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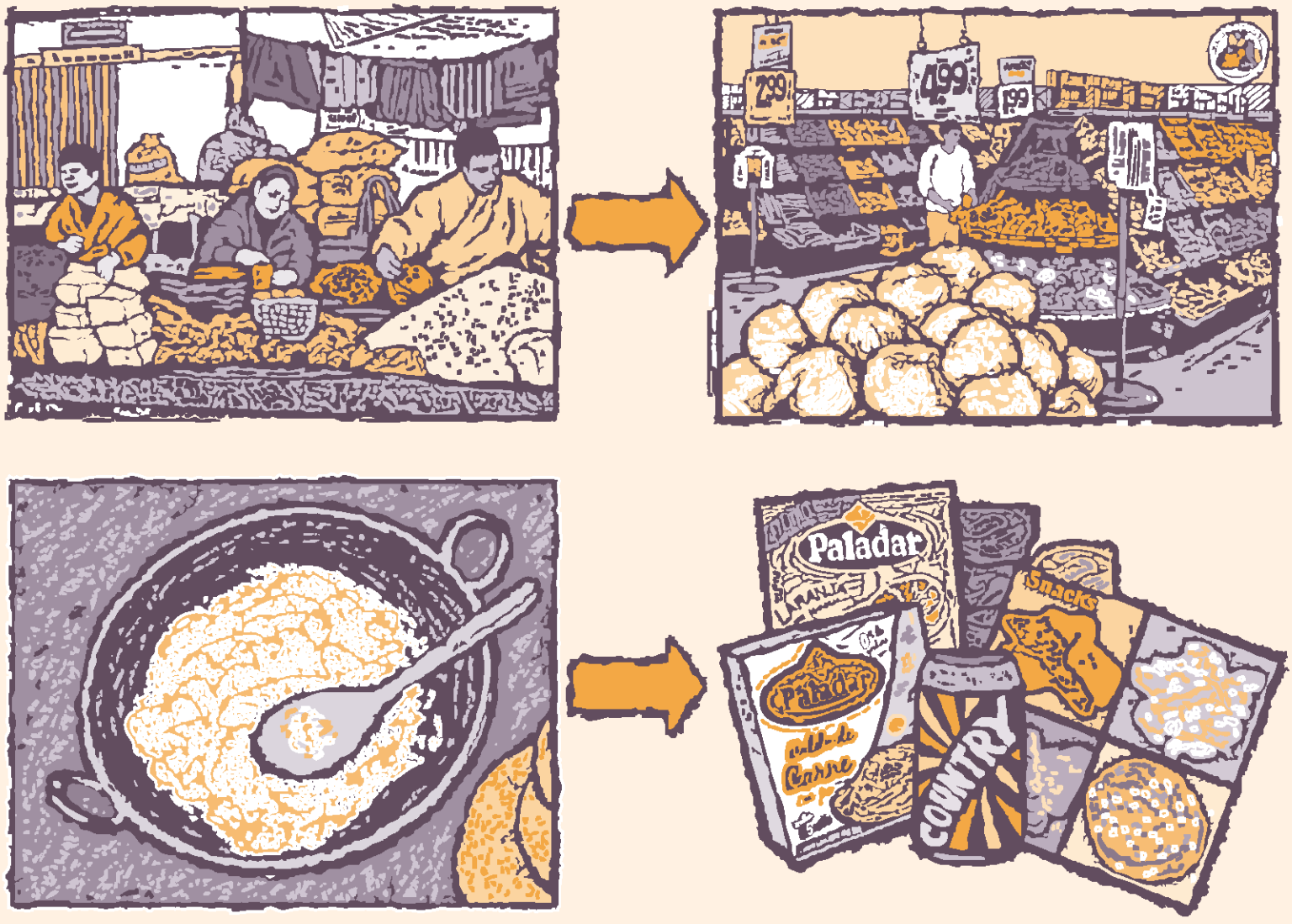
FOOD POLICY
REPORT

THE WORLD FOOD SITUATION

New Driving Forces and Required Actions

Joachim von Braun



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The International Food Policy Research Institute (IFPRI) was established in 1975. IFPRI is one of 15 agricultural research centers that receives its principal funding from governments, private foundations, and international and regional organizations, most of which are members of the Consultative Group on International Agricultural Research.

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The World Food Equation, Rewritten

The world food situation is currently being rapidly redefined by new driving forces. Income growth, climate change, high energy prices, globalization, and urbanization are transforming food consumption, production, and markets. The influence of the private sector in the world food system, especially the leverage of food retailers, is also rapidly increasing. Changes in food availability, rising commodity prices, and new producer–consumer linkages have crucial implications for the livelihoods of poor and food-insecure people. Analyzing and interpreting recent trends and emerging challenges in the world food situation is essential in order to provide policymakers with the necessary information to mobilize adequate responses at the local, national, regional, and international levels. It is also critical for helping to appropriately adjust research agendas in agriculture, nutrition, and health. Not surprisingly, renewed global attention is being given to the role of agriculture and food in development policy, as can be seen from the World Bank's World Development Report, accelerated public action in African agriculture under the New Partnership for Africa's Development (NEPAD), and the Asian Development Bank's recent initiatives for more investment in agriculture, to name just a few examples.

Demand driven by high economic growth and population change

Many parts of the developing world have experienced high economic growth in recent years. Developing Asia, especially China and India, continues to show strong sustained growth. Real GDP in the region increased by 9 percent per annum between 2004 and 2006. Sub-Saharan Africa also experienced rapid economic growth of about 6 percent in the same period. Even countries with high incidences and prevalences of hunger reported strong growth rates. Of the world's 34 most food-insecure countries,[1] 22 had average annual growth rates ranging from 5 to 16 percent between 2004 and 2006. Global economic growth, however, is projected to slow from 5.2 percent in 2007 to 4.8 percent in 2008 (IMF 2007a). Beyond 2008, world growth is expected to remain in the 4 percent range while developing-country growth is expected to average 6 percent (Mussa 2007). This growth is a central force of change on the demand side of the world food equation. High income growth in low-income countries readily translates into increased consumption of food, as will be further discussed below.

Another major force altering the food equation is shifting rural–urban populations and the resulting impact on spending and consumer preferences. The world's urban population has grown more than the rural population; within the next three decades, 61 percent of the world's populace is expected to live in urban areas (Cohen 2006). However, three-quarters of the poor remain in rural areas, and rural poverty will continue to be more prevalent than urban poverty during the next several decades (Ravallion, Chen, and Sangraula 2007).

Agricultural diversification toward high-value agricultural production is a demand-driven process in which the private sector plays a vital role (Gulati, Joshi, and Cummings 2007). Higher incomes, urbanization, and changing preferences are raising domestic consumer demand for high-value products in developing countries. The composition of food budgets is shifting from the consumption of grains and other staple crops to vegetables, fruits, meat, dairy, and fish. The demand for ready-to-cook and ready-to-eat foods is also rising, particularly in urban areas. Consumers in Asia, especially in the cities, are also being exposed to nontraditional foods. Due to diet globalization, the consumption of wheat and wheat-based products, temperate-zone vegetables, and dairy products in Asia has increased (Pingali 2006).

Today's shifting patterns of consumption are expected to be reinforced in the future. With an income growth of 5.5 percent per year in South Asia, annual per capita consumption of rice in the region is projected to decline from its 2000 level by 4 percent by 2025. At the same time, consumption of milk and vegetables is projected to increase by 70 percent and consumption of meat, eggs, and fish is projected to increase by 100 percent (Kumar et al. 2007).

In China, consumers in rural areas continue to be more dependent on grains than consumers in urban areas (Table 1). However, the increase in the consumption of meat, fish and aquatic products, and fruits in rural areas is even greater than in urban areas.

In India, cereal consumption remained unchanged between 1990 and 2005, while consumption of oil crops almost doubled; consumption of meat, milk, fish, fruits, and vegetables also increased (Table 2). In other developing countries, the shift to high-value demand has been less obvious. In Brazil, Kenya, and Nigeria, the consumption of some high-value products declined, which may be due to growing inequality in some of these countries.

World food production and stock developments

Wheat, coarse grains (including maize and sorghum), and rice are staple foods for the majority of the world's population. Cereal supply depends on the production and availability of stocks. World cereal production in 2006 was about 2 billion tons—2.4 percent less than in 2005 (Figure 1). Most of the decrease is the result of reduced plantings and adverse weather in some major producing and exporting countries. Between 2004 and 2006, wheat and maize production in the European Union and the United States decreased by 12 to 16 percent. On the positive side, coarse grain production in China increased by 12 percent and rice output in India increased by 9 percent (based on data from FAO 2006b and 2007b). In 2007, world cereal production is expected to rise by almost 6 percent due to sharp increases in the production of maize, the main coarse grain.

In 2006, global cereal stocks—especially wheat—were at their lowest levels since the early 1980s. Stocks in China, which constitute about 40 percent of total stocks, declined significantly from 2000 to 2004 and have not recovered in recent years (Figure 2). End-year cereal stocks in 2007 are expected to remain at 2006 levels. [2]

As opposed to cereals, the production of high-value

Table 1—China: Per capita annual household consumption

	Urban			Rural		
Product	1990 (kg)	2006 (kg)	2006/1990 ratio	1990 (kg)	2006 (kg)	2006/1990 ratio
Grain	131	76	0.6	262	206	0.8
Pork, beef, and mutton	22	24	1.1	11	17	1.5
Poultry	3	8	2.4	1	4	2.8
Milk	5	18	4.0	1	3	2.9
Fish and aquatic products	8	13	1.7	2	5	2.4
Fruits	41	60	1.5	6	19	3.2

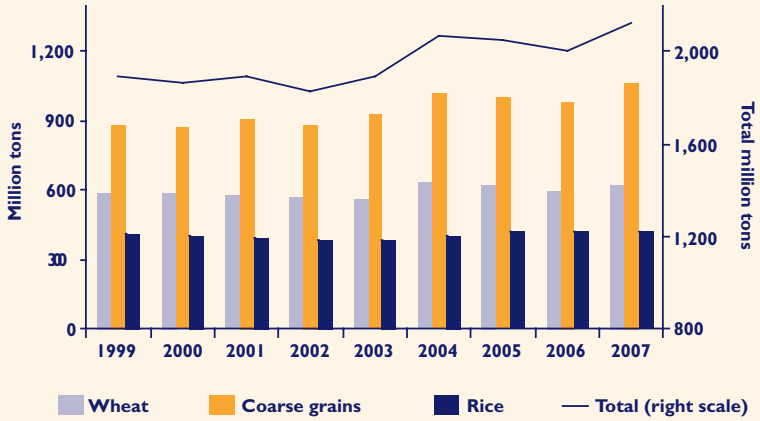
SOURCE: Data from National Bureau of Statistics of China 2007a and 2007b.

Table 2—Change in food-consumption quantity, ratios 2005/1990

Type	India	China	Brazil	Kenya	Nigeria
Cereals	1.0	0.8	1.2	1.1	1.0
Oil crops	1.7	2.4	1.1	0.8	1.1
Meat	1.2	2.4	1.7	0.9	1.0
Milk	1.2	3.0	1.2	0.9	1.3
Fish	1.2	2.3	0.9	0.4	0.8
Fruits	1.3	3.5	0.8	1.0	1.1
Vegetables	1.3	2.9	1.3	1.0	1.3

SOURCE: Data from FAO 2007a.

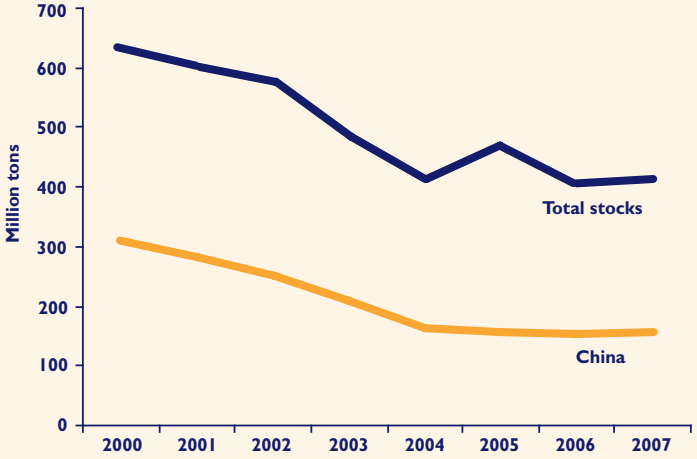
Figure 1—World cereal production, 2000–2007 (million tons)



Source: Data from FAO 2003, 2005, 2006b, and 2007b.

Note: Data for 2007 are forecasts.

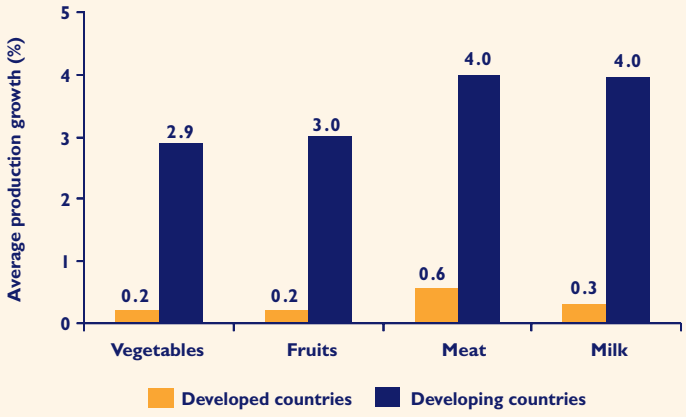
Figure 2—World cereal stocks, 2000–2007



Source: Data from FAO 2003, 2005, 2006b, and 2007b.

Note: Data for 2007 are forecasts.

Figure 3—Annual growth rate of high-value agriculture production, 2004–2006 (percent)



Source: Data from FAO 2007a.

agricultural commodities such as vegetables, fruits, meat, and milk is growing at a fast rate in developing countries (Figure 3).

Climate-change risks will have adverse impacts on food production, compounding the challenge of meeting global food demand. Consequently, food import dependency is projected to rise in many regions of the developing world (IPCC 2007). With the increased risk of droughts and floods due to rising temperatures, crop-yield losses are imminent. In more than 40 developing countries—mainly in Sub-Saharan Africa—cereal yields are expected to decline, with mean losses of about 15 percent by 2080 (Fischer et al. 2005). Other estimates suggest that although the aggregate impact on cereal production between 1990 and 2080 might be small—a decrease in production of less than 1 percent—large reductions of up to 22 percent are likely in South Asia (Table 3). In contrast, developed countries and Latin America are expected to experience absolute gains. Impacts on the production of cereals also differ by crop type. Projections show that land suitable for wheat production may almost disappear in Africa. Nonetheless, global land use due to climate change is estimated to increase minimally by less than 1 percent. In many parts of the developing world, especially in Africa, an expansion of arid lands of up to 8 percent may be anticipated by 2080 (Fischer et al. 2005).

World agricultural GDP is projected to decrease by 16 percent by 2020 due to global warming. Again, the impact on developing countries will be much more severe than on developed countries. Output in developing countries is projected to decline by 20 percent, while output in industrial countries is projected to decline by 6 percent (Cline 2007).

Carbon fertilization[3] could limit the severity of climate-change effects to only 3 percent. However, technological change is not expected to be able to alleviate output losses and increase yields to a rate that would keep up with growing food demand (Cline 2007). Agricultural prices will thus also be affected by climate variability and change. Temperature increases of more than 3°C may cause prices to increase by up to 40 percent (Easterling et al. 2007).

The riskier climate environment that is expected will increase the demand for inno-

Table 3—Expected impacts of climate change on global cereal production

Region	1990–2080 (% change)
World	–0.6 to –0.9
Developed countries	2.7 to 9.0
Developing countries	–3.3 to –7.2
Southeast Asia	–2.5 to –7.8
South Asia	–18.2 to –22.1
Sub-Saharan Africa	–3.9 to –7.5
Latin America	5.2 to 12.5

SOURCE: Adapted from Tubiello and Fischer 2007.

vative insurance mechanisms, such as rainfall-indexed insurance schemes that include regions and communities of small farmers. This is an area for new institutional exploration.

Globalization and trade

A more open trade regime in agriculture would benefit developing countries in general. Research by the International Food Policy Research Institute (IFPRI) has shown that the benefits of opening up and facilitating market access between member countries of the Organisation for Economic Co-operation and Development (OECD) and developing countries—as well as among developing countries—would bring significant economic gains. However, large advances in poverty reduction would not occur except in some cases (Bouet et al. 2007). Multilateral discussions toward further trade liberalization and the integration of developing countries into the global economy are currently deadlocked. The conclusion of the World Trade Organization (WTO) Doha Development Round has been delayed due to divisions between developed and developing countries and a lack of political commitment on the part of key negotiating parties. In the area of agriculture, developed countries have been unwilling to make major concessions. The United States has been hesitant to decrease domestic agricultural support in its new farm bill, while the European Union has been hesitant to negotiate on its existing trade restrictions on sensitive farm products. Deep divisions have also emerged regarding the conditions for nonagricultural market access proposed in Potsdam in July 2007.

In reaction to the lack of progress of the Doha Round, many countries are increasingly engaging in regional and bilateral trade agreements. The number of regional arrangements reported to the WTO rose from 86 in 2000 to 159 in 2007 (UNCTAD 2007). Increasingly, South-South and South-North regional initiatives have emerged—such as the Central American Free Trade Agreement (CAFTA) between the United States and Central America and the negotiations between the African, Caribbean, and Pacific (ACP) states and the European Union—and they may create more opportunities for cooperation among developing countries and for opening up their markets.

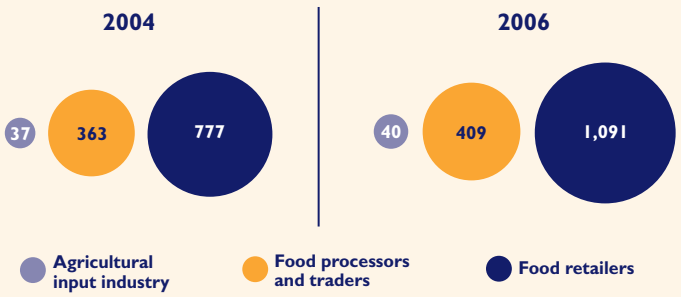
Another development has been the improvement of the terms of trade for commodity exporters as a result of increases in global prices. The share of developing countries in global exports increased from 32 percent in 2000 to 37 percent in 2006, but there are large regional disparities. Africa's share in global exports, for example, increased only from 2.3 to 2.8 percent in the same period (UNCTAD 2007).

Changes in the corporate food system

The growing power and leverage of international corporations are transforming the opportunities available to small agricultural producers in developing countries. While new prospects have arisen for some farmers, many others have not been able to take advantage of the new income-generating opportunities since the rigorous safety and quality standards of food processors and food retailers create high barriers to their market entry.

Transactions along the corporate food chain have increased in the past two years. Between 2004 and 2006, total global food spending grew by 16 percent, from US$5.5 trillion to 6.4 trillion (Planet Retail 2007a). In the same period, the sales of food retailers increased by a disproportionately large amount compared to the sales of food processors and of companies in the food input industry (Figure 4). The sales of the top food processors and traders grew by 13 percent, and the sales of the top 10 companies

Figure 4—A "corporate view" of the world food system: Sales of top 10 companies (in billions of US dollars), 2004 and 2006

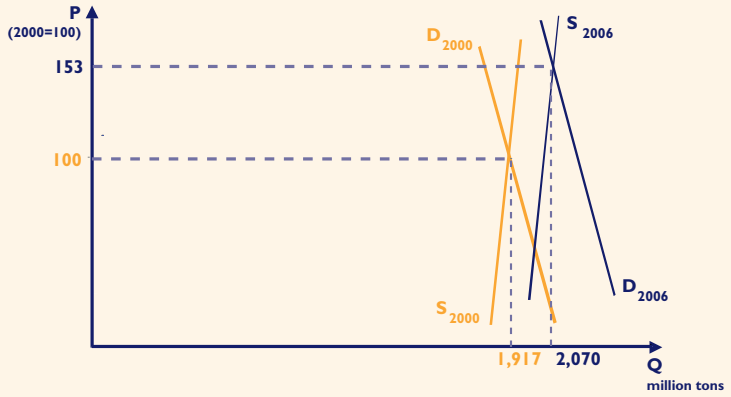


Source: Data from Planet Retail 2007b, Morningstar 2007, von Braun 2005, and companies' financial reports.

producing agricultural inputs (agrochemicals, seeds, and traits) increased by 8 percent. The sales of the top food retailers, however, soared by more than 40 percent. While supermarkets account for a large share of retail sales in most developed and many developing countries, independent grocers continue to represent 85 percent of retail sales in Vietnam and 77 percent in India (Euromonitor 2007).

The process of horizontal consolidation in the agricultural-input industry continues on a global scale. The three leading agrochemical companies—Bayer Crop Science, Syngenta, and BASF—account for roughly half of the total market (UNCTAD 2006). In contrast, the top five retailers do not capture more than a 13-percent share of the market. Global data, however, mask substantial differences between countries; while the top five retailers account for 57 percent of grocery sales in Venezuela, they represent less than 4 percent of sales in Indonesia (Euromonitor 2007). Vertical integration of the food supply chain increases the synergies between agricultural inputs, processing, and retail, but overall competition within the different segments of the world food chain remains strong.

Figure 5—Global supply and demand for cereals, 2000 and 2006



Source: Data from FAO 2003, 2005, 2006b, 2007b, and 2007c.

Notes: Supply and demand of cereals refer to the production and consumption of wheat, coarse grains, and rice.

The changing supply-and-demand framework of the food equation

The above-mentioned changes on the supply and demand side of the world food equation have led to imbalances and drastic price changes. Between 2000 and 2006, world demand for cereals increased by 8 percent while cereal prices increased by about 50 percent (Figure 5). Thereafter, prices more than doubled by early 2008 (compared to 2000). Supply is very inelastic, which means that it does not respond quickly to price changes. Typically, aggregate agriculture supply increases by 1 to 2 percent when prices increase by 10 percent. That supply response decreases further when farm prices are more volatile, but increases as the result of improved infrastructure and access to technology and rural finance.

The consumption of cereals has been consistently higher than production in recent years and that has reduced stocks. A breakdown of cereal demand by type of use gives insights into the factors that have contributed to the greater increase in consumption. While cereal use for food and feed increased by 4 and 7 percent since 2000, respectively, the use of cereals for industrial purposes—such as biofuel production—increased by more than 25 percent (FAO 2003 and 2007b). In the United States alone, the use of corn for ethanol production increased by two and a half times between 2000 and 2006 (Earth Policy Institute 2007).

Supply and demand changes do not fully explain the price increases. Financial investors are becoming increasingly interested in rising commodity prices, and speculative transactions are adding to increased commodity-price volatility. In 2006, the volume of traded global agricultural futures and options rose by almost 30 percent. Commodity exchanges can help to make food markets more transparent and efficient. They are becoming more relevant in India and China, and African countries are initiating commodity exchanges as well, as has occurred in Ethiopia, for example (Gabre-Madhin 2006).

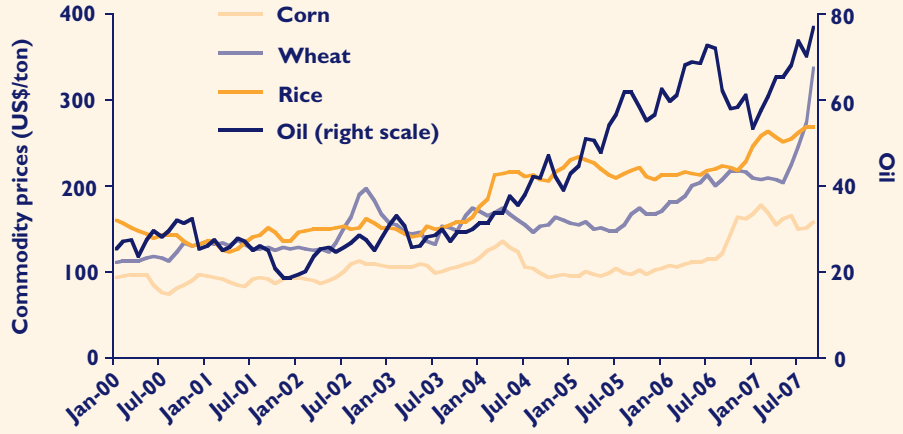
Outlook on Global Food Scarcity and Food-Energy Price Links

Cereal and energy price increases

World cereal and energy prices are becoming increasingly linked. Since 2000, the prices of wheat and petroleum have tripled, while the prices of corn and rice have almost doubled (Figure 6). The impact of cereal price increases on food-insecure and poor households is already quite dramatic. For every 1-percent increase in the price of food, food consumption expenditure in developing countries decreases by 0.75 percent (Regmi et al. 2001). Faced with higher prices, the poor switch to foods that have lower nutritional value and lack important micronutrients.

Due to government price policies, trade restrictions, and transportation costs, changes in world commodity prices do not automatically translate into changes in domestic prices. In the case of Mexico, the margin between domestic and world prices for maize has ranged between 0 and 35 percent since the beginning of 2004, and a strong relationship between domestic and world prices is evident (Figure 7). In India, the differences between domestic and international rice prices were greater, averaging more than 100 percent between 2000 and 2006.[4] While domestic price-stabilization policies diminish price volatility, they require fiscal resources and cause additional market imperfections. Government policies also change the relationship between consumer and producer prices. For instance, producer prices of wheat in Ethiopia increased more than consumer prices from 2000 to 2006 (Figure 8).

Figure 6—Commodity prices (US$/ton), January 2000–September 2007



Source: Data from FAO 2007c and IMF 2007b; in current US $.

Though international price changes do not fully translate into equivalent domestic farm and consumer price changes because of the different policies and trade positions adopted by each country, they are in fact transmitted to consumers and producers to a considerable extent.

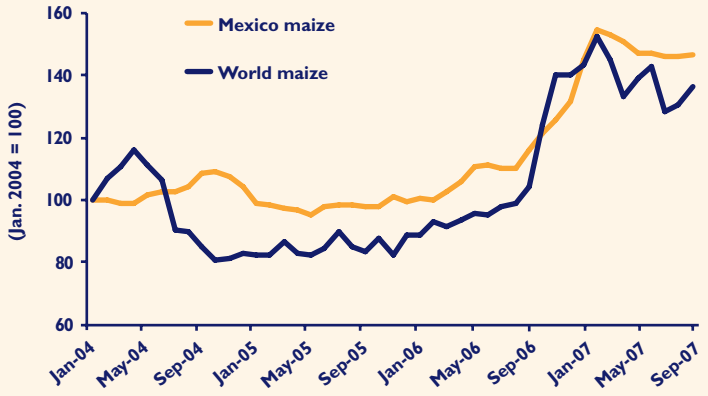
The prices of commodities used in biofuel production are becoming increasingly linked with energy prices. In Brazil, which has been a pioneer in ethanol production since the 1970s, the price of sugar is very closely connected to the price of ethanol (Figure 9). A worrisome implication of the increasing link between energy and food prices is that high energy-price fluctuations are increasingly translated

Table 4—Consumption spending response (%) when prices change by 1% ("elasticity")

	Low-income countries	High-income countries
Food	-0.59	-0.27
Bread and cereals	-0.43	-0.14
Meat	-0.63	-0.29
Dairy	-0.70	-0.31
Fruit and vegetables	-0.51	-0.23

SOURCE: Seale, Regmi, and Bernstein 2003.

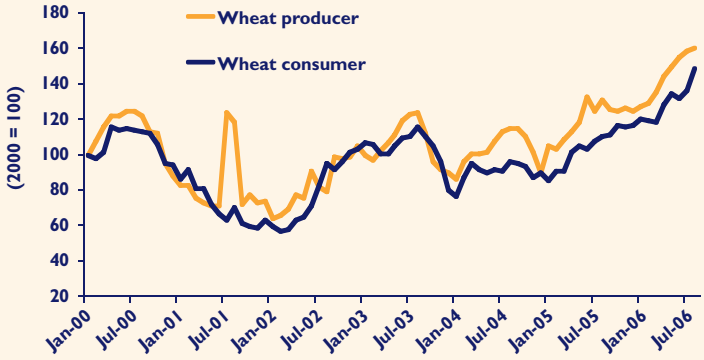
Figure 7—Domestic and world prices of maize in Mexico (January 2004 = 100)



Source: Data from Bank of Mexico 2007 and FAO 2007c.

Note: Domestic prices represent producer prices for the national market in Mexico.

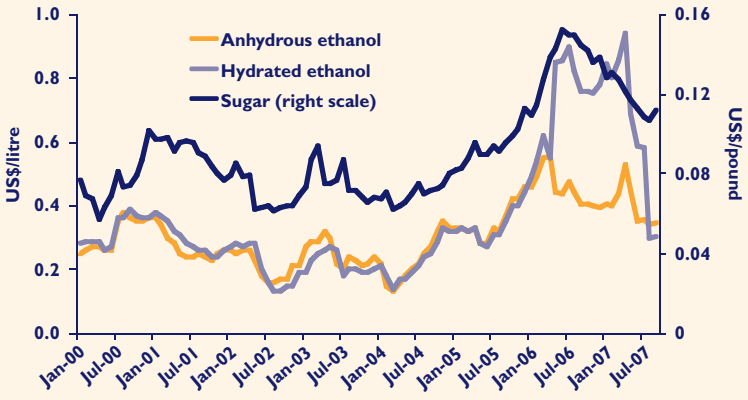
Figure 8—Producer and consumer prices of wheat in Ethiopia (2000 = 100)



Sources: Data from Central Statistical Agency of Ethiopia 2007 and Ethiopian Grain Trade Enterprise 2007.

Note: Consumer prices represent wholesale prices in Addis Ababa, and producer prices are national farmgate prices.

Figure 9—Brazil: Ethanol and sugar prices, January 2000–September 2007



Sources: Data from CEPEA 2007.

Notes: Fuel ethanol prices in Brazil refer to averages for the São Paulo market (mills, distilleries, distributors, intermediaries). Hydrous ethanol is used as a substitute for gasoline and Anhydrous ethanol is mixed with gasoline.

into high food-price fluctuations. In the past five years, price variations in oilseeds and in wheat and corn have increased to about twice the levels of previous decades.[5]

The increasing demand for high-value commodities has resulted in surging prices for meat and dairy products (Figure 10), and this is driving feed prices upward, too. Since the beginning of 2000, butter and milk prices have tripled and poultry prices have almost doubled.

The effects of price increase on consumption are different across different countries and consumer groups. Consumers in low-income countries are much more responsive to price changes than consumers in high-income countries (Table 4). Also, the demand for meat, dairy, fruits, and vegetables is much more sensitive to price, especially among the poor, than is the demand for bread and cereals.

Scenario analyses of the determinants of prices and consumption

The effect of biofuels

When oil prices range between US$60 and $70 a barrel, biofuels are competitive with petroleum in many countries, even with existing technologies. Efficiency benchmarks vary for different biofuels, however, and ultimately, production should be established and expanded where comparative advantages exist. With oil prices above US$90, the competitiveness is of course even stronger.

Feedstock represents the principal share of total biofuel production costs. For ethanol and biodiesel, feedstock accounts for 50–70 percent and 70–80 percent of overall costs, respectively (IEA 2004). Net production costs—which are all costs related to production, including investments—differ widely across countries. For instance, Brazil produces ethanol at about half the cost of Australia and one-third the cost of Germany (Henniges 2005). Significant increases in feedstock costs (by at least 50 percent) in the past few years impinge on comparative advantage and competitiveness. The implication is that while the biofuel sector will contribute to feedstock price changes, it will also be a victim of these price changes.

Food-price projections have not yet been able to fully take into account the impact of biofuels expansion. When assessing potential developments in the biofuels sector and their consequences, the OECD-FAO outlook makes assumptions for a number of countries, including the United States, the European Union, Canada, and China. New biofuel technologies and policies

are viewed as uncertainties that could dramatically impact future food prices (OECD-FAO 2007). The Food and Agricultural Policy Research Institute (FAPRI) conducts a detailed analysis of the potential impact of policy on biofuels and links between the ethanol and gasoline markets, but its extensive modeling is limited to the United States.

A new, more comprehensive global scenario analysis using IFPRI's International Model for Policy Analysis of Agricultural Commodities and Trade (IMPACT) examines current price effects and estimates future ones. In view of the dynamic world food situation and the rapidly changing biofuels sector, IFPRI continuously updates and refines its related models, so the results presented here should be viewed as work in progress. Recently, the IMPACT model has incorporated 2005/06 developments in supply and demand, and has generated two future scenarios based on these developments:

- ***Scenario 1*** is based on the actual biofuel investment plans of many countries that have such plans and assumes biofuel expansions for identified high-potential countries that have not specified their plans.

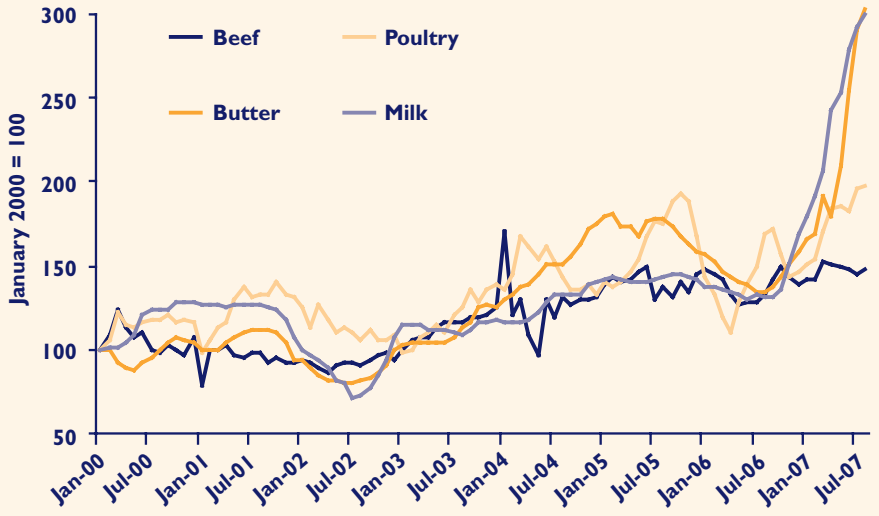
- ***Scenario 2*** assumes a more drastic expansion of biofuels to double the levels used in Scenario 1.

Under the planned biofuel expansion scenario (Scenario 1), international prices increase by 26 percent for maize and by 18 percent for oilseeds. Under the more drastic biofuel expansion scenario (Scenario 2), maize prices rise by 72 percent and oilseeds by 44 percent (Table 5).

Under both scenarios, the increase in crop prices resulting from expanded biofuel production is also accompanied by a net decrease in the availability of and access to food, with calorie consumption estimated to decrease across all regions compared to baseline levels (Figure 11). Food-calorie consumption decreases the most in Sub-Saharan Africa, where calorie availability is projected to fall by more than 8 percent if biofuels expand drastically.

One of the arguments in favor of biofuels is that they could positively affect net carbon emissions as an alterative to fossil fuels. That added social benefit might justify some level of subsidy and regulation, since these external benefits would not be internalized by markets. However, potential forest conversion for biofuel production and the impact of biofuel production on soil fertility are environmental concerns that require attention. As is the case with any form of agricultural production, biofuel feedstock production can be managed in sustainable or in damaging ways. Clear environment-related efficiency criteria and sound process standards need to be

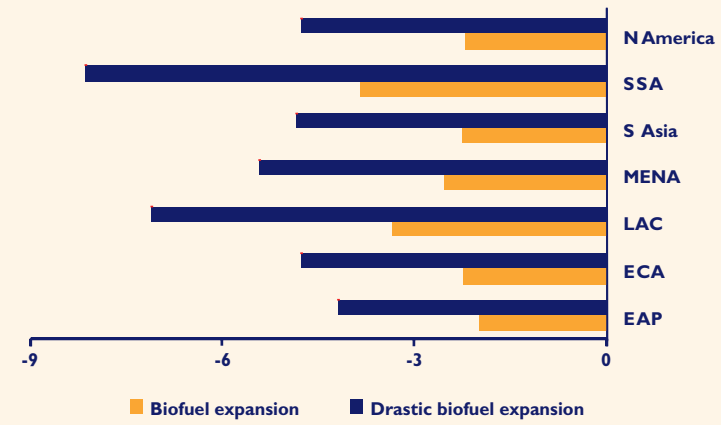
Figure 10—Meat and dairy prices (January 2000 = 100)



Source: Data from FAO 2007c.

Notes: Beef = USA beef export unit value; poultry = export unit value of broiler cuts; butter = Oceania indicative export prices, f.o.b. Milk = Oceania whole milk powder indicative export prices, f.o.b.

Figure 11—Calorie availability changes in 2020 compared to baseline (%)



Source: IFPRI IMPACT projections.

Notes: N America = North America; SSA = Sub-Saharan Africa; S Asia = South Asia; MENA = Middle East & North Africa; LAC = Latin America and the Caribbean; ECA = Europe & Central Asia; EAP = East Asia and Pacific.

established that internalize the positive and negative externalities of biofuels and ensure that the energy output from biofuel production is greater than the amount of energy used in the process. In general, subsidies for biofuels that use agricultural production resources are extremely anti-poor because they implicitly act as a tax on basic food, which represents a large share of poor people's consumption expenditures and becomes even more costly as prices increase, as shown above (von Braun 2007).

Table 5—Changes in world prices of feedstock crops and sugar by 2020 under two scenarios compared with baseline levels (%)

	SCENARIO 1	SCENARIO 2
Crop	Biofuel expansion[a]	Drastic biofuel expansion[b]
Cassava	11.2	26.7
Maize	26.3	71.8
Oilseeds	18.1	44.4
Sugar	11.5	26.6
Wheat	8.3	20.0

SOURCE: IFPRI IMPACT projections (in constant prices).

[a]Assumptions are based on actual biofuel production plans and projections in relevant countries and regions.

[b] Assumptions are based on doubling actual biofuel production plans and projections in relevant countries and regions.

Great technological strides are expected in biofuel production in the coming decades. New technologies converting cellulosic biomass to liquid fuels would create added value by both utilizing waste biomass and by using less land resources. These second-generation technologies, however, are still being developed and third-generation technologies (such as hydrogene) are at an even earlier phase. Even though future technology development will very much determine the competitiveness of the sector, it will not solve the food–fuel competition problem. The trade-offs between food and fuel will actually be accelerated when biofuels become more competitive relative to food and when, consequently, more land, water, and capital are diverted to biofuel production. To soften the trade-offs and mitigate the growing price burden for the poor, it is necessary to accelerate investment in food and agricultural science and technologies, and the CGIAR has a vital role to play in this. For many developing countries, it would be appropriate to wait for the emergence of second-generation technologies, and "leapfrog" onto them later.

Attempts to predict future overall food price changes

How will food prices change in coming years? This is one of the central questions that policymakers, investors, speculators, farmers, and millions of poor people ask. Though the research community does its best to answer this question, the many uncertainties created by supply, demand, market functioning, and policies mean that no straightforward answer can be given. However, a number of studies have analyzed the forces driving the current increases in world food prices and have predicted future price developments.

The Economic Intelligence Unit predicts an 11-percent increase in the price of grains in the next two years and only a 5-percent rise in the price of oilseeds (EIU 2007). The OECD-FAO outlook has higher price projections (it expects the prices of coarse grains, wheat, and oilseeds to increase by 34, 20, and 13 percent, respectively, by 2016–17). The Food and Agricultural Policy Research Institute (FAPRI) expects increases in corn demand and prices to last until 2009–10, and thereafter expects corn production growth to be on par with consumption growth. FAPRI does not expect biofuels to have a large impact on wheat markets, and predicts that wheat prices will stay constant due to stable demand as population growth offsets declining per capita consumption. Only the price of palm oil—another biofuel feedstock—is projected to dramatically increase by 29 percent. In cases where demand for agricultural feedstock is large and elastic, some experts expect petroleum prices to act as a price floor for agricultural commodity prices. In the resulting price corridor, agricultural commodity prices are determined by the product's energy equivalency and the energy price (Schmidhuber 2007).

In order to model recent price developments, changes in supply and demand from 2000 to 2005 as well as biofuel developments were introduced into the IFPRI IMPACT model (see Scenario 1). The results indicate that biofuel production is responsible for only part of the imbalances in the world food equation. Other supply and demand shocks also play important roles. The price changes that resulted from actual supply and demand changes during 2000–2005 capture a fair amount of the noted increase in real prices for grains in those years (Figure 12).[6] For the period from 2006 to 2015, the scenario suggests further increases in cereal prices of about 10 to 20 percent in current U.S. dollars. Continued depreciation of the U.S. dollar—which many expect—may further increase prices in U.S.-dollar terms.

The results suggest that changes on the supply side (including droughts and other shortfalls and the diversion of food for fuel) are powerful forces affecting the price surge at a time when demand is strong due to high income growth in developing countries. Under a scenario of continued high income growth (but no further supply shocks), the preliminary model results indicate that food prices would remain at

high levels for quite some time. The usual supply response embedded in the model would not be strong enough to turn matters around in the near future.

Who benefits and who loses from high prices?

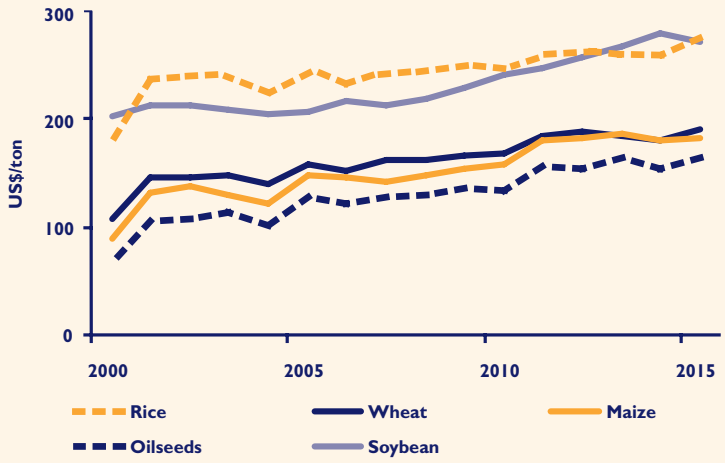
An increase in cereal prices will have uneven impacts across countries and population groups. Net cereal exporters will experience improved terms of trade, while net cereal importers will face increased costs in meeting domestic cereal demand. There are about four times more net cereal-importing countries in the world than net exporters. Even though China is the largest producer of cereals, it is a net importer of cereals due to strong domestic consumption (Table 6). In contrast, India—also a major cereal producer—is a net exporter. Almost all countries in Africa are net importers of cereals.

Price increases also affect the availability of food aid. Global food aid represents less than 7 percent of global official development assistance and less than 0.4 percent of total world food production.[7] Food aid flows, however, have been declining and have reached their lowest level since 1973. In 2006, food aid was 40 percent lower than in 2000 (WFP 2007). Emergency aid continues to constitute the largest portion of food aid. Faced with shrinking resources, food aid is increasingly targeted to fewer countries—mainly in Sub-Saharan Africa—and to specific beneficiary groups.

At the microeconomic level, whether a household will benefit or lose from high food prices depends on whether the household is a net seller or buyer of food. Since food accounts for a large share of the poor's total expenditures, a staple-crop price increase would translate into lower quantity and quality of food consumption. Household surveys provide insights into the potential impact of higher food prices on the poor. Surveys show that poor net buyers in Bolivia, Ethiopia, Bangladesh, and Zambia purchase more staple foods than net sellers sell (Table 7). The impact of a price increase is country and crop specific. For instance, two-thirds of rural households in Java own between 0 and 0.25 hectares of land, and only 10 percent of households would benefit from an increase in rice prices (IFPP 2002).

In sum, in view of the changed farm-production and market situation that the poor face today, there is not much supporting evidence for the idea that higher farm prices would generally cause poor households to gain more on the income side than they would lose on the consumption–expenditure side. Adjustments in the farm and rural economy that might indirectly create new income opportunities due to the changed incentives will take time to reach the poor.

Figure 12—Modeling the actual price change of cereals, 2000–2005 and scenario 2006–2015 (US$/ton)



Source: Preliminary results from the IFPRI IMPACT model, provided by Mark W. Rosegrant (IFPRI). In constant prices.

Table 6—Net cereal exports and imports for selected countries (three-year averages 2003–2005)

Country	1000 tons
Japan	-24,986
Mexico	-12,576
Egypt	-10,767
Nigeria	-2,927
Brazil	-2,670
China	-1,331
Ethiopia	-789
Burkina Faso	29
India	3,637
Argentina	20,431
United States	76,653

SOURCE: Data from FAO 2007a.

Table 7—Purchases and sales of staple foods by the poor (% of total expenditure of all poor)

Staple foods	Bolivia 2002	Ethiopia 2000	Bangladesh 2001	Zambia 1998
Purchases by all poor net buyers	11.3	10.2	22.0	10.3
Sales by all poor net sellers	1.4	2.8	4.0	2.3

SOURCE: Adapted from World Bank 2007a.

Poverty and the Food and Nutrition Situation

Many of those who are the poorest and hungriest today will still be poor and hungry in 2015, the target year of the Millennium Development Goals. IFPRI research has shown that 160 million people live in ultra poverty on less than 50 cents a day (Ahmed et al. 2007). The fact that large numbers of people continue to live in intransigent poverty and hunger in an increasingly wealthy global economy is the major ethical, economic, and public health challenge of our time.

The number of undernourished in the developing world actually increased from 823 million in 1990 to 830 million in 2004 (FAO 2006a). In the same period, the share of undernourished declined by only 3 percentage points—from 20 to 17 percent. The share of the ultra poor—those who live on less than US$0.50 a day—decreased more slowly than the share of the poor who live on US$1 a day (Ahmed et al. 2007). In Sub-Saharan Africa and Latin America, the number of people living on less than US$0.50 a day has actually increased (Ahmed et al. 2007). Clearly, the poorest are being left behind.

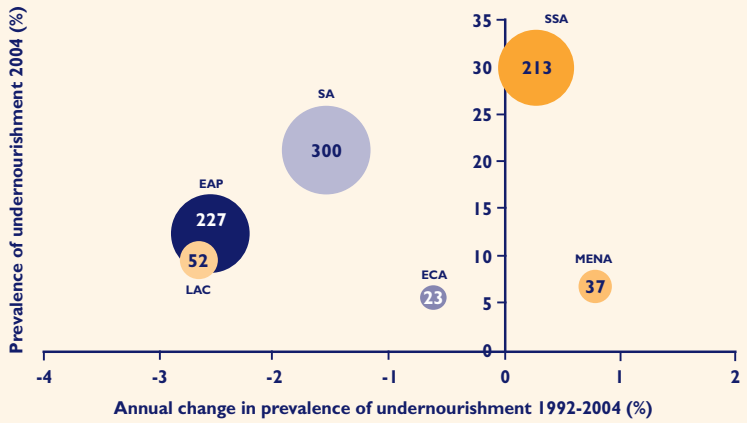
Behind the global figures on undernourishment, there are also substantial regional differences (Figure 13). In East Asia, the number of food insecure has decreased by more than 18 percent since the early 1990s and the prevalence of undernourishment decreased on average by 2.5 percent per annum, mostly due to economic growth in China. In Sub-Saharan Africa, however, the number of food-insecure people increased by more than 26 percent and the prevalence of undernourishment increased by 0.3 percent per year. South Asia remains the region with the largest number of hungry, accounting for 36 percent of all undernourished in the developing world.

Recent data show that in the developing world, one of every four children under the age of five is still underweight and one of every three is stunted.[8] Children living in rural areas are nearly twice as likely to be underweight as children in urban areas (UNICEF 2006).

An aggregate view on progress—or lack thereof—is given by IFPRI's Global Hunger Index (GHI). It evaluates manifestations of hunger beyond dietary energy availability. The GHI is a combined measure of three equally weighted components: (i) the proportion of undernourished as a percentage of the population, (ii) the prevalence of underweight in children under the age of five, and (iii) the under-five mortality rate. The Index ranks countries on a 100-point scale, with higher scores indicating greater hunger. Scores above 10 are considered serious and scores above 30 are considered extremely alarming.

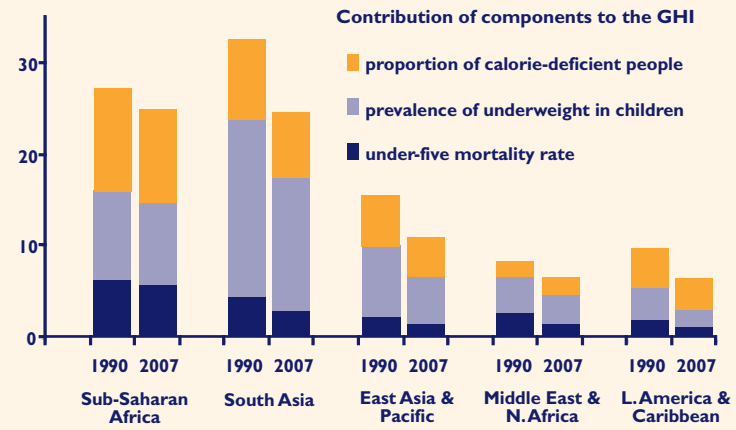
From 1990 to 2007, the GHI improved significantly in South and Southeast Asia, but progress was limited in the Middle East and North Africa and in Sub-Saharan Africa (Figure 14). The causes and manifestations of hunger differ substantially between regions. Although Sub-Saharan Africa and South Asia currently have virtually the same scores, the prevalence of underweight children is much higher in South Asia, while the proportion of calorie-deficient people and child mortality is much more serious in Sub-Saharan Africa.

Figure 13—Prevalence of undernourishment in developing countries, 1992–2004 (% of population)



Source: Data from FAO 2006a and World Bank 2007b.
Note: The size of the bubbles represents millions of undernourished people in 2004. EAP—East Asia and the Pacific, LAC—Latin America and the Caribbean, SA—South Asia, SSA—Sub-Saharan Africa, MENA—Middle East and North Africa, ECA—Eastern Europe and Central Asia.

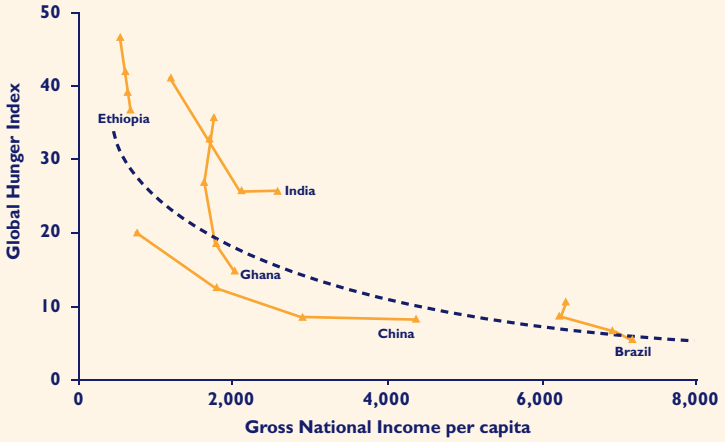
Figure 14—Changes in the Global Hunger Index (GHI)



Source: Adapted from Wiesmann et al. 2007.

Note: GHI 1990 was calculated on the basis of data from 1992 to 1998. GHI 2007 was calculated on the basis of data from 2000 to 2005, and encompasses 97 developing countries and 21 transition countries.

Figure 15—Trends in the GHI and Gross National Income per capita (1981, 1992, 1997, 2003)



Source: Analysis by Doris Wiesmann (IFPRI) based on GHI data from Wiesmann et al. 2007 and gross national income per capita data from World Bank 2007b.

Note: Gross National Income per capita was calculated for three-year averages (1979–81, 1990–92, 1995–97, and 2001–03, considering purchasing power parity). Each triangle represents one of the four years: 1981, 1992, 1997, and 2003.

In recent years, countries' progress toward alleviating hunger has been mixed. For instance, progress slowed in China and India, and accelerated in Brazil and Ghana (Figure 15). Many countries in Sub-Saharan Africa have considerably higher GHI values than countries with similar incomes per capita, largely due to political instability and war. Index scores for Ethiopia moved up and down, increasing during times of war and improving considerably between 1997 and 2003.

Climate change will create new food insecurities in coming decades. Low-income countries with limited adaptive capacities to climate variability and change are faced with significant threats to food security. In many African countries, for example, agricultural production as well as access to food will be negatively affected, thereby increasing food insecurity and malnutrition (Easterling et al. 2007). When taking into account the effects of climate change, the number of undernourished people in Sub-Saharan Africa may triple between 1990 and 2080 under these assumptions (Table 8).

Table 8—Expected number of undernourished in millions, incorporating the effects of climate change

Region	1990	2020	2050	2080	2080/1990 ratio
Developing countries	885	772	579	554	0.6
Asia, Developing	659	390	123	73	0.1
Sub-Saharan Africa	138	273	359	410	3.0
Latin America	54	53	40	23	0.4
Middle East & North Africa	33	55	56	48	1.5

SOURCE: Adapted from Tubiello and Fischer 2007.

Conclusions

The main findings of this update on the world food situation are:

- Strong economic growth in developing countries is a main driver of a changing world food demand toward high-value agricultural products and processed foods.
- Slow-growing supply, low stocks, and supply shocks at a time of surging demand for feed, food, and fuel have led to drastic price increases, and these high prices do not appear likely to fall soon.
- Biofuel production has contributed to the changing world food equation and currently adversely affects the poor through price-level and price-volatility effects.
- Many small farmers would like to take advantage of the new income-generating opportunities presented by high-value products (meat, milk, vegetables, fruits, flowers). There are, however, high barriers to market entry. Therefore, improved capacity is needed to address safety and quality standards as well as the large scales required by food processors and retailers.
- Poor households that are net sellers of food benefit from higher prices, but these are few. Households that are net buyers lose, and they represent the large majority of the poor.
- A number of countries—including countries in Africa—have made good progress in reducing hunger and child malnutrition. But many of the poorest and hungry are still being left behind despite policies that aim to cut poverty and hunger in half by 2015 under the Millennium Development Goals.
- Higher food prices will cause the poor to shift to even less-balanced diets, with adverse impacts on health in the short and long run.

Business as usual could mean increased misery, especially for the world's poorest populations. A mix of policy actions that avoids damage and fosters positive responses is required. While maintaining a focus on long-term challenges is vital, there are five actions that should be undertaken immediately:

1. Developed countries should facilitate flexible responses to drastic price changes by eliminating trade barriers and programs that set aside agriculture resources, except in well-defined conservation areas. A world confronted with more scarcity of food needs to trade more—not less—to spread opportunities fairly.
2. Developing countries should rapidly increase investment in rural infrastructure and market institutions in order to reduce agricultural-input access constraints, since these are hindering a stronger production response.
3. Investment in agricultural science and technology by the Consultative Group on International Agricultural Research (CGIAR) and national research systems could play a key role in facilitating a stronger global production response to the rise in prices.
4. The acute risks facing the poor—reduced food availability and limited access to income-generating opportunities—require expanded social-protection measures. Productive social safety nets should be tailored to country circumstances and should focus on early childhood nutrition.
5. Placing agricultural and food issues onto the national and international climate-change policy agendas is critical for ensuring an efficient and pro-poor response to the emerging risks.

Notes

1. The most food-insecure countries include the 20 countries with the highest prevalence of undernourishment and the 20 countries with the highest number of undernourished people as reported in FAO 2006a. Six countries overlap across both categories.

2. The data on stocks are estimates that need to be interpreted with caution since not all countries make such data available.

3. Carbon fertilization refers to the influence of higher atmospheric concentrations of carbon dioxide on crop yields.

4. Calculation based on data from Government of India 2007 and FAO 2007b.

5. The coefficient of variation of oilseeds in the past five years was 0.20, compared to typical coefficients in the range of 0.08–0.12 in the past two decades. In the past decade, the coefficient of variation of corn increased from 0.09 to 0.22 (von Braun 2007).

6. The weather variables are partly synthesized because complete data are not available, so turning points on prices will not be precise, but the trend captures significant change.

7. Calculations are for 2006 and are based on data from OECD 2007, FAO 2007a, and WFP 2007.

8. With height less than two standard deviations below the median height-for-age of the reference population.

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