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International Food Security Assessment, 2010 Update

Improved Production Mitigated Impact of Higher Food Commodity Prices

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Abstract

Rising global food commodity prices have again focused attention on agriculture and food security. With 2010 data now available on all the key variables used in the ERS food security assessment model, ERS has updated its July 2010 assessment, replacing estimated values with actual data. In addition to higher prices, we have actual 2010 production data, as of February 2011, and we have updated exports earnings growth. For the 70 study countries in aggregate, the difference between actual and estimated grain production was negligible. However, actual Sub-Saharan Africa grain production was 1.6 percent higher than previously estimated, including significant changes in major countries in the region. The results show an overall improvement in food security, relative to the 2010 projections in the ERS publication *Food Security Assessment, 2010-20*. The total number of food-insecure people is estimated to be 9 percent lower than the initial assessment, while the food gap (distribution gap) associated with unequal purchasing power or food access is estimated to be 1.7 percent lower. Food-insecure people are those consuming less than the nutritional target of 2,100 calories per day per person.

Keywords: food security, food commodity prices, Sub-Saharan Africa, Latin America and Caribbean, Asia, grain production, consumption, food gaps, nutrition, calories

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Introduction

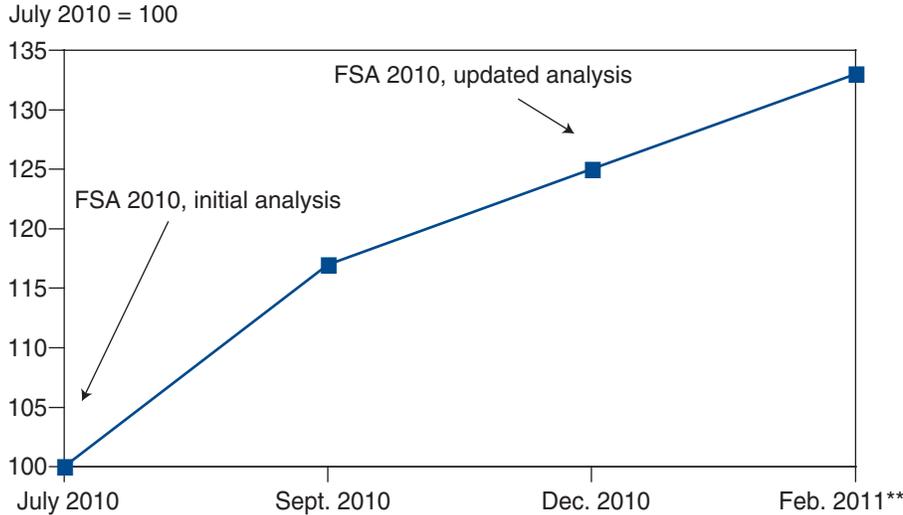
Rising global food commodity prices have again focused attention on agriculture and food security. By January 2011, indexes of global food commodity prices were higher than the record levels reached in 2008. In this report, we examine the impact of changing market conditions—global and national—on food security in 2010 for the 70 developing countries included in the ERS *Food Security Assessment, 2010-20* report. Our analysis concludes that, despite apparent similarities to the higher global price environment of 2008, food security impacts appear to be more nuanced than in 2008, reflecting increases in domestic production in a number of food-insecure countries and regions that experienced favorable weather conditions in 2010.

In July 2010, ERS *Food Security Assessment, 2010-20* report results indicated improvement in the food security situation of 70 developing countries, including a 7.5-percent decline in the number of food-insecure people between 2009 and 2010, in part due to economic recovery in many of these countries. Another important factor that led to the improved assessment was a projected decline in food prices in 2010. In early 2010 (when the initial analysis was done), the available projections for the 2009/10 crop year suggested that 2010 global prices for both food and raw material prices would decline (World Global Commodity Markets: review and forecast, 2010, World Bank; USDA Agricultural Projections to 2019). The World Bank projected a 6-percent decline in the prices of these commodities, while USDA's baseline projections for 2009/10 showed even sharper declines for staple food prices. Energy prices were projected to stabilize because of the large inventory and slow demand. Energy prices affect world agricultural commodity markets through the impact on cost of food production and transportation. Additionally, in recent years, energy and food markets have become more linked through biofuels.

But with 2010 now complete, it is clear that a range of unanticipated factors dramatically changed earlier price expectations for the second half of the calendar year. The UN Food and Agriculture Organization food price index for December 2010 exceeded the peak reached in 2008. But the current jump in the food price index has been driven more by sugar and vegetable oils than grains as it was in 2008. While these commodities have become increasingly important in the diet of developing countries, grains remain the principal component in many food-insecure countries. In Sub-Saharan Africa (SSA), the most food-insecure region in the world, grains account for about half of the diet (2007 Food Balance sheet, FAO). In lower income Asian countries, grains account for 62 percent of the diet. In Latin American and Caribbean (LAC) and Commonwealth of Independent States (CIS) countries included in the ERS report, diets are more diversified, but grains still account for a significant share of the diet, 41 and 53 percent. Sugar's share of the diet is largest in the LAC countries. Even in those countries, however, sugar's share of the diet is only 14 percent, followed by the CIS region at 8 percent. Vegetable oils account for 11 percent of diets in LAC and 7 percent in the CIS region. Consequently, grain prices remain the most relevant for the food security situation in these countries.

There has also been considerable change in grain price estimates since the ERS *Food Security Assessment, 2010-20* was released in July 2010. Grain prices through the 2010 calendar year were roughly 25 percent higher than those in the initial analysis, which were based primarily on 2009/10 crop-year price estimates. For wheat, crop years begin June 1; for rice, August 1; and for corn, September 1.

Figure 1
Grain price* increases through time



*Grain price used in the analysis is based on weighted percentage change in international prices of wheat, corn and rice from 2009-10. Weighting is based on volume of trade.

**Used average annual weighted grain price through Feb, 2011

FSA=Food Security Assessment.

Source: USDA, Economic Research Service analysis; International Monetary Fund.

Impacts of Higher 2010 Global Prices Offset by Higher Domestic Production

With actual 2010 data now available on all the key variables used in the ERS food security assessment model, ERS has updated its earlier assessment, replacing estimated values with actual data. In addition to higher prices, we now have actual 2010 production data (as of February 2011) and we have updated exports earnings growth. In the initial analysis in the July 2010 report, production was estimated using the ERS food security model's acreage and yield response functions, which are dependent on lagged domestic prices, fertilizer, labor, and technological change. For the 70 countries in aggregate, the difference between actual and estimated grain production was negligible. However, actual SSA grain production was 1.6 percent higher than previously estimated, including significant changes in major countries in the region. In Nigeria (SSA's largest grain producer), actual production was roughly 20 percent lower than previously estimated, while actual output in Ethiopia (SSA's second-largest grain producer) was 11.5 percent higher. In Asia, there was virtually no difference between actual and estimated aggregate production, although the differences were significant for some countries.

Also notable regarding the impact of higher world food prices is that domestic prices in individual countries are not completely correlated with world prices. The rate at which world prices are transmitted to domestic markets' consumers and producers varies by country. This imperfect price transmission results in lags in response of domestic prices to changes in world prices or in incomplete adjustment of domestic prices. The rate of price transmission to domestic markets depends on the level of market infrastructure development and the extent of government interventions through subsidies, exchange rate policies, tax policies, and trade restrictions or preferences. According to available information from the U.S. Agency for International Development's Famine Early Warning Systems Network (FEWS NET) through the end of February 2011, domestic prices had not increased in many of the 70 countries covered in the ERS assessment. In Sub-Saharan Africa, grain supplies have been adequate following good harvests, resulting in relatively low prices. More recently, however, prices have begun to increase, following their typical seasonal pattern. Central America has seen some increases in corn prices, but not as great as those at the international level (FEWS NET Price Watch, February 28, 2011).

Table 1

Grain production variation: actual versus estimated levels for 2010¹

	Estimated*	Actual**	Percent below estimates		Estimated*	Actual**	Percent above estimates
	—Million tons—				—Million tons—		
Sierra Leone	0.99	0.60	-39.0	Swaziland	0.04	0.08	82.9
Cent African Rep	0.24	0.18	-26.3	Zambia	1.80	3.08	71.5
Nigeria	29.62	23.75	-19.8	Senegal	1.10	1.79	63.5
Guatemala	1.43	1.18	-17.2	Angola	0.86	1.35	56.3
N. Korea	3.89	3.27	-15.9	Rwanda	0.49	0.74	51.9
Bolivia	1.82	1.57	-13.9	Gambia	0.22	0.33	46.8
Honduras	0.71	0.64	-9.0	Mozambique	1.67	2.44	45.8
Pakistan	34.01	31.43	-7.6	Somalia	0.25	0.34	36.3
Azerbaijan	2.17	2.01	-7.4	Dominican Rep	0.47	0.63	33.1
Philippines	19.27	18.05	-6.3	Tunisia	1.84	2.43	31.9

¹Countries were chosen by ranking top 10 in percent above and top 10 in percent below original estimates.

*Estimated by USDA ERS Food Security Assessment model for July 2010 report.

**UN Food and Agriculture Organization.

Source: USDA, Economic Research Service analysis; UN FAO.

Indicators of Food Security Improve

In the ERS food security assessment, we recognize that aggregate availability does not capture the unequal purchasing power or food access (distribution gap) of people across the income distribution. The estimated distribution gap measures the food needed to raise consumption in each income quintile (20 percent) to the nutritional requirement of approximately 2,100 calories per day per person. In many countries, consumption in the lower income quintiles is significantly below the 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 adverse income or economic conditions. In some countries, average consumption of the poorest quintile of the population narrowly exceeds nutritional requirements. In such cases, we further disaggregate to include the lowest decile (10 percent) of the population in our estimation of food gaps. When our estimates show no distribution gap for the poorest 10 percent of the population, we consider the country food secure despite the fact that food insecurity may exist for some people in the poorest 10 percent of the population. Finally, the projected number of people who cannot meet their nutritional requirements is calculated based on the estimated population share consuming less than their nutritional requirement as well as on total population.

Using higher realized global food prices and actual production data, we updated the model to examine the impact of these changes on food security for 2010. The results show an overall improvement in food security, relative to the earlier projections completed in early 2010 (see Shapouri et al. July 2010. *Food Security Assessment, 2010-20*, GFA-21, USDA, Economic Research Service). The total number of food-insecure people is estimated to be 9 percent lower than the initial assessment, while the food gap (distribution gap) associated with unequal purchasing power or food access is estimated to be 1.7 percent lower (see box, “Food Security Assessment Model”). The results, however, vary significantly by region. In Asia, for example, the number of food-insecure people declined more than 9 percent, but the region’s food gap grew by 25 percent. This means that, while fewer people in the Asia region were estimated to be food insecure, food insecurity intensified for those who were food insecure. Overall, there was little difference in the region’s estimated versus actual production, but for some countries, the differences were significant. The largest differences in terms of percentage increase in food gaps were in North Korea, Pakistan, and the Philippines. In each of these countries, actual production was significantly below the original estimate.

In LAC both the number of food-insecure people and food gap increased. Many of the LAC countries that are included in this analysis import a large share of their grain supplies and higher global prices led to a lower estimate of capacity to import grain commercially. In the case of the Dominican Republic, where actual production was higher than estimated previously, both the number of food-insecure people and the food gap rose as the loss of import capacity due to higher prices more than offset the higher production levels. The country imports roughly three-quarters of its grain supplies. As a result, higher global prices had a greater impact than higher production

Food Security Assessment Model

The Food Security Assessment model used in this analysis is based on data available as of February 2011 and therefore does not reflect any subsequent changes that may have transpired related to the food security of these countries. Historical production data are from the United Nations Food and Agriculture Organization (FAO) and food aid data are from the UN World Food Programme (WFP). For commercial imports, the 2009 figure is based on projections, not actual data. Financial and macroeconomic data are based on World Bank data. The estimates of 2010 food security indicators are based on the food security baseline projections and constant food stocks and food aid at the average 2006-08 level. Therefore, if countries decide to raise or lower food stocks, or donors change the level of food aid commitments to countries in need, these estimates of gaps, as well as the number of food-insecure people, would change.

Commodities covered in this report include grains, root crops, and “other,” which represents the remainder of the diet. The 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. Grain has roughly 3.5 calories per gram and tubers have about 1 calorie per gram. One ton of tubers is, therefore, equivalent to about 0.29 ton of grain (1 divided by 3.5), and 1 ton of vegetable oil (8 calories per gram) is equivalent to about 2.29 tons of grain (8 divided by 3.5).

Food consumption and food access are projected in 70 lower income developing countries—37 in Sub-Saharan Africa, 4 in North Africa, 11 in Latin America and the Caribbean, 10 in Asia, and 8 in the Commonwealth of Independent States. (See <http://www.ers.usda.gov/Publications/GFA21/GFA21.pdf/> for a detailed description of the methodology, definitions of terms, and a list of countries.) The model analyzes the gap between food availability (production plus commercial and food aid imports minus nonfood use) and the nutritional target of roughly 2,100 calories per capita per day—depending on the region.

levels in the country. Food security is also estimated to have been adversely affected in Guatemala, where actual production was 17 percent below earlier estimates. In addition, Guatemala imports roughly half of its grain supplies, so higher global grain prices reduced estimated import capacity.

SSA is the one region where food security is estimated to have unambiguously improved relative to the earlier analysis. The estimated number of food-insecure people fell more than 11 percent while the food gap fell more than 10 percent. With domestic production accounting for roughly 80 percent of grain consumption, the key driver of the improved result was the 1.6-percent increase in the region’s grain production compared with the earlier estimate. Ethiopia, the most vulnerable country in the region with respect to the number of food-insecure people, registered among the largest improvements. In the earlier analysis, about 80 percent of the country’s population was estimated to be food insecure. But actual production turned out to be 11.5 percent higher than the estimated levels, reducing the estimated number of

food-insecure people by half. Because Ethiopia imports only about 7 percent of the grain it consumes, the estimated impact of the higher global prices on import capacity has a relatively minor impact on grain supplies.

Table 2
Actual numbers of food-insecure people, food distribution gaps are lower than estimates in 70 developing countries, 2010

	Total	Region				
		Asia	LAC	NA	CIS	SSA
<i>Food-insecure people (millions)</i>						
Early 2010 estimate*	882	433	58	0	2	390
Actual production and prices**	802	393	61	0	2	346
<i>Food distribution gap (million tons)</i>						
Early 2010 estimate*	24.2	4.8	2.0	0	0.02	17.5
Actual production and prices**	23.8	6.0	2.1	0	0.04	15.7

*Early 2010 production and price estimate from *Food Security Assessment, 2010-20* (July 2010).
 **Actual 2010 prices and actual 2010 cereal production incorporated in the FSA model.
 LAC=Latin America and Caribbean; NA=North Africa; CIS=Commonwealth of independent States; SSA=Sub-Saharan Africa.
 Food distribution gap=Measurement of food needed to raise consumption in each income quintile (20 percent) to the 2,100-calories-per-day nutritional requirement.
 Source: USDA, Economic Research Service.

Production Variability

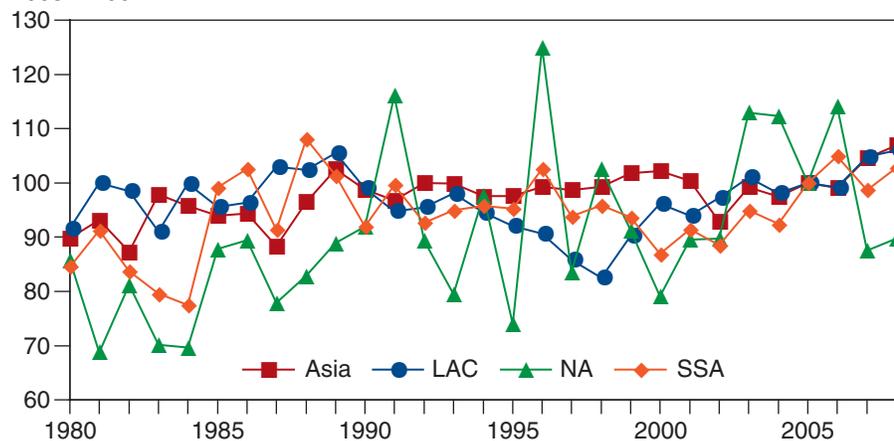
An important factor behind the short-term change in food security indicators is the degree of production variability in the 70 developing countries covered in this report. This variability is high, largely because their food production, in most cases, takes place in rain-fed areas that are subject to variable moisture for crop cultivation. Of the 70 countries, average annual production variability from trend (using the coefficient of variation, which measures deviation from trend, 1980-2008) is highest in NA (34 percent), followed by CIS (22 percent), SSA (21 percent), LAC (12 percent), and Asia (10 percent). So, in the case of a vulnerable region such as SSA, grain production in any given year can range, on average, from 21 percent above trend levels to 21 percent below trend levels. Among individual countries, production variability is among the lowest (less than 5 percent) in countries such as Egypt and India, where a large share of food is produced in irrigated areas. The countries with the highest average annual production variability in SSA—ranging from 40 to 67 percent—are Cape Verde, Eritrea, Lesotho, Liberia, Sierra Leone, and Zimbabwe. In Asia, the country with by far the highest production variability is North Korea, more than 34 percent; in CIS, Kazakhstan has the highest variability, 37 percent, and in LAC, it is Jamaica, 24 percent. In North Africa, with the exception of Egypt, average annual production variation is more than 40 percent.

While inadequate local production is the key challenge to food security, episodes of above-trend production also present some challenges. Above-trend production variability, like the 2010 case, could be a positive factor at a time of rising food import prices. However, it can also cause difficulties for longer term food security. The reason for this is that most food-insecure countries are not fully integrated into international markets and therefore are not able to take full advantage of potential trade opportunities when they have surplus production. Countries with sporadic surpluses have difficulty finding export markets. As a result, the surplus is often not exported and domestic prices are depressed, potentially leading to reduced production incentives in the following year.

Figure 2

Grain production is highly variable

2005 = 100



Production is per capita; LAC=Latin America and Caribbean; NA=North Africa; SSA=Sub-Saharan Africa.

Source: USDA, Economic Research Service analysis.

Institutional Response to Price Changes

High production variability and the fact that many low-income countries are not fully integrated into global markets means that internal production performance is often the key determinant of food security conditions in these countries. Poor production performance and high prices put particularly severe pressure on consumers in low-income countries. In those countries, food spending typically accounts for 50 percent or more of the total expenditures of the average household, and for even more of the total spending of the poorest households.

Currently, food prices in many of these countries have not mirrored the upswing in international prices, mostly a result of good production in these countries. Food prices tend to fall after harvest and then rise gradually in the ensuing months. Also, in most cases, the available price data are for urban areas and/or capital cities, and may not reflect the market situation in rural areas, where a large share of the population resides.

In low-income countries, food consumption of urban households has always been dependent on how well markets function. In many cases, urban markets are not fully connected to the rural markets, due to poor transportation infrastructure, and are often more reliant on imported foods than rural areas are. As a result, some countries have initiated new food programs and/or have increased budget allocations to existing programs that address food insecurity in urban areas. In response to the high 2008 prices, the UN World Food Programme initiated a voucher program in Burkina Faso's two main cities—the capital, Ouagadougou, and the commercial center, Bobo-Dioulasso. The first stage of the program ran through 2009, but it was extended for six additional months in 2010. This program improves access to food by distributing vouchers to vulnerable people. Each family receives a certain number of vouchers per month with a defined value. People can then go to approved vendors and exchange the vouchers for corn, vegetable oil, salt, sugar, and soap (see <http://www.voanews.com/english/news/a-13-2009-04-09-voa31-68683617.html>).

In addition to programs targeting consumers, many governments increased investment in food production in response to the higher food prices of 2008. West African countries such as Mali, Niger, and Senegal invested in high-yielding rice varieties and offered input subsidies. In addition, some countries have imposed export restrictions and eliminated import tariffs that are major sources of government revenues, in an effort to enhance food supplies. Given the short time period since these policies have been put in place, it is difficult to draw conclusions about the extent of their effectiveness. However, the overall trend has been to look inward and find ways to reduce the pressure of higher food prices.

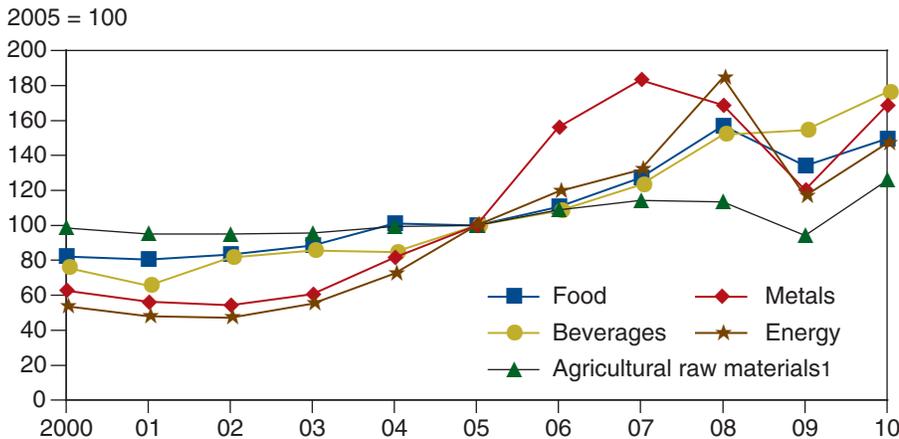
Impact of Changes in Nonfood Prices and Incomes

In addition to food prices, the global food security situation is also dependent on the prices of fuel and export commodities. In 2008, crude oil prices averaged nearly \$100 per barrel. While prices in 2010 averaged much less, about \$80 per barrel, they were still the second-highest on record. However, as of early March 2011, prices are once again above \$100. High fuel prices may amplify the rise in food prices by reducing further the amount of income poor households have to spend on food. Also, high transportation costs within countries and continents, as well as shipping freight costs across oceans intensify the financial burden on many countries by further increasing import and food distribution costs. Moreover, the higher energy import bill can squeeze out imports of necessities such as food and other raw materials.

These financial pressures can be mitigated, however, by commensurate increases in prices of commodities exported by these countries. Data through 2010 indicate that this has been the case for several commodities. While the International Monetary Fund (IMF) food price index increased 11.5 percent from 2009 to 2010, the index increased at a faster rate for beverages, over 14 percent; agricultural raw materials (i.e., timber, cotton, wool, rubber, hides), nearly 34 percent; and metals, 40 percent. Countries such as Ghana, Cote d'Ivoire, Ethiopia, Kenya, and Vietnam are major exporters of coffee, tea, and/or cocoa. Mozambique, Tajikistan, and Ghana export aluminum, while Zambia, Peru, and Indonesia export copper.

Figure 3

Rising export commodity prices mitigate impact of higher food prices



¹Agricultural raw materials include timber, cotton, wool, rubber, and hides.

Source: International Monetary Fund.

Another factor affecting the situation in these countries is economic growth—their own and that of countries that import from them. According to the IMF, real GDP growth in almost all these countries is projected to remain solid in 2011, in the range of 5 to 6 percent. However, the prospect for a rise in domestic inflation resulting from the increases in food and fuel prices will need careful monitoring. GDP growth in developed countries, the major trading partners of developing countries, is estimated by the IMF to remain modest in 2011, at around 2.2 percent. This will likely dampen demand from developed countries for imports from developing countries. On the other hand, growth in China, which has become an increasingly important trading partner for many developing countries, is estimated to retain its very strong 2010 GDP growth at 9.6 percent in 2011 as well.

Conditions in global food and financial markets continue to evolve and therefore have the potential to change the estimates reported in this update. ERS continues to monitor conditions, the impacts of which will be captured in our annual food security assessment report, scheduled for release in July.