning that consumption falls below the nutritional target of roughly 2,100 calories per day for far less than 10 percent of their population. For the entire region, on average, 8.5 percent of the population is projected to be food insecure. In 2000, 23 percent of the population was considered food insecure. Grain production, driven by gains in yields, has increased roughly 2.8 percent per year since 2000, exceeding the population growth of 1.5 percent. The region imports only about 7 percent of its grain supplies, so this positive trend in per capita output has contributed to an improved food security situation.

In the longer term, the region's food security situation, on average, is projected to change negligibly as the share of population that is food insecure is also projected at 8.5 percent in 2024. A change is, however, projected in the depth of food insecurity, with the region's distribution gap projected to rise 66 percent and the number of food-insecure people projected to rise 13 percent. This result is principally driven by Yemen and, to a lesser extent, India. Yemen's distribution gap is projected to triple over the next decade, reaching 690,000 tons in 2024. Only the country's highest income group is projected to exceed the nutritional target, meaning that roughly 90 percent of the population will

be food insecure. Imports account for nearly 80 percent of Yemen's grain supplies, and the country's low export earnings growth is projected to constrain imports. Constrained imports, combined with relatively high population growth, lead to a projected decline in per capita food availability over the next decade. The country has been severely affected by conflict in the northern regions and secessionist movements in the south.

In India, the share of population that is food insecure is projected at 10 percent in 2024. The country's distribution gap, projected at nearly 1.6 million tons in 2024, roughly the same as in 2013 and lower than the average gap during 2000-09 of nearly 2.4 million tons. The projected increase in the distribution gap and food insecure population by 2024 is primarily due to the effect of above-trend supplies in the 2014 base period leading to slower projected growth through 2024.

Improvements are projected for Afghanistan, North Korea, and Mongolia. In Afghanistan, the share of population that is food insecure is projected to fall from 90 percent in 2014 to 70 percent in 2024. Production of grains (80 percent of which is wheat) increased 3.3 percent per year over the last decade—mostly derived from higher yields. The higher level of productivity was supported by improved seed availability provided by the private sector along with the provision of subsidized, improved seeds by the Ministry of Agriculture, Irrigation, and Livestock. Households with low purchasing power in the northern part of the country are eligible for subsidies for improved seeds. Grain output growth for the projection period is projected to be near 3 percent per year, which exceeds a declining rate of population growth. Afghanistan's population growth rate is estimated at 3.3 percent in 2014, 2.7 percent by 2019, and to 2.4 percent by 2024.

After Afghanistan, North Korea has been the most persistently food insecure country in the region as grain output stagnated from 1995 until 2010. Only recently has some growth been exhibited. In 2014, 70 percent of the population is estimated to be food insecure; this is projected to decline to 40 percent in 2024. Since grain production growth is projected to remain low—around 1 percent per year—during that time, the improvement is driven primarily by low projected population growth of 0.4 percent per year.

Mongolia is projected to be mostly food secure in 2024, improving from the 10 percent of the population estimated to be food insecure in 2014. Much of this improvement is due to low population growth, which is projected to be exceeded by grain output growth by roughly 1 percentage point per year.

Other than Yemen, Tajikistan is the only country in the Asia region where food security is projected to deteriorate, but with the share of the population that is food insecure projected to rise to 10 percent by 2024. Grain supplies are split evenly between domestic production and imports. Grain production has been flat for the last several years and growth is projected to remain low. Imports are projected to grow about 2.3 percent per year, faster than population, but the slow production growth results in slightly declining per capita supplies. A main factor affecting food security for the lower income segment of Tajikistan's population is prices. The country's reliance on grain imports, primarily wheat, exposes the country to global price movements. Prices reached a high in 2012 due to high fuel and transportation costs as well as high wheat prices quoted from the main source of these imports, Kazakhstan. In an attempt to offset the impact of these high prices, the Government released wheat flour from state reserves and significantly increased wheat imports. Wheat prices have started to come down since early 2013.



Table 5  
**Food availability and food gaps for Asia**

Year	Grain production*	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grain equiv.)	Aggregate availability of all food
<i>1,000 tons</i>					
2005	386,474	22,172	23,815	2,994	531,231
2006	387,701	23,349	36,546	2,087	552,918
2007	415,659	23,813	28,494	2,280	563,578
2008	429,359	26,775	32,382	1,743	573,701
2009	425,846	26,800	32,472	1,698	581,478
2010	445,846	28,433	35,930	2,275	594,566
2011	466,733	30,547	36,877	1,337	601,728
2012	480,698	31,820	31,877	1,469	612,905
2013(e)	484,142	30,992	36,775	1,694	631,664
<b>Projections</b>				<b>Food gap*</b>	
				NG	DG
2014	484,613	31,356	38,852	<b>343</b>	<b>1,616</b>
2019	518,355	33,242	47,338	<b>0</b>	<b>2,166</b>
2024	552,890	35,209	50,090	<b>529</b>	<b>2,682</b>

\*See table 3.

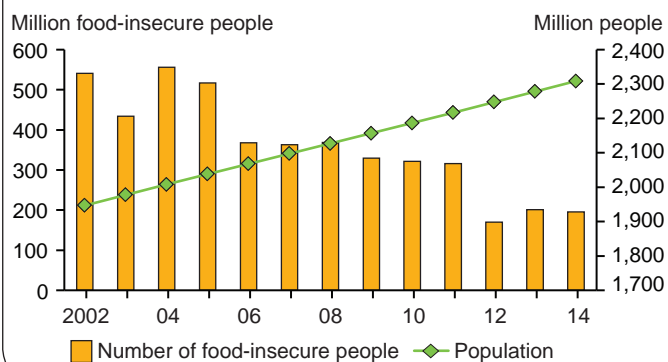
### Asia

(2.3 billion people in 2014)

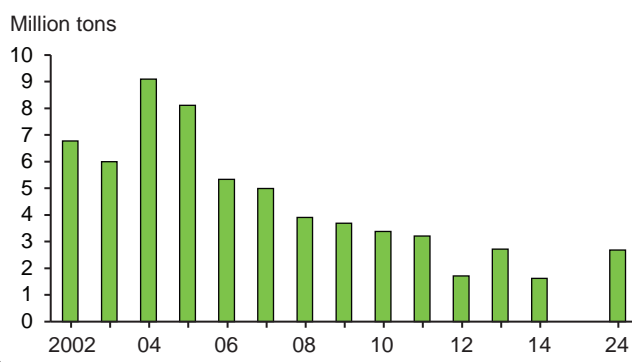
The countries in the Asian region in this study are relatively food secure as 8.5 percent of the population, on average, is estimated to be food insecure in 2014.

However, food insecurity remains widespread in Afghanistan, North Korea, and Yemen. With the exception of Yemen, the situation is projected to improve over the next decade.

**Asia: Trend in number of food-insecure people versus population**



**Asia: Distribution gaps**



**Asia: Growth in grain production, area, and yields in selected countries**

	Grain production		Grain area		Grain yields		Average yields 2010-12
	1993-2003	2003-2013	1993-2003	2003-2012	1993-2003	2003-2012	
<i>Average annual growth, percent</i>							<i>MT/ha</i>
Afghanistan	-1.0	3.3	-1.0	0.4	1.2	3.3	1.8
Bangladesh	4.0	1.9	1.0	1.4	3.1	3.7	2.9
India	1.2	2.6	-0.2	0.0	1.4	2.7	2.3
North Korea	-4.9	1.3	-1.7	-0.2	-3.1	1.0	2.9
Cambodia	6.8	-3.8	2.3	4.8	4.4	4.4	2.0
Yemen	-4.6	8.4	-3.0	3.2	-1.7	6.3	1.2
Mongolia	-10.4	17.2	-9.4	7.6	-1.2	10.8	1.5
Tajikistan	10.3	3.1	4.2	0.9	8.1	1.9	2.4
<b>Asia</b>	<b>3.1</b>	<b>3.3</b>	<b>0.9</b>	<b>0.9</b>	<b>2.2</b>	<b>2.6</b>	<b>2.6</b>

\*Most recent data for grain production is for 2013 while area and yields are available through 2012.

MT/ha = Metric tons per hectare.

Source: USDA, Economic Research Service calculations based on data from United Nations, Food and Agriculture Organization, Global Information and Early Warning System for grain production and FAOSTAT for area and yields.

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## Latin America and the Caribbean

Improvements in food security in the region in 2014 are driven by continued strong economic growth, overall positive conditions for crop production, and declining food prices. Economic growth has translated into improved incomes of lower income households as average incomes increased and income distribution became less skewed over the last 10 years. This is true for all countries in the region with the exceptions of Jamaica and Haiti (for which no data are available) and Guatemala, which experienced a change in the opposite direction. Guatemala and Honduras continue to have the most uneven income distribution, with the poorest 20 percent of the population having an income share of around 4 percent while the richest 20 percent of the population have an income share of around 54 percent.

Food security is projected to continue to improve in Latin America and the Caribbean through 2024. The number of food insecure people is projected to fall more than 12 percent between 2013 and 2014, from nearly 42 million to about 36 million, and decline further to about 31 million by 2024. The 11 countries covered in this report—El Salvador, Guatemala, Honduras, Guatemala, and Nicaragua in Central America; Jamaica, Haiti, and the Dominican Republic in the Caribbean; and Bolivia, Ecuador, and Peru in South America—have a population of about 165 million people in 2014. Food insecurity is projected to affect 22 percent of the population in 2014, dropping to 17 percent of the population by 2024.

Distribution gaps are projected to decline significantly from 830,000 tons in 2013 to 579,000 tons in 2014. This sharp decline in food gaps is a reflection of increasing per capita food consumption levels across all income groups. A steeper decline in the food gap compared to the decline in the number of food-insecure people indicates that those who are food insecure have moved closer to their nutritional target or that food insecurity has become less intense. In other words, even those segments of the population that are still unable to reach the nutritional target are experiencing improvements by narrowing the gap. The lowest income decile is projected to fall short of the nutritional target by just 6 percent, down from 9 percent in 2013.

Crop production and grain imports continue to rise at a faster pace than population, and incomes are increasing across all income groups. Therefore, per capita food consumption is increasing and allowing more income groups to reach and/or exceed the nutritional target.

While differences exist among countries, imports continue to play a growing role in contributing to the region's food supplies. In 2014, grain imports are estimated to account for 52 percent of grain supplies. Increasingly, corn is imported for the rapidly expanding feed industry in a number of countries, such as El Salvador, Guatemala, Honduras, and Nicaragua.

The increase in food imports mirrors trends in other sectors. All LAC countries except for Bolivia have a negative trade balance for goods and services, meaning that they are importing more than

Table 6

**Food availability and food gaps for Latin America and the Caribbean**

Year	Grain production*	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grain equiv.)	Aggregate availability of all food
			1,000 tons		
2005	14,437	3,534	14,735	772	41,602
2006	14,368	3,738	15,108	791	42,240
2007	15,386	3,877	15,026	414	43,213
2008	15,836	3,903	15,147	393	44,074
2009	16,535	4,145	15,455	403	44,842
2010	15,872	4,153	16,827	670	45,082
2011	15,918	4,191	16,812	437	45,253
2012	16,495	4,371	17,201	252	46,034
2013(e)	16,669	4,342	17,733	453	46,841
<b>Projections</b>				<b>Food gap*</b>	
				NG	DG
2014	16,989	4,392	18,268	0	579
2019	18,312	4,670	21,290	0	433
2024	19,722	4,959	22,536	0	520

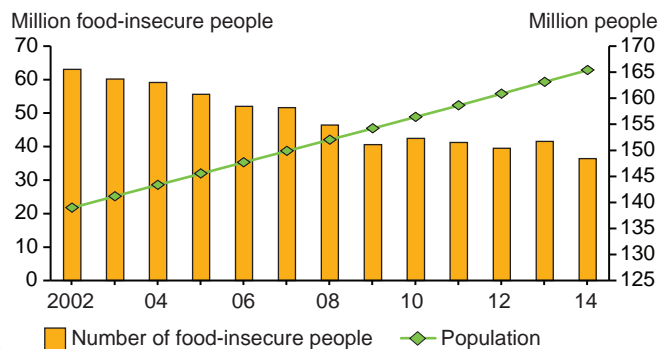
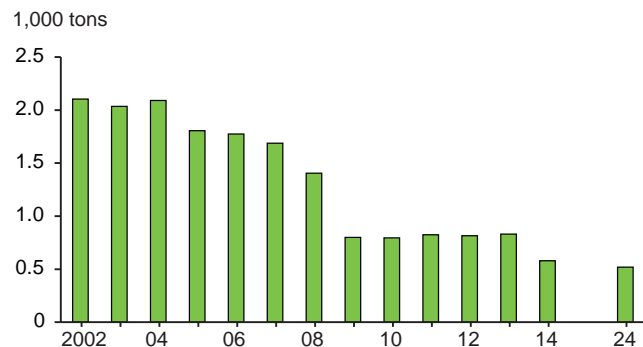
\*See table 3.

**Latin America and the Caribbean**

(166 million people in 2014)

The number of food insecure people is projected to drop to 31 million or 17 percent of the region's population by 2024. This most recent projection points to a continued trend of improved food security in the region.

The group of countries with improved food security is expanding. Nicaragua is the latest country to join the relatively food secure countries Peru, Colombia, Jamaica, and El Salvador, where 10 percent or less of households are projected to be food insecure between 2014 and 2024.

**LAC: Trend in number of food-insecure versus population****LAC: Distribution gaps****Latin America and the Caribbean: Growth in grain production, area, and yields in selected countries**

	Grain production		Grain area		Grain yields		Average yields 2010-12
	1993-2003	2003-2013	1993-2003	2003-2012	1993-2003	2003-2012	
<i>Average annual growth, percent</i>							<i>MT/ha</i>
Bolivia	3.3	3.3	1.1	2.1	2.2	1.4	1.9
Colombia	3.9	3.3	-2.5	-1.3	4.3	-1.3	2.9
Ecuador	-0.8	3.1	-2.4	-0.8	2.2	3.1	2.7
Guatemala	-1.2	5.6	-0.4	2.3	-0.8	3.8	2.0
Haiti	-1.1	3.8	-0.7	4.5	-0.5	-0.1	0.9
Nicaragua	6.2	0.6	5.1	-0.9	0.4	1.3	1.8
Peru	7.4	3.6	4.8	1.5	2.6	2.1	3.2
<b>LAC</b>	<b>1.5</b>	<b>2.6</b>	<b>0.2</b>	<b>1.7</b>	<b>1.4</b>	<b>1.2</b>	<b>2.1</b>

\*Most recent data for grain production is for 2013 while area and yields are available through 2012.

MT/ha = Metric tons per hectare.

Source: USDA, Economic Research Service calculations based on data from United Nations, Food and Agriculture Organization, Global Information and Early Warning System for grain production and FAOSTAT for area and yields.

they are exporting. Peru became a net importer of goods and services as recently as 2009. While food imports are rising, food production is also increasing. Between 1995 and 2013, crop production increased at an average annual rate of 2.1 percent, with yield growth accounting for two-thirds of this growth. In five countries, average annual growth in area planted was actually negative.

The Dominican Republic, Guatemala, and Haiti increased production mostly by increasing area planted. Bolivia and Nicaragua increased area and yields equally, while Colombia, Ecuador, El Salvador, and Peru were able to substantially improve yields. El Salvador and Ecuador experienced the highest average annual yield growth at 3.7 and 4.3 percent, respectively. In general, food production is increasing at a faster pace than population in these LAC countries, with annual population growth averaging 1.4 percent in the region, and ranging from a low of 0.4 percent in Jamaica to a high of 2.6 percent in Guatemala. Guatemala, one of the most food-insecure countries in the region, is one of the few countries expected to experience increasing population growth rates over the next decade.

Economic growth is projected to be relatively strong in the region, with average real GDP growth of 4 percent. While the Caribbean countries are expected to grow at a slightly slower pace of about 3.3 percent, growth is expected to exceed 5 percent in Bolivia and Peru. Growth prospects are dampened in the Caribbean due in part to high indebtedness but, with the help of rising tourism revenues, economic growth is expected to about double the rate of population growth.

The number of countries in the region that can be categorized as mostly food secure is steadily increasing. In 2014, five countries—up from four in 2013—are projected to have 10 percent or less of their population suffering from food insecurity, as Colombia, El Salvador, Jamaica, and Peru are joined by Nicaragua in this category. Nicaragua has been able to steadily increase food supplies. Over the last 20 years, grain production has increased at an average annual rate of 3.1 percent while grain imports, 33 percent of supplies in 2012, grew nearly 5 percent per year. Population growth, in contrast, slowed from 2.8 percent in the early 1980s to 1.4 percent in 2012, thereby helping to increase per capita food availability. In addition, targeted government programs designed to improve food access for the lower income households contributed to a more equal income distribution than found in other countries in the region.

The most food-insecure countries in the region are Haiti, Guatemala, and Bolivia. Haiti has made improvements in rebuilding its economy after the devastating 2010 earthquake there, but a series of additional natural disasters, as well as a cholera epidemic and lingering political instability, have slowed the recovery. Haiti is suffering from years of neglect of the agricultural sector while being particularly vulnerable to extreme weather events. There are, however, signs that food production is increasing and yields are beginning to rise, but not enough to outpace population growth. Food insecurity is projected to affect 70 percent of the population in 2014 and, if the slow pace of improvement persists, about 60 percent are projected to remain food insecure by 2024.

Both Bolivia and Guatemala are projected to have about 50 percent of their population unable to reach the nutritional target in 2014, but both countries are projected to improve over the next decade. Except for the lowest income decile, where Bolivian households consume just 74 percent of the nutritional target and Guatemalan households just 84 percent, the next four income groups fall within about 10 percent of the nutritional threshold. This means that these households are food insecure, but the shortfall is relatively small. Bolivia has experienced robust growth in crop production over the last decade, with average annual growth of 2.6 percent, driven by both area expansion and yield growth, although yields are still below the regional average. Bolivia's economy is forecast to grow

at 5 percent per year through 2018 and this growth is in part fueled by strong hydrocarbon exports, which provide export earnings to support food imports. This economic growth has been shared among all income groups and Bolivia, once one of the countries with the most unequal income distributions in the region and the world, has experienced income increases for the lower income groups during the last 10 years. Food insecurity is projected to affect 20 percent of the population by 2024 compared with 50 percent in 2014.

Guatemala is the only country in the region that experienced a shift toward a more unequal income distribution over the last 10 years. However, crop production has been growing at an average annual rate of 5.6 percent for the last 10 years, in part relying on area expansion, but to a larger extent driven by increasing yields. Yields are still fairly low, but approaching the regional average of 2.1 tons per hectare (1 hectare (ha) = 2.47 acres). Imports had been growing at an even faster rate between 1990 and 2006, increasing the share of imports in total grain supplies from 20 to 53 percent. Since then, however, this share has declined, reaching 43 percent in 2013. Guatemala has the highest population growth rate in the region, thereby requiring higher growth in food supplies in order to maintain or increase per capita consumption levels. Assuming continued strong growth, food insecurity is projected to improve with about 40 percent of the population projected to remain food insecure by 2024, compared with 50 percent in 2014.

In Ecuador and Honduras, food insecurity is projected to affect 30 percent and 20 percent of the population, respectively, in 2014. Both countries are land constrained, and production increases must be driven by improved yields. Honduras has been increasingly relying on imports, with the import share of grain supplies rising from 27 to 56 percent between 1990 and 2013. While Honduras has also experienced strong crop production growth in recent years, this growth mostly relied on area expansion. Sustained growth will require higher yields which are currently the lowest in the region after Haiti. Ecuador increased production and imports at similar rates, thus keeping the import share to about one-third of supplies. Since 2012, the Government of Ecuador has been distributing improved seeds and other agricultural inputs, as well as technical assistance, and providing a guaranteed minimum price. The guaranteed minimum price was almost double the world price at the beginning of the 2013/14 crop year. The goal of this corn production support program is to achieve self-sufficiency in corn.

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## North Africa

In the four North African countries included in this report—Algeria, Egypt, Morocco, and Tunisia—fewer than 10 percent of the population is projected to suffer from food insecurity in 2014. Egypt, Morocco, and Tunisia are classified by the World Bank as lower middle-income countries, but food consumption (calories per capita per day) in those countries approaches levels more commonly seen in the world's high-income countries. Grain remains the dietary staple in these North African countries. Governments in the region are committed to protecting low-income households from food insecurity and therefore have been subsidizing basic staples. While political unrest after the 2008 food price spike contributed to a slowdown in economic growth in the region, moderate growth of around 4 percent is projected through 2018, according to the IMF. For the 2014 to 2024 period, rising imports and growing food production allow all income groups in the region to have access to sufficient amounts of food to keep them above nutritional target levels.

The four countries in this region have a total population of 168 million people in 2014. The region is characterized by variable weather. Algeria, Morocco, and Tunisia, all with mostly rain-fed agriculture, suffer wide swings in domestic production. Favorable weather may enable a bumper crop in one year, while drought claims more than half of crop production in another year. Egypt's crop production is mostly irrigated and therefore much less vulnerable to weather-induced losses. Its crop production variability was 17 percent between 1990 and 2013, compared to over 40 percent in the other 3 countries in the region. While expanding irrigation might reduce variability due to drought, water scarcity is considered one of the most urgent food security issues in the region. FAO expects water availability in this region to drop by 50 percent by 2050. In June 2013, a pilot phase of the Regional Water Scarcity Initiative was launched in six countries, Egypt, Morocco, and Tunisia among them. The goal is to assess the current status of water availability as well as the potential for further agricultural production.

Algeria is now the largest country in Africa by land area, after Sudan and South Sudan split in 2011. The country's economy is based on hydrocarbons and it is the sixth largest exporter of natural gas. Thanks to energy export earnings, the country has large reserves of foreign exchange. The Government of Algeria is trying to diversify its economy and works toward attracting domestic and foreign investors in sectors other than the energy sector, in particular the agricultural sector. Yields and the share of land that is irrigated are low, but have been growing at encouraging rates in the recent past. While area planted has varied greatly with weather conditions and shown little growth over the last 20 years, yields have achieved average annual growth of more than 4 percent since 1993. During that period, production has increased at an average rate of 3.7 percent per year, similar to the increase in imports. Sustained moderate economic growth is projected to contribute to maintaining consumption levels over the coming decade, despite relatively high population growth of about 1.5 percent.

While the low share of people who are food insecure in Egypt is not projected to increase over the coming decade, per capita food consumption levels are projected to decline slightly as political uncertainty affects economic growth. Egypt, with 85 million people in 2013, is the most populous country in the region. The country has made great strides in increasing its grain production to more than 20 million tons in 2013, up from just 12 million tons in 1990. Egypt's climate is arid and agriculture is mostly irrigated. An intensive cropping system allows for yields of more than 6 metric tons/ha, roughly four times the average yields of the other three countries in the region. Crop production growth slowed in the early 2000s, but has increased since 2005. The Government

**Table 7**  
**Food availability and food gaps for North Africa**

Year	Grain production*	Root production (grain equiv.)	Commercial imports (grains)	Food aid receipts (grain equiv.)	Aggregate availability of all food
<i>1,000 tons</i>					
2005	31,105	1,878	25,995	51	59,461
2006	35,766	1,731	25,707	58	60,848
2007	28,114	1,620	29,451	28	62,853
2008	29,457	1,977	32,442	39	64,180
2009	39,910	2,055	29,673	22	65,482
2010	31,748	2,328	34,290	41	66,703
2011	35,194	2,641	37,259	60	67,606
2012	33,604	2,754	32,297	43	68,738
2013(e)	36,635	2,693	34,657	48	70,752
<b>Projections</b>					
				<b>Food gap*</b>	
				NG	DG
2014	34,092	2,732	37,398	0	0
2019	35,714	2,974	43,541	0	0
2024	37,998	3,226	46,579	0	0

\*See table 3.

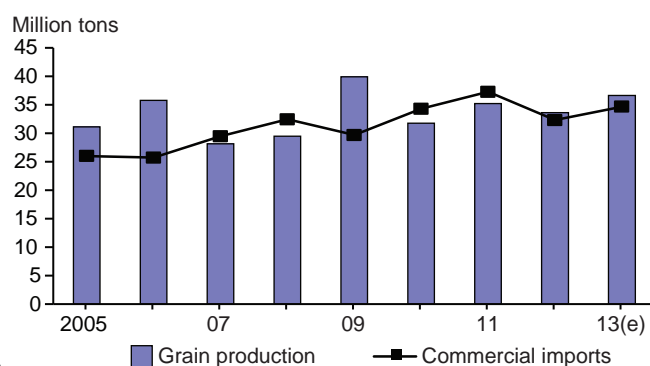
### North Africa

(168 million people in 2014)

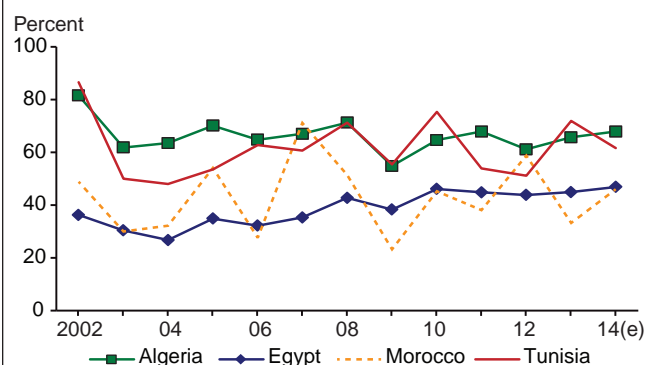
Average food consumption in the four North African countries continues to be far above target levels. Owing to government policies that subsidize consumption of basic foods average intake has been around 3,300 calories per capita per day, a level more commonly seen in high-income countries.

Even the lowest income decile in this region is estimated to have average consumption levels 33-45 percent above nutritional targets. Consumption in Morocco and Tunisia is projected to further increase, while it is projected to slightly decline in Algeria and Egypt, over the next decade.

**North Africa: Grain production and imports**



**North Africa: Grain imports as a share of supplies**



**North Africa: Growth in grain production, area, and yield, and yields in selected countries**

	Grain production		Grain area		Grain yields		Average yields 2010-12
	1993-2003	2003-2013	1993-2003	2003-2012	1993-2003	2003-2012	
<i>Average annual growth, percent</i>							<i>MT/ha</i>
Algeria	6.0	2.9	1.1	0.2	4.8	2.1	1.6
Egypt	3.5	0.4	0.7	1.1	2.7	-1.0	6.3
Morocco	2.1	2.1	0.3	-0.8	7.9	1.1	1.4
Tunisia	1.9	-3.5	-2.8	-3.1	3.8	2.5	1.7
<b>NA</b>	<b>3.4</b>	<b>0.5</b>	<b>-0.2</b>	<b>-0.6</b>	<b>3.3</b>	<b>1.2</b>	<b>2.8</b>

\*Most recent data for grain production is for 2013 while area and yields are available through 2012.

MT/ha = Metric tons per hectare.

Source: USDA, Economic Research Service calculations based on data from United Nations, Food and Agriculture Organization, Global Information and Early Warning System for grain production and FAOSTAT for area and yields.

of Egypt seeks to produce three-quarters of its domestic wheat needs by 2015/16. The country's recently adopted new constitution considers agriculture as fundamental to the national economy and aims to ensure a fair return to farmers, improve rural development, and protect the countryside from environmental hazards.

The Government of Egypt long has been ensuring food security among its lower income households by subsidizing basic foods and fuel, an expenditure that comprised almost 30 percent of the national budget in 2013. The Government is trying to cut costs by tackling waste and corruption. A pilot program has been started that gives families access to subsidized food via smart cards in order to improve targeting of subsidies to truly needy families. While government programs ensure access to sufficient amounts of basic foods, the country simultaneously faces a nutritional crisis of another kind: 33.1 percent of all Egyptians have been identified as obese, more than in any other country in the Middle East.

Tunisia experienced sharp grain production declines in 2013 due to lack of rain. Production was down by 50 percent compared to the bumper crop in 2012, but prospects for 2014 are favorable. The country is highly dependent on grain imports, which account for about 50 percent of supplies in a good year and up to 85 percent of supplies in years of extreme drought. Yields remain relatively low, but have been growing steadily at an average annual rate of 2.7 percent since 1993. Not even the lowest decile is projected to be food insecure in 2014, which does not mean that food insecurity is a problem for a share of the lowest income 10 percent. Slight consumption increases are projected for all income groups over the next decade.

Unlike Tunisia, Morocco enjoyed above-average crop production in 2013 after suffering serious losses due to drought in 2012. Morocco's grain production is among the most volatile in the world, with production variability of 46 percent. Grain yields have varied between 0.5 and 2.0 tons/ha between 2007 and 2012, but the Government is committed to improving yields, by subsidizing certified seed prices, farm machinery and irrigation equipment, and soil testing to optimize fertilizer application. As in other countries in the region, imports are an important source of grain supplies in Morocco, and imports vary greatly depending on domestic production levels. Food insecurity is projected to affect fewer than 10 percent of the population and consumption levels of all income groups are projected to increase by about 8 percent by 2024, the largest increase in the region.

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## Productivity Impacts on Food Security in Sub-Saharan Africa

*Stacey Rosen, Keith Fuglie, and Nicholas Rada*

The number of food-insecure people in 76 low- and middle-income countries is projected at 490 million in 2014. This is equal to roughly 14 percent of the total population of the 76 countries covered. The 22 Asian countries included in this study comprise the largest share, 65 percent, of the population of the study countries in 2014. However, these countries are projected to account for just 40 percent of the food-insecure people of the 76 countries. The reverse is true for Sub-Saharan Africa: the 39 countries included in this region account for 25 percent of the population of the 76 countries, but are projected to account for just over half of the food-insecure people.

The vulnerability of SSA is illustrated to an even greater degree with the distribution gap. This food gap for the 76 countries is projected at 12.7 million tons, grain equivalent. Asia is projected to account for nearly 13 percent of the total while SSA is projected to account for 83 percent.

Given that domestic grain production accounts for roughly 80 percent of SSA's grain supply, the key to improving food security in this region is improving performance of the agricultural sector. The driving factor behind the relatively poor performance in the sector is that SSA has some of the lowest levels of productivity for agricultural land and labor in the world.

Historically, the sources of agricultural growth for SSA have been the addition of land, labor, and other resources to production. In fact, nearly half of grain production growth between 1995 and 2010 was due to increasing acreage. In comparison, area expansion was responsible for only 12 percent of grain output growth in the Asian countries. Grain yields in SSA are among the lowest in the world, with an average of roughly 1.2 tons/ha in 2010-12. The average for the world's low and middle income countries is 3.3 tons/ha, compared to 4.56 tons/ha in high-income countries and 3.62 tons/ha for the world as a whole.

However, trends are beginning to change. Policy reforms and incentives for farmers have spurred adoption of new technologies which have resulted in rising rates of agricultural productivity. Higher levels of productivity are expected to raise farmer's incomes and reduce food costs for a population that spends well over 50 percent of its income on food.

Productivity-based growth raised average farm output per unit of input, thereby contributing to an increase in the growth rate of agricultural production (Fuglie and Rada, 2013). In fact, with the rise in productivity, agricultural output in 2010 was roughly 30 percent higher than it would have been if the region had continued to rely on the aforementioned resource-based growth alone. Despite the improvement in productivity-based growth, the region's agricultural productivity growth rate lags behind that of the rest of the world. Moreover, the productivity gap is widening over time. Total factor productivity (TFP) compares growth in the total output of crop and livestock commodities to the growth of total inputs of agricultural land, labor, capital, and material resources. For developing countries as a whole, this index increased roughly 2 percent per year, twice the rate of SSA, since 1961.

## Total Factor Productivity

Total factor productivity (TFP) is defined as the ratio of total agricultural output of crop and livestock commodities to total agricultural input of land, labor, capital, and materials used in production. Growth in TFP implies that total output is growing faster than total inputs. It can be interpreted as the rate of technical change. Crop yield, on the other hand, is a measure of partial factor productivity. It relates output per unit of a single input, in this case land. Increases in crop yield can come about either through input intensification (using more labor, capital, and materials per hectare) or by improving TFP (getting more output from the same levels of labor, capital, and materials per hectare). TFP can improve if a new technology is introduced, such as a new crop variety or new agronomic technique. However, the new technology may also involve a change in conventional input use, such as more fertilizer or labor per hectare. “Net yield” gain is the difference in gross yield improvement and the change in cost from input intensification associated with adoption of a new technology. Net yield is synonymous with TFP for a specific commodity.

It should be noted that TFP growth rates vary widely within SSA as some of the countries have been able to sustain modest rates of improvement for a few decades. On average, SSA’s TFP grew roughly 1 percent per year between 1985 and 2008. Among the subregions, the highest growth was in Southern Africa, 1.1 percent per year, while the lowest rate was in Central Africa, where TFP declined 0.4 percent per year. A declining TFP growth rate indicates resource use has accelerated faster than productivity growth. As for individual countries, the strongest TFP growth was in Angola, Malawi, Benin, Ghana, and Nigeria—all achieving growth rates exceeding 2 percent per year.

The SSA TFP growth was partly driven by investment in research and development, which resulted in improved technologies for producers. These technologies included improved crop varieties, pest control, livestock disease controls, and more efficient management of natural resources. It is estimated that by 2005, these new technologies were adopted on at least 25 percent of the region’s cropland.

Many of the new technologies adopted for SSA’s farmers came from research conducted by the 15 international agricultural research centers of the CGIAR (the Consultative Group on International Agricultural Research). By 2011, CGIAR was investing more than \$300 million annually—roughly half of its research funding—in SSA. In addition to this research funding, many SSA countries have established their own agricultural research systems, spending on which approached \$600 million in 2008.

Policy reforms, by improving economic incentives, have also contributed to the higher productivity in the region. These changes included freeing up agricultural markets, reducing taxes on exports and imports, freeing exchange rates, and reducing subsidies for energy and fertilizer. As implicit net taxation to agriculture fell, farmers invested in adopting new technologies which resulted in accelerated productivity growth.

The African Union has called for an increase in investment in the agricultural sector with a goal of achieving a 6-percent-per-year growth in the sector. This rate represents a doubling of current growth rates. Achieving this growth requires an increase in both resource use and productivity.

Table P-1

**Crop area devoted to modern varieties, 2006-10 average**

	<i>Percent</i>		<i>Percent</i>
<b>Central Africa</b>		<b>East Africa</b>	
Cameroon	19.1	Burundi	7.2
Central African Republic	1.8	Ethiopia & Eritrea	18.9
Congo, Dem. Rep.	29.4	Kenya	40.3
Congo, Rep.	0.0	Rwanda	6.5
Weighted average	22.3	Somalia	0.0
		Sudan	22.7
		Tanzania	23.7
		Uganda	22.3
<b>West Africa</b>		Weighted average	22.3
Benin	27.0		
Burkina Faso	19.1	<b>Southern Africa</b>	
Chad	10.9	Angola	11.2
Côte d'Ivoire	13.4	Lesotho	45.4
Gambia	6.2	Madagascar	16.0
Ghana	27.6	Malawi	35.3
Guinea	14.1	Mozambique	22.5
Guinea-Bissau	0.0	Namibia	32.2
Liberia	0.0	Swaziland	65.9
Mali	35.9	Zambia	54.5
Mauritania	0.0	Zimbabwe	63.5
Niger	13.7	Weighted average	31.1
Nigeria	26.9		
Senegal	43.1		
Sierra Leone	10.0		
Togo	7.8		
Weighted average	22.4		

Data in italics indicates regional highpoint.

Source: Area in modern varieties derived from Diffusion and Impact of Improved Varieties in Africa DIIVA—CGIAR project and other surveys.

## Scenario analysis

To the extent that higher productivity rates are reflective of new technologies, gains in TFP will equal those of yield. In many countries, adoption of new technologies has already resulted in higher output per hectare. For example, in Nigeria, Benin, Ghana, Senegal, Malawi, and Zambia 27-55 percent of crop area was devoted to modern varieties in 2006-10. In each of these countries, grain yields increased from 4 to 16 percent per year. If all countries in the region were able to replicate these changes, food security could improve significantly. According to Fuglie and Rada, a 1-percent increase in area dedicated to modern varieties leads to a 0.65-percent increase in net yields. Net yield gain is the increase in output per hectare minus any increases in costs due to the changes in input use. It is synonymous to improvement in TFP. The International Food Security Assessment (IFSA) model, developed by USDA's Economic Research Service to project food consumption, food

access, and food gaps in low- and middle-income countries through 2024, is employed here to assess the impact of increased adoption of improved varieties, and ensuing higher yields, on food security. Two scenarios are considered: increasing the percent of land devoted to modern varieties (MVs) (1) to the subregional average and (2) to that of the country in the subregion with the highest area devoted to MVs. The scenarios assume the availability of seeds, water, fertilizers, and other inputs needed to support the increased cultivation of MVs.

In the first scenario, a country's percent of land devoted to MVs is assumed to rise to the average of its respective subregion: West, Central, East, and Southern Africa. The difference between the current level and the subregional average was multiplied by the 0.65 productivity elasticity to determine the expected increase in net yields. This increase was then applied to the 2014 estimated yield of the IFSA model.

In the Central Africa region, 22.3 percent of crop area, on average, was devoted to MVs in 2006-10. As a result of raising the percent of crop area devoted to MVs to the subregional average, the Republic of Congo's share of population that is food insecure is projected to fall from 30 percent to less than 10 percent. A marked improvement was also seen in the Central African Republic where the share of food-insecure population fell from 90 to 60 percent. These improvements were due to the fact that both countries had little or no crop area devoted to MVs in 2006-10, therefore raising that area to the regional average resulted in much higher yields, and in turn, higher production levels.

In the East Africa region, 22.3 percent of crop area, on average, was devoted to MVs in 2006-10. Five countries within this subregion had lower-than-average shares devoted to MVs. When the percent of MV crop area was increased to the regional average in these countries, the result is a projected 36-percent decline in food-insecure people and a 26-percent decline in distribution gaps. The principal drivers of this result were Rwanda, Ethiopia, and Burundi. Rwanda and Burundi have some of the lowest levels of area devoted to improved varieties, so the increase to the regional average allowed for strong growth in yields, and subsequent improvement in food security. In the case of Ethiopia, the country's projected consumption is close to the nutritional target, therefore the boost in food availability was sufficient to raise consumption above the nutritional target and therefore have a large positive impact on food security.

In Southern Africa, just over 31 percent of crop area, on average, was devoted to modern varieties in 2006-10. Only three countries in the region—Angola, Madagascar, and Mozambique—were below that average. Of those, only Madagascar is projected to be food insecure in 2014. Under this scenario, this country would also be considered food secure (less than 10 percent of the population consuming below the nutritional target and therefore no distribution gaps).

In West Africa, 14 of the subregion's 17 countries included in this study are considered food-secure (less than 10 percent of the population is projected to consume below the nutritional target). Of the 3 remaining countries, one, Senegal, had the region's highest share of crop area devoted to MVs. Therefore, the scenario was run for only two countries: Chad and Liberia. For Chad, the higher net yields (resulting from more crop area in MVs) are projected to result in a 66-percent reduction in the number of food-insecure people and a near 92-percent decline in the distribution gap. Liberia is considered to be food secure.

Table P-2

**Results summary for Scenario 1**

	Base		Scenario 1*		Change (improvement) Scenario 1	
	# of food insecure people	Distribution gap	# of food insecure people	Distribution gap	# of food insecure people	Distribution gap
	<i>Millions</i>	<i>1,000 tons</i>	<i>Millions</i>	<i>1,000 tons</i>	<i>Percent</i>	
<b>SSA</b>	258	10,484	224	9,921	-13.2	-5.4
<b>Central Africa</b>						
Cen. Afr. Rep.	4.3	150.1	2.9	60.5	-32.3	-59.7
Congo, Dem. Rep.	--	--	--	--	--	--
Congo, Rep.	1.3	10.9	0.0	0.0	-100.0	-100.0
<b>East Africa</b>						
Burundi	9.1	267.9	7.3	131.0	-20.0	-51.1
Eritrea	5.9	499.0	5.9	499.2	0.0	0.0
Ethiopia	36.1	280.3	18.0	150.5	-50.0	-46.3
Kenya	--	--	--	--	--	--
Rwanda	3.6	37.0	0.0	0.0	-100.0	-100.0
Somalia	10.3	352.9	10.3	276.4	0.0	-21.7
Sudan	--	--	--	--	--	--
Tanzania	--	--	--	--	--	--
Uganda	--	--	--	--	--	--
<b>Southern Africa</b>						
Lesotho	--	--	--	--	--	--
Madagascar	4.6	41.0	0.0	0.0	-100.0	-100.0
Namibia	--	--	--	--	--	--
Swaziland	--	--	--	--	--	--
Zambia	--	--	--	--	--	--
Zimbabwe	--	--	--	--	--	--
<b>West Africa</b>						
Chad	3.7	45.3	1.2	3.8	-66.3	-91.6
Liberia	0.4	2.5	0.0	0.0	-100.0	-100.0
Senegal	--	--	--	--	--	--

Scenario 1: Countries increase crop area dedicated to modern varieties to subregional average. These countries were excluded from this scenario because their crop area in modern varieties equaled or exceeded the sub-regional average: Angola, Benin, Burkina Faso, Cameroon, Cape Verde, Côte d'Ivoire, Gambia, Ghana, Guinea, Guinea-Bissau, Mali, Malawi, Mauritania, Mozambique, Niger, Nigeria, Sierra Leone, and Togo are excluded because they are estimated to be food secure in 2014 (less than 10 percent of the population is estimated to consume below the nutritional target).

Source: USDA, Economic Research Service.

In the second scenario, the percent of land devoted to MVs is assumed to match that achieved by the country within the sub-region with the highest area devoted to MVs. In Central Africa, DR Congo had the highest share of crop area in MVs at 29.4 percent. When the Republic of Congo's crop area was raised to this level, the country became food secure. In the Central African Republic, where less than 2 percent of crop area was devoted to MVs in 2006-10, the large increase in area planted to

Table P-3

**Results summary for Scenario 2**

	Base		Scenario 2**		Change (improvement) Scenario 2	
	# of food insecure people	Distribution gap	# of food insecure people	Distribution gap	# of food insecure people	Distribution gap
	<i>Millions</i>	<i>1,000 tons</i>	<i>Millions</i>	<i>1,000 tons</i>	<i>Percent</i>	
<b>SSA total</b>	258	10,484	153	8,598	-40.7	-18.0
<b>Central Africa</b>						
Cen. Afr. Rep.	4.3	150.1	1.9	40.3	-55.6	-73.2
Congo, Dem. Rep.	--	--	--	--	--	--
Congo, Rep.	1.3	10.9	0.0	0.0	-100.0	-100.0
<b>East Africa</b>						
Burundi	9.1	267.9	3.6	22.2	-60.0	-91.7
Eritrea	5.9	499.0	5.9	471.2	0.0	-5.6
Ethiopia	36.1	280.3	0.0	0.0	-100.0	-100.0
Kenya	--	--	--	--	--	--
Rwanda	3.6	37.0	0.0	0.0	-100.0	-100.0
Somalia	10.3	352.9	9.3	217.7	-9.9	-38.3
Sudan	38.4	650.6	19.2	203.1	-50.0	-68.8
Tanzania	5.1	32.9	0.0	0.0	-100.0	-100.0
Uganda	19.0	245.1	3.8	8.3	-80.0	-96.6
<b>Southern Africa</b>						
Lesotho	2.0	69.2	1.8	51.8	-11.1	-25.1
Madagascar	4.6	41.0	0.0	0.0	-100.0	-100.0
Namibia	1.5	35.3	0.7	13.5	-53.3	-61.8
Swaziland	--	--	--	--	--	--
Zambia	11.8	290.1	7.4	120.2	-37.5	-58.6
Zimbabwe	12.3	349.1	10.9	322.1	-11.1	-7.7
<b>West Africa</b>						
Chad	3.7	43.5	0.0	0.0	-100.0	-100.0
Liberia	0.4	2.5	0.0	0.0	-100.0	-100.0
Senegal	--	--	--	--	--	--

Scenario 2: Countries increase crop area dedicated to modern varieties to the level achieved by the country with the highest share in the region. These countries were excluded from this scenario because their crop area in MVs was the highest in the region: Angola, Benin, Burkina Faso, Cameroon, Cape Verde, Côte d'Ivoire, Gambia, Ghana, Guinea, Guinea-Bissau, Mali, Malawi, Mauritania, Mozambique, Niger, Nigeria, Sierra Leone, and Togo are not included here because they are estimated to be food secure in 2014 (less than 10 percent of the population is estimated to consume below the nutritional target).

Source: USDA, Economic Research Service.

MVs reduced the number of food-insecure people nearly 56 percent and the distribution gap by more than 73 percent.

In East Africa, Kenya had the highest share of land in MVs during 2006-10, at more than 40 percent. When the percent of crop area devoted to MVs was raised to that level for all countries in the sub-region, both the number of food-insecure people and distribution gaps were cut by more than 60

percent. Ethiopia, Rwanda, and Tanzania become food secure in this scenario and Uganda nearly approaches that level. In fact, Eritrea and Somalia were the only countries in the region that were not highly affected by this change. This is due to the depth of their food insecurity: consumption is projected to be so far below the nutritional target that even this boost in productivity was insufficient to significantly improving the food security situation.

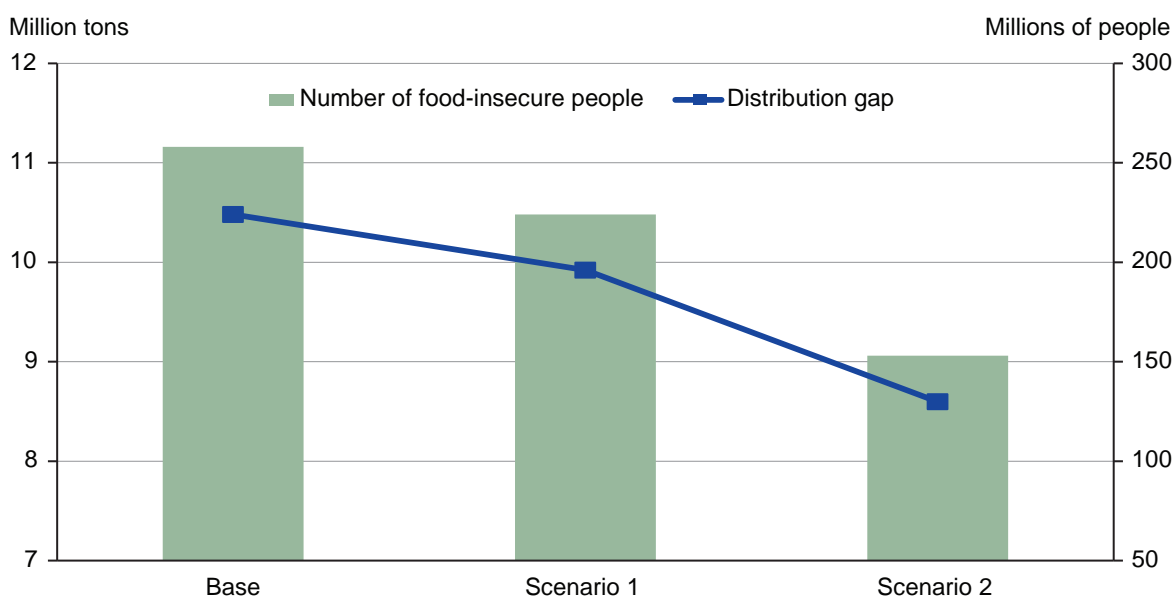
Swaziland, at nearly 66 percent, had the highest share of crop area in MVs in Southern Africa in 2006-10—double the subregional average. When all countries in the subregion were raised to this level, both the number of food-insecure people and the distribution gap are projected to decline more than one-third. Madagascar is projected to be food secure, and significant improvements are projected for Namibia and Zambia.

In West Africa, Senegal, at roughly 43 percent had the highest level of crop area devoted to MVs. When Chad and Liberia’s crop area in MVs was raised to that level, they became food-secure, meaning that less than 10 percent of the populations consume below the nutritional target.

In summary, the results indicate that countries where food insecurity was not severe—30 percent or less of the population consuming below the nutritional target—the boost in productivity through increased crop area to MVs tended to enable the countries to achieve food security. Higher productivity in SSA in recent years has been driven by increased investment in research and development by the countries themselves as well as international institutions. According to Fuglie and Rada, spending by the CGIAR research centers generated an internal rate of return of 58 percent per year—or roughly \$6 of benefits for every \$1 spent in the region. Rates of return for national research-and-development spending were about half that level. Given these returns and the continued emphasis on agricultural development in the region, land area devoted to improved varieties is likely to continue rising. With that increase, as the scenario analysis illustrates, food security can be significantly improved for many countries.

Figure P-1

**Food security improves as countries devote more crop area to modern varieties**



Source: USDA, Economic Research Service.



## References

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World Bank. Various years. World Development Indicators.

## Appendix—Food Security Model: Definition and Methodology

The IFSA model projects food consumption, food access and food gaps (previously called food needs) in low-income countries through 2024. Food is divided into three groups: grains, root crops, and a category called “other,” which includes all other commodities consumed, thus covering 100 percent of food consumption. All of these commodities are expressed in grain equivalent.

Food security of a country is evaluated based on the gap between projected domestic food consumption (domestic production plus imports minus nonfood uses) and a consumption requirement. Like last year, we include total food aid data (cereal and noncereal food commodities) provided by WFP. All food aid commodities were converted into grain equivalent based on calorie content to allow aggregation. For example: grain has roughly 3.5 calories per gram and tubers have about 1 calorie per gram. One ton of tubers is therefore equivalent to 0.29 ton of grain (1 divided by 3.5), 1 ton of vegetable oil (8 calories per gram) is equivalent to 2.29 tons of grain (8 divided by 3.5).

While projection results provide a baseline for the food security situation in the countries, the results depend on the specification of the model and the underlying assumptions. Since the model is based on historical data, it implicitly assumes that the historical trend in key variables will continue in the future.

Two kinds of food gaps are estimated and projected:

- 1) The national average nutrition gap, where the objective is to maintain the daily caloric intake standard of about 2,100 calories per capita per day—depending on the region—based on average requirement calculations by FAO in The Sixth World Food Survey. The caloric targets (based on total share of grains, root crops, and “other”) used in this assessment are those necessary to sustain life with at a moderate level of activity.
- 2) The distribution gap, where the objective is to let each income group reach the nutritional target. If food availability in a given income group is lower than this target, that difference is part of the distribution gap for this country.

The nutrition-based food gaps assist in comparisons of relative well-being. Large nutrition-based needs mean additional food must be provided if improving nutrition levels are the main objective. The national average nutritional gap approach, however, fails to address inequalities of food distribution within a country. Those are addressed by the distribution gap.

### Structural framework for estimating and projecting food consumption in the aggregate and by income group

**Projection of food availability.** The simulation framework used for projecting aggregate food availability is based on partial equilibrium recursive models of 76 low- and middle-income countries. The country models are synthetic, meaning that the parameters that are used are either cross-country estimates or are estimated by other studies. Each country model includes three commodity groups: grains, root crops and “other.” The production side of the grain and root crops are divided into yield and area response. Crop area is a function of 1-year lag returns (real price times yield) to crop production, lagged returns to substitute crops and lagged crop area. Yield responds to input use. Commercial imports are assumed to be a function of domestic price, world commodity price,

and foreign exchange availability. Food aid received by countries is assumed constant at the base level during the projection period. Foreign exchange availability is a key determinant of commercial food imports and is the sum of the value of export earnings and net flow of credit. Foreign exchange availability is assumed to be equal to foreign exchange use, meaning that foreign exchange reserves are assumed constant during the projection period. Countries are assumed to be price takers in the international market, meaning that world prices are exogenous in the model. However, producer prices are linked to the international market through food imports and their impact on domestic supply. The projection of consumption for the “other” commodities is simply based on a trend that follows the projected growth in supply of the food crops (grains plus root crops). Although this is a very simplistic approach, it represents an improvement from the previous approach where the contribution of commodities such as meat and dairy products to the diet was overlooked. The plan is to enhance this aspect of the model in the future.

Food consumption ( $FC$ ) for grains and root crops ( $c$ ) is defined as domestic supply ( $DS$ ) minus nonfood use ( $NF$ ), where  $n$  is a country index and  $t$  is a time index.

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

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

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

Domestic supply of a commodity group is the sum of domestic production ( $PR$ ) plus commercial imports ( $CI$ ), changes in stocks ( $CSTK$ ), and food aid ( $FA$ ).

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

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

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

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

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

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

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

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

The commercial import demand function is defined as:

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

where  $WPR$  is real world food price,  $NWPR$  is real world substitute price,  $FEX$  is real foreign exchange availability, and  $M$  is import restriction policies.

The real domestic price is defined as:

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

where  $NDS$  is the supply of a substitute commodity,  $GDP$  is real income, and  $EXR$  is the real exchange rate.

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

Assuming that consumption increases with income, but at a declining rate (semi log functional form) the income/consumption relationship was specified as shown below:

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

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

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

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

$i = 1$  to 10

where  $C$  and  $Y$  are known average per capita food consumption (all commodities in grain equivalent) and per capita income (all deciles),  $C_o$  is total food consumption,  $P$  is the total population,  $i$  is income deciles,  $a$  is the intercept,  $b$  is the consumption income propensity. A consumption-income elasticity,  $b/C$ , is calculated for individual countries. The parameter  $b$  was estimated based on cross-country (76 low-income countries) data for per capita calorie consumption and income. The parameter  $a$  is estimated for each country based on the known data for average per capita calorie consumption and per capita income.

## Data

Historical crop production, supply and use balance, and trade data for 1990-2012—or 2013 when available—are from FAOSTAT, FAO/GIEWS and USDA as of March 2014. Food aid data are from WFP for 1988-2012, and financial data are from IMF and the World Bank. Population data are from the U.N. Population Division, 2012 Revision, medium variant. The base year data used for projections are the average for 2010-2012.

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<sup>1</sup>The method is similar to that used by Shlomo Reutlinger and Marcelo Selowsky in *Malnutrition and Poverty*, World Bank, 1978.

***Endogenous projection variables:***

*Production, area, yield, commercial imports, domestic producer prices, and food consumption.*

***Exogenous projection variables:***

*Population*—data are medium variant United Nations population projections, 2012 Revision.

*World price*—data are USDA long-term projections.

*Stocks*—FAO data; assumed constant during the projection period.

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

*Food exports*—FAOSTAT data, projections are either based on the population growth rate or extrapolation of historical trends.

*Inputs*—fertilizer and capital projections are, in general, extrapolations of historical growth data from FAO.

*Agricultural labor*—projections are based on United Nations population projections, accounting for urbanization growth.

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

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

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

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

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

**List of countries and their food gaps in 2014**

	2014 food gaps			2014 food gaps	
	Nutrition <sup>1</sup>	Distribution <sup>2</sup>		Nutrition	Distribution
	1,000 tons			1,000 tons	
Angola	0	0	Algeria	0	0
Benin	0	0	Egypt	0	0
Burkina Faso	0	0	Morocco	0	0
Burundi	229	268	Tunisia	0	0
Cameroon	0	0	<b>North Africa</b>	0	0
Cape Verde	0	0			
Cen. Afr. Rep.	81	150	Afghanistan	272	400
Chad	0	45	Armenia	0	0
Congo, Dem. Rep.	6,526	6,933	Azerbaijan	0	0
Congo, Rep.	0	11	Bangladesh	0	0
Côte d'Ivoire	0	0	Cambodia	0	0
Eritrea	485	499	Georgia	0	0
Ethiopia	0	280	India	0	696
Gambia	0	0	Indonesia	0	0
Ghana	0	0	Kazakhstan	0	0
Guinea	0	0	Korea, Dem. Rep.	70	289
Guinea-Bissau	0	0	Kyrgyzstan	0	0
Kenya	0	179	Laos	0	0
Lesotho	40	69	Moldova	0	0
Liberia	0	2	Mongolia	0	2
Madagascar	0	41	Nepal	0	0
Malawi	0	0	Pakistan	0	0
Mali	0	0	Philippines	0	0
Mauritania	0	0	Sri Lanka	0	0
Mozambique	0	0	Tajikistan	0	0
Namibia	0	35	Turkmenistan	0	0
Niger	0	0	Uzbekistan	0	0
Nigeria	0	0	Vietnam	0	0
Rwanda	0	37	Yemen	0	228
Senegal	0	9	<b>Asia</b>	<b>343</b>	<b>1,616</b>
Sierra Leone	0	0			
Somalia	311	353	Bolivia	0	126
Sudan	346	651	Colombia	0	7
Swaziland	0	4	Dominican Republic	0	4
Tanzania	0	33	Ecuador	0	62
Togo	0	0	El Salvador	0	0
Uganda	0	235	Guatemala	0	145
Zambia	36	290	Haiti	0	179
Zimbabwe	169	349	Honduras	0	48
<b>Sub-Saharan Africa</b>	<b>8,222</b>	<b>10,474</b>	Jamaica	0	0
			Nicaragua	0	9
			Peru	0	0
			<b>Latin America and the Caribbean</b>	<b>0</b>	<b>579</b>
			<b>Grand total</b>	<b>8,565</b>	<b>12,669</b>

<sup>1</sup>Nutrition gap: gap between available food and food needed to support a per capita nutritional standard.

<sup>2</sup>Distribution gap: amount of food needed to raise consumption in each income quintile to the nutritional standard.

Source: USDA, Economic Research Service.

Appendix table 1b

**List of countries and their food gaps in 2024**

	2024 food gaps			2024 food gaps	
	Nutrition <sup>1</sup>	Distribution <sup>2</sup>		Nutrition	Distribution
	1,000 tons			1,000 tons	
Angola	0	0	Algeria	0	0
Benin	0	0	Egypt	0	0
Burkina Faso	0	19	Morocco	0	0
Burundi	202	254	Tunisia	0	0
Cameroon	0	0	<b>North Africa</b>	0	0
Cape Verde	0	0			
Cen. Afr. Rep.	162	234	Afghanistan	70	312
Chad	0	49	Armenia	0	0
Congo, Dem. Rep.	8,792	9,291	Azerbaijan	0	0
Congo, Rep.	0	59	Bangladesh	0	0
Côte d'Ivoire	0	0	Cambodia	0	0
Eritrea	476	496	Georgia	0	0
Ethiopia	0	121	India	0	1,564
Gambia	0	3	Indonesia	0	0
Ghana	0	0	Kazakhstan	0	0
Guinea	0	0	Korea, Dem. Rep.	0	110
Guinea-Bissau	0	0	Kyrgyzstan	0	0
Kenya	0	246	Laos	0	0
Lesotho	0	22	Moldova	0	0
Liberia	0	8	Mongolia	0	0
Madagascar	0	111	Nepal	0	0
Malawi	0	36	Pakistan	0	0
Mali	0	0	Philippines	0	0
Mauritania	0	0	Sri Lanka	0	0
Mozambique	0	18	Tajikistan	0	6
Namibia	0	40	Turkmenistan	0	0
Niger	0	1	Uzbekistan	0	0
Nigeria	0	0	Vietnam	0	0
Rwanda	0	70	Yemen	459	690
Senegal	0	51	<b>Asia</b>	<b>529</b>	<b>2,682</b>
Sierra Leone	0	0			
Somalia	747	797	Bolivia	0	74
Sudan	474	843	Colombia	0	20
Swaziland	0	3	Dominican Republic	0	0
Tanzania	0	112	Ecuador	0	31
Togo	0	8	El Salvador	0	12
Uganda	337	884	Guatemala	0	114
Zambia	161	480	Haiti	0	173
Zimbabwe	64	315	Honduras	0	51
<b>Sub-Saharan Africa</b>	<b>11,414</b>	<b>14,571</b>	Jamaica	0	0
			Nicaragua	0	6
			Peru	0	39
			<b>Latin America and the Caribbean</b>	<b>0</b>	<b>520</b>
			<b>Grand total</b>	<b>11,943</b>	<b>17,773</b>

<sup>1</sup>Nutrition gap: gap between available food and food needed to support a per capita nutritional standard.

<sup>2</sup>Distribution gap: amount of food needed to raise consumption in each income quintile to the nutritional standard.

Source: USDA, Economic Research Service.

Appendix table 2

**Number of food-insecure people, 2014 and 2024**

	2014	2024		2014	2024
	<i>Millions of people</i>			<i>Millions of people</i>	
<b>Asia</b>	<b>195</b>	<b>220</b>	<b>SSA</b>	<b>258</b>	<b>346</b>
Afghanistan	32	33	Angola	0	0
Armenia	0	0	Benin	0	0
Azerbaijan	0	0	Burkina Faso	0	2
Bangladesh	0	0	Burundi	9	10
Cambodia	0	0	Cameroon	0	0
Georgia	0	0	Cape Verde	0	0
India	129	145	Ken. Afr. Rep.	4	5
Indonesia	0	0	Chad	4	5
Kazakhstan	0	0	Congo, Dem. Rep.	73	93
Korea	17	10	Congo, Rep.	1	3
Kyrgyzstan	0	0	Côte d'Ivoire	0	0
Laos	0	0	Eritrea	6	7
Moldova	0	0	Ethiopia	36	22
Mongolia	0	0	Gambia	0	0
Nepal	0	0	Ghana	0	0
Pakistan	0	0	Guinea	0	0
Philippines	0	0	Guinea-Bissau	0	0
Sri Lanka	0	0	Kenya	14	17
Tajikistan	0	1	Lesotho	2	1
Turkmenistan	0	0	Liberia	0	1
Uzbekistan	0	0	Madagascar	5	9
Viet Nam	0	0	Malawi	0	5
Yemen	16	32	Mali	0	0
			Mauritania	0	0
<b>LAC</b>	<b>36</b>	<b>31</b>	Mozambique	0	3
Bolivia	5	2	Namibia	1	2
Colombia	5	5	Niger	0	3
Dominican Republic	1	0	Nigeria	0	0
El Salvador	0	1	Rwanda	<b>4</b>	<b>6</b>
Guatemala	8	8	Senegal	1	5
Haiti	7	7	Sierra Leone	0	0
Honduras	2	2	Somalia	10	14
Jamaica	0	0	Sudan	38	48
Nicaragua	1	1	Swaziland	0	0
Ecuador	5	2	Tanzania	5	14
Peru	3	3	Togo	0	1
			Uganda	19	41
<b>North Africa</b>	<b>0</b>	<b>0</b>	Zambia	12	16
Algeria	0	0	Zimbabwe	12	13
Egypt	0	0			
Morocco	0	0	<b>Grand total</b>	<b>490</b>	<b>598</b>
Tunisia	0	0			

LAC = Latin American and the Caribbean; NA = North Africa; SSA = Sub-Saharan Africa.

Source: USDA, Economic Research Service.



**Country indicators**

Region and country	Population, 2014	2013 Population growth rate	Grain production		Annual root production growth, 1990-2012	Projected annual growth in supply, 2011-2024
			Annual growth, 1990-2013	Coefficient of variation, 1990-2013		
	1,000		<i>Percent</i>			
<b>North Africa:</b>						
Algeria	37,474	1.3	4.4	48.0	6.7	2.0
Egypt	86,788	1.7	2.4	17.0	4.4	1.2
Morocco	33,250	1.0	2.2	45.5	2.7	1.7
Tunisia	10,921	1.0	0.9	40.8	2.7	2.2
<b>Central Africa:</b>						
Cameroon	21,363	2.1	6.4	46.3	4.5	1.7
Cent. Afr. Rep.	4,760	2.0	4.6	30.4	1.5	1.6
Congo, Dem. Rep.	73,291	2.6	0.1	3.4	-1.2	2.1
Congo, Rep.	4,415	2.1	6.3	40.2	3.1	1.1
<b>West Africa:</b>						
Benin	9,865	2.7	3.6	25.3	5.1	1.4
Burkina Faso	18,557	3.0	3.8	29.5	5.7	1.5
Cape Verde	515	1.0	-5.3	85.3	0.9	1.3
Chad	12,458	2.6	5.7	46.6	1.5	2.6
Côte d'Ivoire	21,533	2.3	0.8	8.3	2.7	2.0
Gambia	1,925	2.7	5.3	40.1	-1.2	2.1
Ghana	26,721	2.3	3.4	26.0	5.0	1.3
Guinea	11,034	2.6	6.0	41.5	2.7	1.6
Guinea-Bissau	1,647	2.1	1.6	18.1	4.5	1.6
Liberia	4,451	2.3	6.8	57.3	3.7	2.3
Mali	17,308	3.0	5.4	44.4	13.9	3.1
Mauritania	3,786	2.2	3.0	37.1	1.2	1.9
Niger	17,858	3.6	4.1	34.1	1.6	2.9
Nigeria	175,288	2.6	2.5	19.6	4.2	1.5
Senegal	13,805	2.6	2.0	26.9	10.3	2.1
Sierra Leone	6,384	2.1	8.2	77.4	5.8	2.5
Togo	6,543	2.0	3.9	27.5	2.6	1.6
<b>East Africa:</b>						
Burundi	9,069	1.8	0.03	7.6	1.3	2.0
Eritrea <sup>1</sup>	5,915	2.9	3.5	57.0	-3.4	3.4
Ethiopia <sup>1</sup>	90,179	2.1	6.6	41.0	4.6	2.0
Kenya	45,121	2.7	1.6	17.2	6.5	2.7
Rwanda	11,950	2.9	6.5	60.2	7.0	2.6
Somalia	10,323	2.7	-0.7	32.4	0.0	1.8
Sudan	47,939	2.4	0.3	29.7	5.0	2.7
Tanzania	50,705	3.2	3.3	27.9	1.0	3.2
Uganda	37,923	3.2	3.5	26.1	0.4	2.4

See footnotes at end of table.

Continued—

## Country indicators—continued

Region and country	Macroeconomic indicators					
	Per capita GNI 2012	Per capita GDP growth, 2012	GDP growth, 2012	Export earnings growth, 2012	Official develop- ment assistance as a share of GNI, 2012	External debt present value as a share of GNI, 2012
	<i>U.S. dollars</i>	<i>Percent</i>				
<b>North Africa:</b>						
Algeria	5,020	1.4	3.3	0.0 '09	0.1	3.3 '11
Egypt	2,980	0.5	2.2	-4.6	0.8	15.7
Morocco	2,960	2.7	4.2	2.7	1.5	36.0
Tunisia	4,150	2.6	3.6	11.0	2.3	58.4
<b>Central Africa:</b>						
Cameroon	1,170	2.0	4.6	-9.2	4.9	14.8
Ken. Afr. Rep.	510	4.8	6.9	--	12.0	25.8
Congo, Dem. Rep.	230	4.3	7.2	9.1	18.5	35.8
Congo, Rep.	2,550	1.1	3.8	18.1	1.3	26.1
<b>West Africa:</b>						
Benin	750	2.6	5.4	3.0 '10	6.8	27.4
Burkina Faso	670	6.4	9.5	--	10.5	24.0
Cape Verde	3,830	1.7	2.5	11.5 '11	1.0	67.9
Chad	970	5.7	8.9	-3.2 '06	20.9	18.8
Côte d'Ivoire	1,220	7.0	9.5	--	10.9	41.7
Gambia	510	2.0	5.3	4.2	15.2	58.7
Ghana	1,550	5.6	7.9	9.5	4.6	32.2
Guinea	440	1.3	3.9	0.2 '10	6.8	17.6
Guinea-Bissau	510	-8.9	-6.7	--	9.2	31.2
Liberia	370	7.3	10.2	--	37.3	30.2
Mali	660	-3.3	-0.4	3.4 '07	10.3	31.3
Mauritania	1,110	4.9	7.6	-0.1	9.7	82.3
Niger	390	6.7	10.8	--	13.4	36.3
Nigeria	2,490	3.8	6.7	--	0.5	4.2
Senegal	1,030	0.5	3.5	4.5	7.6	35.1
Sierra Leone	580	13.0	15.2	-2.0 '10	12.8	29.5
Togo	500	2.9	5.6	10.7 '10	7.3	22.6
<b>East Africa:</b>						
Burundi	240	0.8	4.0	6.6	21.9	27.0
Eritrea <sup>1</sup>	450	3.6	7.0	233.1 '10	4.8	32.4
Ethiopia <sup>1</sup>	380	6.0	8.7	-10.9	9.3	24.3
Kenya	860	1.8	4.6	4.4	7.1	31.1
Rwanda	600	5.0	8.0	34.3	12.8	17.5 '11
Somalia	--	--	--	--	--	--
Sudan	1,500	0.6	-10.1	23.0 '08	1.8	40.3
Tanzania	570	3.7	6.9	7.2	10.6	41.4
Uganda	480	0.0	3.4	15.6	9.4	22.5

See footnotes at end of table.

Continued—

**Country indicators—continued**

Region and country	Population, 2013	2012 Population annual growth rate	Grain production		Root production growth 1990-2011	Projected annual growth in supply 2012-2023
			Annual growth, 1990-2012	Coefficient of variation, 1990-2012		
	1,000		Percent			
<b>Southern Africa:</b>						
Angola	21,275	2.7	5.1	41.1	11.2	1.6
Lesotho	2,263	1.0	-1.9	42.0	3.3	2.7
Madagascar	23,196	2.8	3.5	28.0	1.8	2.9
Malawi	16,954	3.3	5.3	43.3	15.0	2.1
Mozambique	25,590	2.2	7.2	42.0	4.1	1.9
Namibia	2,444	1.7	1.0	30.4	2.9	1.7
Swaziland	1,254	1.4	-2.0	30.2	1.6	1.0
Zambia	14,768	3.2	4.8	51.3	3.6	3.3
Zimbabwe	13,665	2.5	-2.0	40.4	3.4	2.8
<b>South Asia:</b>						
Afghanistan	35,623	3.3	3.8	33.9	0.0	2.8
Bangladesh	156,380	1.3	3.4	24.3	8.4	1.2
India	1,291,780	1.3	1.7	12.9	3.9	1.3
Nepal	32,059	1.7	2.7	19.3	6.2	1.4
Pakistan	186,429	1.8	2.8	19.8	5.8	1.3
Sri Lanka	21,556	0.8	2.8	23.6	-1.6	0.7
Yemen	27,163	3.1	1.3	24.2	2.3	2.3
<b>East/Southeast Asia:</b>						
Cambodia	14,836	1.2	7.4	51.8	21.7	2.1
Indonesia	249,563	1.0	2.6	19.6	2.0	1.3
Korea, Dem. Rep.	24,754	0.4	-1.7	34.5	5.5	0.7
Laos	6,543	1.3	6.8	47.7	5.3	1.4
Mongolia	2,932	1.5	-2.0	59.0	4.5	2.8
Philippines	99,765	1.7	2.9	21.7	-0.2	1.8
Vietnam	91,563	1.0	4.1	27.2	5.5	1.3
<b>Central Asia:<sup>2</sup></b>						
Armenia	3,126	0.3	2.0	21.9	2.7	1.3
Azerbaijan	9,643	1.2	4.9	34.6	12.2	1.3
Georgia	4,252	-0.6	-1.2	28.4	-1.2	2.9
Kyrgyzstan	5,562	1.1	0.7	13.8	7.7	1.5
Moldova	3,474	-0.6	1.1	28.0	-3.4	-0.2
Tajikistan	7,291	1.5	7.5	45.2	12.7	2.1
Turkmenistan	5,300	1.2	4.0	45.2	16.3	1.4
Uzbekistan	28,725	1.2	6.8	39.7	7.7	2.3
<b>Latin America and the Caribbean:</b>						
Bolivia	10,573	1.6	4.8	34.9	0.7	2.1
Colombia	48,771	1.3	0.2	10.8	0.0	2.2
Dominican Republic	10,432	1.2	2.7	20.7	1.6	1.0
Ecuador	15,255	1.3	2.5	20.3	-1.9	2.0
El Salvador	6,343	0.6	1.2	13.8	0.4	0.6
Guatemala	15,924	2.6	1.4	19.1	3.6	1.9
Haiti	10,521	1.3	1.4	18.4	2.0	1.9
Honduras	8,232	2.0	-0.6	13.4	3.7	0.9
Jamaica	2,781	0.4	-3.8	46.1	-2.4	1.0
Nicaragua	6,128	1.4	4.0	27.8	3.5	0.8
Peru	30,419	1.1	5.2	33.3	5.0	1.4

See footnotes at end of table.

Continued—

**Country indicators—continued**

Region and country	Macroeconomic indicators					
	Per capita GNI, 2012	Per capita GDP growth, 2012	GDP growth, 2012	Export earnings growth, 2012	Official development assistance as a share of GNI, 2012	External debt present value as a share of GNI, 2012
	<i>U.S. dollars</i>	<i>Percent</i>				
<b>Southern Africa:</b>						
Angola	4,580	3.5	6.8	3.1	0.3	21.6
Lesotho	1,380	2.8	4.0	5.6	10.0	31.3
Madagascar	430	0.3	3.1	0.0 '09	3.9	29.9
Malawi	320	-1.0	1.9	4.6	23.3	31.7
Mozambique	510	4.7	7.4	21.0 '10	16.4	32.9
Namibia	5,610	3.1	5.0	4.7	2.1	--
Swaziland	1,500	0.6	-10.1	--	1.8	40.3
Zambia	1,350	3.9	7.2	8.0	5.0	27.6
Zimbabwe	650	1.6	4.4	-2.4	11.2	75.5
<b>South Asia:</b>						
Afghanistan	680	11.6	14.4	--	33.0	14.6 '11
Bangladesh	840	5.0	6.2	7.8	1.7	20.6
India	1,550	3.4	4.7	5.0	0.1	20.8
Nepal	700	3.6	4.9	1.9	4.0	19.5
Pakistan	1,260	2.3	4.0	-15.3	0.9	25.5
Sri Lanka	2,920	9.2	6.4	0.2	0.8	43.6
Yemen	1,290	-2.2	0.1	--	2.3	22.5
<b>East/Southeast Asia:</b>						
Cambodia	880	5.4	7.3	18.9 '10	6.2	42.9
Indonesia	3,420	4.9	6.2	2.0	0.0	29.9
Korea, Dem. Rep.	--	--	--	--	--	--
Laos	1,270	6.2	8.2	5.5	4.9	73.4
Mongolia	3,160	10.6	12.3	-0.2	5.1	53.0
Philippines	2,500	5.0	6.8	8.9	0.0	24.6
Vietnam	1,550	4.1	5.2	15.7	3.0	44.1
<b>Central Asia/CIS:<sup>2</sup></b>						
Armenia	3,720	7.0	7.2	10.7	2.5	72.9
Azerbaijan	6,220	0.9	2.2	2.2	0.6	16.3
Georgia	3,290	5.8	6.0	..	4.5	85.4
Kyrgyzstan	990	-2.5	-0.9	-11.3	8.5	99.1
Moldova	2,070	-0.8	-0.8	1.9	6.4	78.5
Tajikistan	880	4.9	7.5	5.9	5.6	52.7
Turkmenistan	5,410	9.7	11.1	42.5 '06	0.1	1.6
Uzbekistan	1,720	6.6	8.2	5.2 '05	0.5	16.6
<b>Latin America and the Caribbean:</b>						
Bolivia	2,220	3.5	5.2	11.9	2.8	27.2
Colombia	7,020	2.8	4.2	5.4	0.2	22.4
Dominican Republic	5,470	2.6	3.9	5.4	0.5	29.7
Ecuador	5,170	3.5	5.1	2.9	0.2	20.3
El Salvador	3,590	1.3	1.9	2.8	1.0	58.1
Guatemala	3,120	0.4	3.0	2.0	0.6	30.3
Haiti	--	--	--	--	--	--
Honduras	2,120	1.8	3.9	5.8	3.4	29.9
Jamaica	5,130	-0.7	-0.5	..	0.2	99.5
Nicaragua	1,650	3.7	5.2	8.8	5.4	86.7
Peru	6,060	5.0	6.3	4.5	0.2	29.4

<sup>1</sup>= data start in 1993. <sup>2</sup>= data start in 1992.

GNI = gross national income. -- = data unavailable or not applicable due to inconsistent data set.

Note: If 2012 data were not available, year(s) of data used indicated by '11, etc., next to number.

Source: Population = FAOSTAT, UN 2012 revision (medium variant), Macroeconomic indicators = World Development Indicators online (as of May 2014), World Bank.