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**FOOD POLICY**  
**REPORT**

# **GLOBAL FOOD CRISES**

**Monitoring and Assessing Impact to Inform Policy Responses**

Todd Benson, Nicholas Minot, John Pender, Miguel Robles, Joachim von Braun



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International Food Policy Research Institute  
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# Executive Summary

**S**trong upward trends and increased variability in global food prices over the past two years have led to concern that hunger and poverty will increase across the world. At the same time, rising food prices provide an incentive and opportunity for many developing countries to strengthen the contribution their farmers make to national economic growth and poverty reduction. Policymakers and opinion leaders in developing countries, however, often lack sufficient information to gauge the likely effects of global food crises on their country and to identify, design, and implement policy actions that can best avoid risks and take advantage of opportunities. The deficiencies in information and analysis can lead to over- and underreactions, resulting in policy and market failures. Experiences across countries in 2007 and 2008 show ample evidence of such outcomes.

This report seeks to support national decisionmakers, as well as their international development partners, in acquiring information and applying methods for understanding the likely effects of a global food crisis on their country and acting to alleviate the risks and exploit the opportunities brought about by such crises. It describes data and methods and suggests how to facilitate their collection and use. The report then outlines the design and implementation of an open Internet-based portal for sharing reliable, appropriate information and decision-support tools for national policymakers so they can respond quickly to changes in world food markets in an informed manner.

National decisionmakers and policy analysts must understand the degree to which their country and population groups within it are exposed to the negative effects of rising food prices or could exploit new opportunities offered by the higher prices. This requires information on

- global market developments;

- the characteristics of the country with regard to international trade in food;
- the trends in local wages, agricultural prices, and fuel prices;
- the composition of income and expenditure among different population groups in the country; and
- the responses of producers, consumers, and the government to rising food prices.

The actual effects of the food crisis at the national level depend on

- the net trade position (exporter or importer) in agricultural commodities relative to the size of the economy;
- the degree to which changes in global prices are transmitted to local markets;
- the sensitivity of government revenue and expenditures to rising food prices; and
- the political and fiscal capacity of the government to respond to the crisis.

Moreover, the effects of a crisis will differ among communities and from household to household, depending on

- the net sales (or net purchases) of food relative to household income;
- the level of income and assets, which influence food security and vulnerability to shocks; and
- the existence and effectiveness of government programs and policies to protect vulnerable households.

Within households, members are likely to be affected by a crisis to varying degrees, with the nutritionally vulnerable members—women of childbearing age and young children—most at risk.

This report distinguishes the basic information needed to assess the broad implications of a global food crisis for a country from the more advanced information and analyses that are needed to design and implement specific responses to such crises. In considering the vulnerability of countries, households, and individuals to a global food crisis, the report points to information that national decisionmakers can use to assess the degree to which their country as a whole is likely to be affected by rising global food prices in one way or another and to determine which population groups are likely to see a change in their well-being. The most important sources of such data include nationally representative household surveys, food price series from important commodity marketplaces in a country, and trade statistics. Where such data are missing for a country, it is necessary to rely on qualitative or indicative, rather than representative, data to make the needed assessments in the short run. To undertake relatively thorough assessments of the impact of a global food crisis on a country and its citizens, however, and to determine the best course of action to follow in response, detailed data are required.

The analytical capacity required at the national level to respond to a global food crisis will vary. Some powerful initial analyses to gauge the probable impact of a crisis can be conducted without much specialized skill using relatively basic data sets. Detailed studies of the second-round and economywide effects of a global food crisis on a country, however, call for more comprehensive data, sophisticated analytical tools, and specialized skills.

A wealth of information on the world food situation and its shifts is available, but not everywhere, quickly, or at the needed level of disaggregation. In some contexts, even when information is available, access to it is not assured for all stakeholders. Frequently, government

leaders and their analysts, civil society, and business actors are not sufficiently informed for sound decision-making. In response to these information challenges, the report outlines a global initiative by which networks of partners and individual experts would provide reliable, appropriate information and decision-support tools for national policymakers. This plan includes the creation of an Internet-based information portal to serve as a reliable information- and decision-support tool to strengthen the ability of policymakers to respond quickly to dynamic developments in world food markets. In today's Internet world, many useful websites and portals exist, including important ones operated by FAO, the World Bank, the CGIAR, and others. The portal designed here will not duplicate them but add specific value. The portal will become a reliable information and decision-support tool to strengthen the ability of policymakers in the developing world to respond quickly to dynamic developments in the world food system, especially crises. It will include policy analysis tools that users can employ directly and detailed country-by-country data and other food policy information, assembled from a wide array of sources. Because the portal will be designed in an open Wikipedia-type fashion, access to the portal both to obtain and to add information and tools will be open to the wider public as an international public good.

The adequacy of the response to a global food crisis depends to a large degree on the policy- and program-related reactions of national-level policymakers around the globe. This report provides insight on the information and analytical tools that national-level decisionmakers need to assess the risks and opportunities posed to their country and its citizens by a global food crisis, to determine how they might respond to those risks and opportunities, and to identify ways to monitor the impact of the food crisis and the effects of policy responses.

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# Introduction

**The current world food crisis has revealed serious deficiencies in the information available for guiding policy responses at global and national levels. This report seeks to support national governments, as well as international development partners that assist country-level actions, with the information and tools they require to assess the impact of the food crisis and to design and implement policy responses to it.**

Strong upward trends in global food prices over the past two years have led to widespread concern that hunger and poverty will increase sharply across the world. At the same time, rising food prices provide a strong incentive and opportunity for many developing countries to strengthen the contribution their farmers, and the agricultural sector as a whole, make to national economic growth and poverty reduction. Although a coordinated response is urgently needed at international and regional levels, national governments in particular face the challenge of responding to their people's immediate increased food and nutritional needs while stimulating the agricultural sector to increase the food supply. The adequacy of the global response to the global food crisis depends to a large degree on the policy- and program-related reactions of national-level policymakers around the globe.

Policymakers in developing countries often do not, however, have sufficient information to gauge the likely effects of the global food crisis on their country and to implement appropriate policy actions. For example, the

imposition of domestic food price controls in many countries in reaction to the current crisis can be expected to limit farmers' incentives to increase the production of food crops in subsequent cropping seasons. It is clear that many national leaders require tools to assess the impact of global food crises on their country, on its economy, and on vulnerable population groups, as well as to design and implement national policies and programs to address the risks and opportunities presented by such crises.

Since the implications of high and volatile food prices differ widely across countries and across groups within each country, policy responses must be adapted to country-specific needs and conditions. Although policy responses are likely to be country-specific, however, a relatively consistent set of information and analytical tools is required to guide policymaking in countries affected by global food crises. This report describes these data and methods and suggests how to coordinate their collection and use.

# Conceptual Framework for Understanding the Impact of a Food Crisis

**F**igure 1 provides a framework for understanding the context for this report. The key elements in tracing the effects of a global food crisis at the national level and below are presented in the top half of the figure, and the pathways for policy analysis and policy action are diagrammed in the lower half. This figure is necessarily simplified; several of the elements are described in further detail later in the report.

The process starts at the upper left with the interaction of factors governing global demand for and supply of food. The factors most commonly highlighted as contributing to the current global food crisis include increased costs of food production, processing, and marketing linked to sharply higher oil prices; the use of food crops for biofuel production in the United States and Europe; growing meat consumption that stimulates increased demand for animal feed; poor harvests in certain major agricultural regions; and consistent underinvestment in agriculture over past decades resulting in agricultural production that lags behind population growth or broader economic growth. Several other factors must also be noted, including a weak U.S. dollar on foreign exchange markets, disincentives to agricultural production and trade stemming from protectionist or distortionary trade policies, and speculative behavior by both governments and commercial agents (see Abbott, Hurt, and Tyner 2008; FAO 2008; von Braun et al. 2008). Debate continues about the relative importance of each factor at the global level, but the net effect has been sharply higher world food prices.

The global food crisis has effects at a range of scales—national, household, and individual—and across a range of sectors of the economy. The impact of higher global prices on each country and its citizens depends, however, on local conditioning factors. For example, the degree to which global price changes are transmitted to the national economy depends on a country's structure of imports and exports, transportation costs, and trade policy. Similarly, the degree to which higher local food prices affect household welfare depends on the importance of net food purchases relative to the size of the household budget. (These conditioning factors are

examined in more detail later in this report.) It is worth noting, however, the double-ended arrow running between effects and conditioning factors in Figure 1—the effects of the high food prices have feedback effects on the conditioning factors.

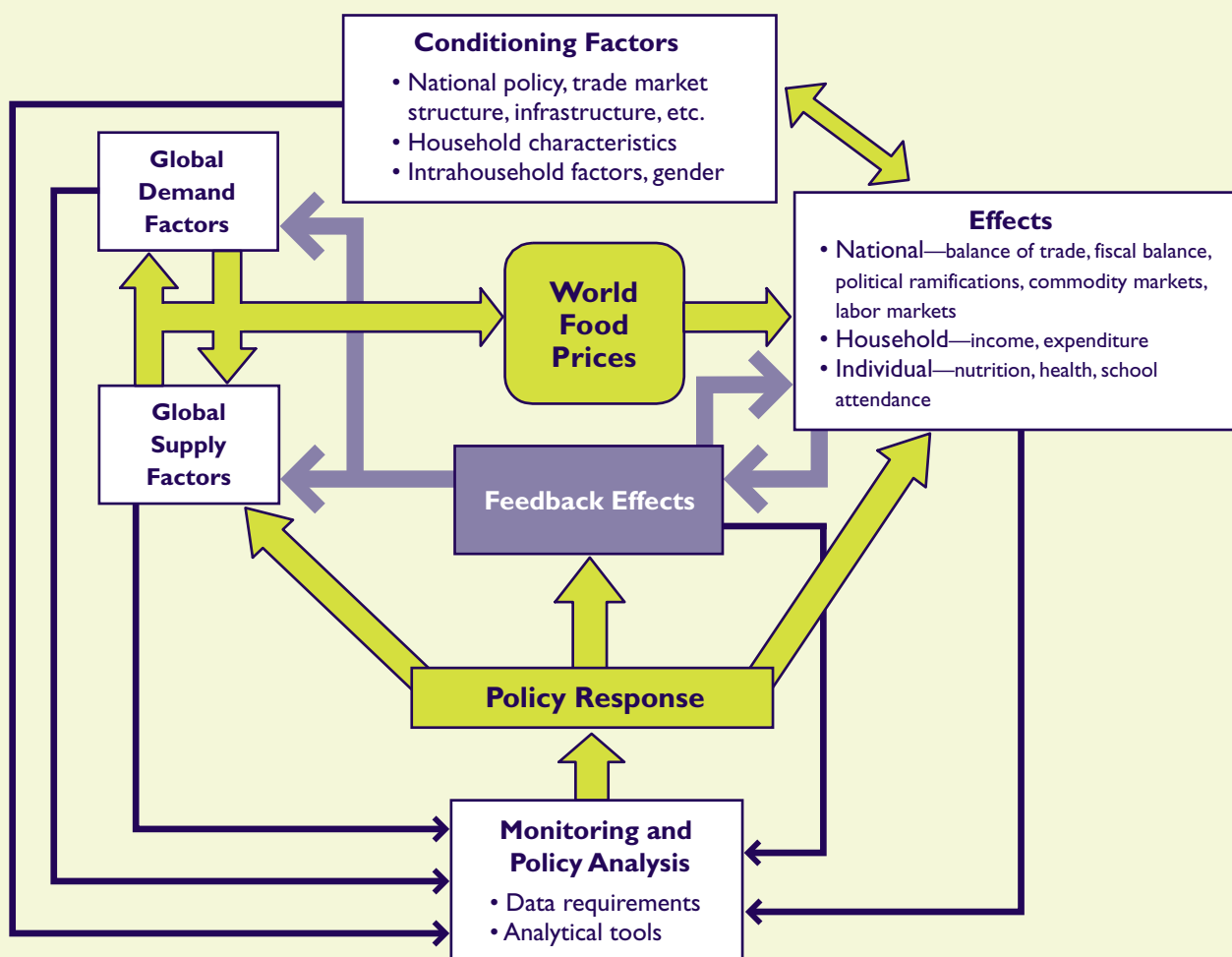
Feedback effects are the final element in tracing the effects of a global food crisis at the national level and below. These feedback effects are shown in the diagram by the looped arrows running between effects and feedback effects, and from feedback effects to global supply and demand factors. The initial effects of rising global prices will themselves lead to a cascade of secondary effects that may reinforce or mitigate the initial effects. Although these feedback effects are strongest within a country, as shown by the looped arrows, the impact of some of them will contribute to further changes in global food prices, particularly through the regional and international impact of a country's trade and agricultural policies.

The pathways for policy analysis and policy action in response to higher global food prices are diagrammed in the lower half of Figure 1. For a national government to design and implement effective policy in response to a global food crisis, its leaders and policy analysts must understand the degree to which the country and population groups within it are exposed to risks or opportunities presented by the higher prices. This understanding requires information on the characteristics—the conditioning factors—of the country and the population groups that determine how they are likely to be affected by the global food crisis, information on global demand for and supply of food, and information on the effects of rising global food prices, both initially and in the second-round feedback processes.

With appropriate data and the application of appropriate methods for policy analysis and monitoring, political leaders and policy analysts within government will have the evidence they need to design effective policies and programs to respond to the effects (and feedback

effects) of a global food crisis on the country and its citizens. Moreover, although the impact of the policies implemented will be strongest within a country, some policies will also contribute to further changes in demand and supply factors determining global food prices.

**Figure 1—Linking policy and policy analysis in addressing the effects of the global food crisis at the national level and below: A conceptual framework**



# Monitoring and Assessing the Impact of a Food Crisis

**T**o assess the impact of global food price changes on countries, households, and individuals, this section considers two elements of the broad conceptual framework presented in Figure 1—the effects and the conditioning factors—in more detail and then examines the data and the methods required to monitor and to assess the likely effects of a global food crisis.

## Effects of a food crisis

Figure 2 is a conceptual diagram of how changes in global food prices affect the national economy, the operations of government, and commodity and labor markets. These adjustments result in some immediate short-term effects on the incomes of households, the nature of which will depend on key household characteristics. Finally, changes in the economic condition of the household will lead to changes in the well-being of individuals within affected households.

### Effects at the national level

Ultimately, the welfare of communities and individuals is of the greatest interest, but changes at the national level may be indicators of current or future impacts at these levels. Five elements contribute to the aggregate national impact—changes in local commodity markets, local labor markets, fiscal balance, terms of trade, and political activity.

**Local commodity markets.** Higher world commodity prices generally increase the price of food, fuel, and fertilizer in developing-country markets, but the degree to which the price increase is transmitted depends on the commodity, the location of the country relative to global market centers, and the country's trade policies. Almost all of the global price increase is likely to be transmitted to local markets when the commodity is internationally traded, when local and international commodities are close substitutes, when the country's trade policy is relatively open, and when there are good transportation links with international markets. In many countries, wheat, maize, and to a lesser degree rice are tradable, so their domestic price generally reflects international prices.

For commodities that are not widely traded internationally, however, such as cassava, sweet potato, and, in some countries, rice, the impact of world prices on local

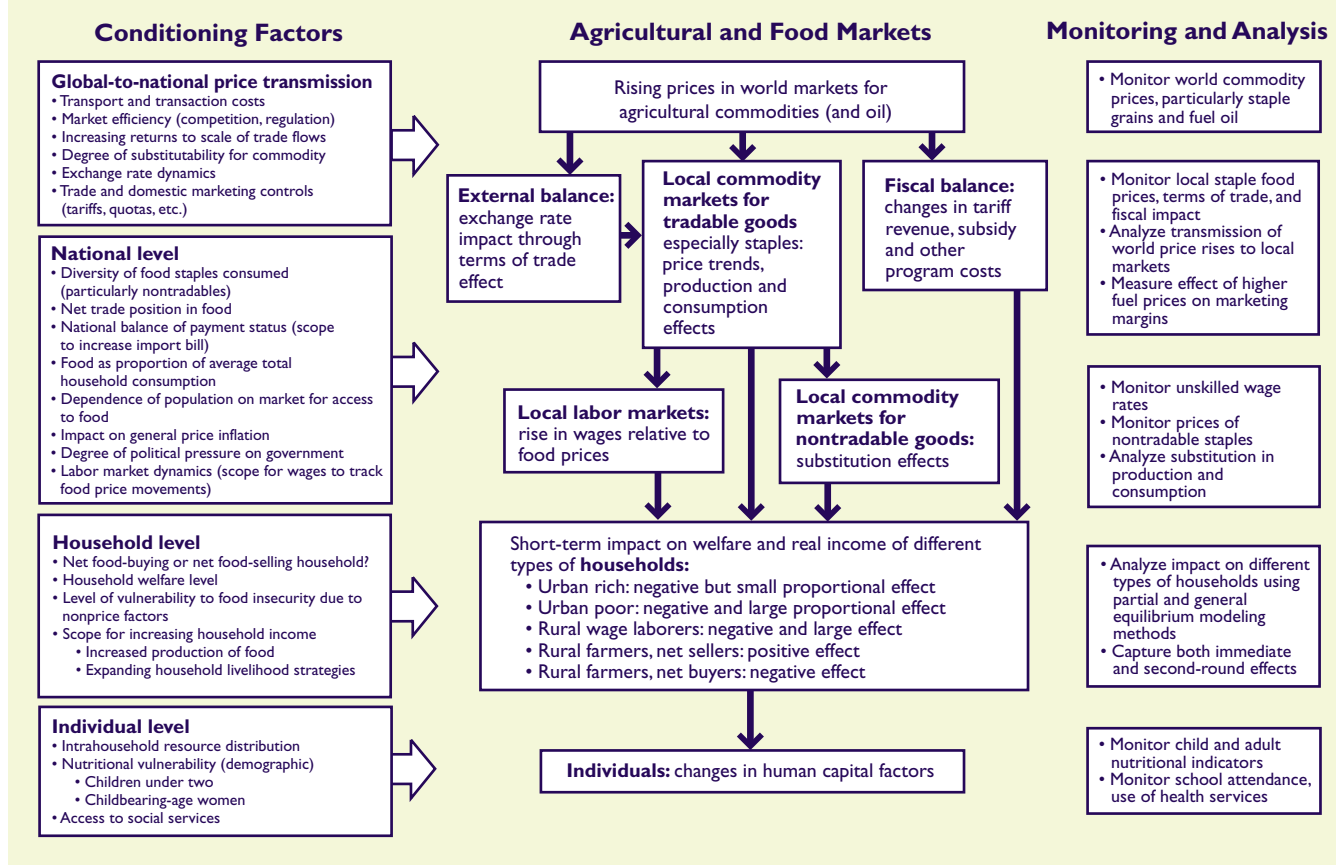
prices is likely to be muted, as local prices follow local supply and demand conditions. Yet even the local prices of nontradable staples can be expected to rise in response to a food crisis as consumers seeking lower-priced substitutes shift their staple food consumption to these nontradables. In addition, to the extent that farmers shift into production of tradable crops in response to their higher prices, the supply of nontradables may tighten, contributing to price increases for those commodities.

A rise in fuel prices increases the cost of transportation, which has a disproportionate effect on agricultural commodities because of their low value–bulk ratio. Increased transportation costs further raise the delivered cost of imported food and reduce the local prices obtained for export crops. To the extent that the fuel price hikes are transmitted to local markets, they also increase the cost of domestic agricultural marketing.

**Local labor markets.** Higher prices for commodities, particularly food, will put upward pressure on wage rates. In the face of higher food prices, employees will seek to renegotiate the wages they receive from employers in order to reestablish their previous purchasing power. Typically, however, wages are “sticky” and upward adjustments lag behind price increases. Because labor is often an important source of income for the urban poor, the rural landless, and small part-time farmers, it is important to monitor changes in wage rates, particularly for unskilled labor, to assess the impact of a global food crisis.

**Fiscal balance.** Global food crises can affect government revenue and expenditure in several ways. First, changes in the volume and value of trade due to a food crisis will influence tariff revenue, an important source of revenue for many developing countries. Second, changes in the price of food, fuel, and fertilizer will affect government spending on subsidies, particularly if the after-subsidy price, rather than the size of the

**Figure 2—Conceptual framework for understanding the welfare impact of food crises**



subsidy, is fixed—a situation that can result in a rapid ballooning of subsidy costs. Third, government spending on social assistance programs will be affected to the extent that a food crisis causes more (or fewer) people to participate in the program or increases the cost per beneficiary, as would be the case if program benefits are defined in terms of a quantity of goods, for example.

Any adverse fiscal impact of a food crisis will eventually be transmitted to households in the form of higher taxes or reduced provision of goods and services, although the costs may be passed on in future years or to future generations in the form of debt.

**External balance.** Global food crises also can affect exports, imports, and the market for foreign currency through changes in the terms of trade between importers and exporters. For countries that are net importers of food and fuel, higher world prices result in a decline in the terms of trade. If the exchange rate floats, the increased demand for foreign currency results in depreciation of the country's currency. If the exchange rate is fixed, the result will be a "shortage" of foreign

currency and the possible emergence of a parallel market for foreign currency. In either case, the impact is eventually transmitted to households in the form of higher relative prices for households purchasing tradable goods (imported and exportable goods), but higher returns for households selling tradable goods (exports and import-substitute goods).

**Political activity.** In many countries, the recent increase in food and fuel prices has led to street demonstrations and even riots. These events are not necessarily a good indicator of the size of the adverse impact of a food crisis because political activity is also affected by the degree of political mobilization in urban areas, the government's tolerance of dissent, and other factors. These political effects are likely, however, to influence the government's reaction to the food crisis, to define the range of possible policy responses it might undertake, and to condition how effective its actions might be to safeguard the welfare of the most vulnerable households and individuals.



### **Effects at the household level**

The broadest measure of the impact of a food crisis on household welfare is the change in the real value of per capita consumption expenditure, although asset ownership and nonmonetary measures (such as nutrition or incidence of crime) may be useful as well. As diagrammed in Figure 2, household welfare is directly influenced by the price of food and other commodities the household buys and sells, as well as prevailing wage rates. Similarly, the fiscal balance of government affects households through changes in taxes and in the provision of government services from which households might benefit. The external balance affects households indirectly by influencing the exchange rate, which in turn affects the relative price of tradable and nontradable goods that households face in the market.

The impact of a food crisis will vary across different types of households in a country. Net food-selling households are likely to benefit from rising food prices. These generally better-off farming households will see an increase in income that will more than compensate for the rise in the price of any foods they purchase. Net food-buying households, however, which generally make up the majority of the population in most developing countries, are likely to be adversely affected by the global food crisis. Their purchasing power will be eroded by higher food prices, potentially resulting in a shift to cheaper sources of calories, a reduction in nonfood spending, the sale of assets, or a combination of these responses. For urban poor and landless rural households, significant reductions in welfare can be expected due to rising food prices, at least initially. Although wage rates for workers in these groups will adjust upward, these wage increases usually occur with a time lag and fail to keep up with food price increases.

Similarly, the household-level effects of higher fuel prices, which are an integral element of the current global food crisis, depend on the importance of transportation, fuel, and fertilizer in household expenditure patterns, as well as having an indirect impact through the higher cost of transportation of goods that they purchase. For poor households in developing countries, the impact of higher fuel prices is usually much smaller than the impact of higher food prices.

Given this variation in impact across households, it is misleading to talk about the “average impact” of a global food crisis. To fully understand the effects of a crisis, it is important to evaluate the impact of a particular crisis on different types of households within a country.

### **Effects at the individual level**

The welfare impact of a food crisis may differ across members of the same household, a fact that is not taken into account in the preceding household-level analysis. Many studies have demonstrated that resources are generally not distributed equally to all household members, with women and girls often being disadvantaged, although the degree varies across countries and regions and by household characteristics (Quisumbing 2003).

In considering the effects of a global food crisis at the individual level and how governments might respond, the focus should be principally on the degree to which past and future investments in the human capital of individuals can be safeguarded so that individuals can attain their full social and economic potential and contribute creatively to their own and the country’s economic well-being. Educational attainment and health and nutritional status are key factors to consider, particularly because households may cope with the negative impacts of a food crisis by disinvesting in the human capital of individuals in the households, particularly the young. They may, for example, withdraw children from school to reduce costs or to generate income from their labor, reduce expenditures on preventative health care, and change the household diet away from protein- and micronutrient-rich foods (meat and vegetables) to less expensive staples. Through such pathways, the negative impact of a global food crisis on vulnerable households may extend into the next generation.

### **Factors influencing vulnerability to a food crisis**

As already noted, the effects of higher global food prices depend on a range of conditioning factors that operate at different levels. These factors determine the vulnerability of countries, communities, households, and individuals to adverse impacts due to rising global food prices. A closer examination of these factors will provide national leaders with a better understanding of the type and size of impact that a global food crisis is likely to have on their country and its citizens.

On the left side of Figure 2, four sets of conditioning factors are highlighted—those governing the degree to which global food prices are transmitted to national food markets, those that determine national-level impacts, those that determine the degree to which households might benefit from or be adversely affected by higher food prices, and, finally, those that influence how individuals within those households are likely to be affected.

The impact of a global food crisis is transmitted to the level of the individual in a certain sequence. National-level effects are dependent upon the degree to which global prices are transmitted to national markets. If a country has poor trading links to global market centers because it is landlocked or has inadequate transportation links or because it has adopted strongly protectionist policies, the global food crisis is likely to have only a limited direct impact on the country. Several other factors that affect the transmission of prices are noted in Figure 2 (Rapsomanikis, Hallam, and Conforti 2006). Characteristics of the food economy of the country—whether it is a net importer or exporter of food, the importance of subsistence food production for the population, and the degree to which food dominates the consumption baskets of households in the country—will determine the actual national effects of the rise in global food prices. Broader economic and trade considerations are also important, such as the size of the food import bill relative to total exports, the fiscal impact of higher prices, and the ability of the country to implement social protection programs. Similarly, the responsiveness of labor markets to changes in commodity prices will be an important factor in determining both national-level and household-level effects of a food crisis.

As noted, households vary in the degree to which they are exposed to the impact of rising food prices and in the nature of that impact. Some households will see an improvement in their welfare, others a decline, with some slipping into poverty in consequence (Ivanic and Martin 2008). The position of households as consumers or producers with regard to food markets was already highlighted as a key characteristic in determining the initial impact of higher food prices in local markets. The general welfare level of a household is also important—the wealthier a household is, the more resilient it will be to such economic shocks. Similarly, those households that can exploit additional income sources or expand existing sources will be better able to cope with the negative aspects of rising food prices and potentially benefit from them.

Finally, although the vulnerability of their household will be the most important determinant of individuals' vulnerability to risks from a global food crisis, the vulnerability of members of a household will vary. Where continued access to adequate food and basic social services is jeopardized, the nutritional well-being of household members is placed at risk. The most severe and enduring effects of any resulting malnutrition are felt by women of childbearing age and their young

children, both in the womb and in the early years of life when physical and mental development occurs rapidly. The degree to which household resources are directed to the needs of these individuals will determine how significant and persistent the effects of a global food crisis will be for them. Similarly, the provision of basic public social services or community assistance to the most vulnerable will mitigate some of the adverse individual effects of a food crisis.

Most national leaders seek to act so that any positive impacts of a global food crisis are enhanced and sustained and any adverse effects that constrain the development ambitions of the country or its people are avoided or reduced. Moreover, the entire social and economic framework within which the effects of a global food crisis play out at the national level is dynamic. Any public policy responses or any adjustments made by private firms, households, and individuals in the face of changing economic conditions due to rising global food prices will alter the conditioning factors that determined the nature of the initial impact of these rising prices. Consequently, feedback or second-round effects will foster additional adjustments. Many of these second-round effects may operate in a manner opposite to the initial effects experienced. Relatively sophisticated policy analysis will be required to identify these second-round effects and adequately address the threats and opportunities facing a country and its citizens.

In considering the vulnerability of countries, households, and individuals to global food crises, national leaders can use a relatively small set of information to assess the degree to which their country as a whole is likely to be affected by rising global food prices in one way or another and to determine which groups in the population of the country are thus likely to see a change in their well-being. Table 1 provides a list of key national- and household-level indicators to use for this purpose.

The most important sources of these data for a country include nationally representative household surveys with information on consumption, expenditure, and income; food price series from important commodity marketplaces in a country; and trade statistics. Most countries have such data, but where they are missing, it will be necessary to rely on qualitative or indicative, rather than representative, data to make this assessment. For national leaders focusing on their own country's vulnerability to a global food crisis, qualitative assessments of the factors noted in Table 1 should be sufficient to provide a reasonable indication of the degree to which the country is exposed. In such a

decisionmaking context, the value of the list of indicators presented in Table I lies more in identifying what sort of factors to consider than in their precise levels. Undertaking a quantitative assessment of these factors, however, particularly if cross-country or within-country trend analyses are needed, requires professional analysis to compute some of the indicators listed.

Finally, for investigating what policy responses to global food crises are most appropriate for particular types of countries or households, the conditioning factors at the national and household level listed in Table I provide an initial set of criteria upon which to construct typologies of country, household, or country-by-household types. With this relatively restricted set of categorical criteria, such groups can be defined simply through the construction of matrices based on them.

## Data and analyses to assess impact of a food crisis

The preceding section discussed the factors that make some countries and households more vulnerable than others to the effects of global food crises. This section considers what sort of information and analysis are needed to measure the effects of such food crises, including both monitoring and impact analysis. Monitoring refers to the regular measurement of indicators in order to understand historical trends, regardless of causes. In contrast, impact analysis tries to identify the effect of one causal factor, such as the increase in world food and fuel prices, excluding the influence of other factors, such as changes in local weather or agricultural policy.

### Measuring national effects

Understanding the five elements that contribute to the overall national impact of a global food crisis—changes in local commodity markets, local labor markets, fiscal balance, external balance, and political activity—calls for certain data and analytical requirements.

**Local commodity markets.** The basic data requirements for monitoring and analyzing the effects of global food price changes on local food prices include

- monthly or weekly prices in key markets for staple foods, fertilizer, fuel, and other commodities that are important to poor households;
- estimates of the cost of shipping imported commodities from international markets and shipping export commodities to their final destination; and
- the consumer price index.

These data can be used to plot the movement of

nominal and real local prices in different markets, as well as import and export parity prices for each commodity. A rough measure of the degree of price transmission is the ratio of the percentage change in local prices to the percentage change in world prices over a specific time period—an elasticity of global price transmission for the country.

A more advanced analysis of the effects of global price changes on local commodity markets would examine the degree of price transmission using time-series econometrics. If data permit, it would be useful to include subnational estimates of production of the most recent harvest of the food crops in question. The analysis could be done for different commodities and different markets within the country in order to assess the relative importance of local supply shocks and global price changes in determining local prices (see Delgado, Minot, and Tiongco 2005).

A broad set of qualitative, somewhat more contextual information would usefully inform any quantitative analysis on the interactions of global and local commodity markets. This information would include the trade policy orientation of government, the quality of a country's market infrastructure—transport, communication, contract enforcement—and a profile of food consumption patterns across households and regions.

**Local labor markets.** Basic data requirements to consider how local labor markets respond to global food crises include monthly data on unskilled wage rates by gender and the rate of unemployment in the formal sector. Where possible, these data should be disaggregated by region and between types of labor (such as agricultural or construction). A qualitative understanding of local labor markets would be required to judge their flexibility in the face of rising food prices. Key market characteristics of interest would include the relative size of the formal and informal labor markets, its sectoral composition, and the range of labor market regulations, including those governing minimum wages and employment contracts. In addition to being useful in themselves, these data are also an important input in the analysis of household-level impact, as discussed later.

**Fiscal balance.** A basic analysis of the impact of rising global food prices on the fiscal condition of a national government would examine each source of revenue or type of expenditure separately and estimate the change in revenue or expenditure that would result from a given increase in food and fuel prices. For example, what is the change in revenue associated with an ad valorem tariff on imported cereals, assuming actual changes in prices but no change in trade volume or tariff rate?

**Table 1—Basic information needed to assess the exposure of countries and households to the effects of rising global food prices**

INFORMATION	INDICATOR	NOTES
<b>National</b>		
Degree of integration into global food trade	The extent of relative global food basket price transmission for a country	Alternative measures: qualitative indicators of conditioning factors for price transmission from Figure 2 (transport and transaction costs, trade regulation, exposure to terms-of-trade effects, etc.)
Diversity of staples consumed nationally	Proportion of all calories consumed from staple foods that comes from the staple food providing most calories	<ul style="list-style-type: none"> <li>• Provides indication of scope for substitution in staples away from those globally traded</li> <li>• Possibly restrict focus to staple consumption patterns of poor households</li> <li>• Alternative measure: proportion of all calories consumed that come from globally traded staple foods</li> </ul>
Net food trade position	Ratio of net staple food imports to GDP	<ul style="list-style-type: none"> <li>• Net exporting countries gain from higher prices, net importers lose, and countries that do not trade staple foods are relatively unaffected</li> <li>• Alternative measure: Ratio of net staple food imports to total value of exports</li> </ul>
Variability in national food production	Annual variability in estimates of total staple food production over past 10 years	<ul style="list-style-type: none"> <li>• Poor production in one cropping season will result in heightened exposure to global food crisis.</li> <li>• Alternative measure: seasonal rainfall variability</li> </ul>
Trade balance	National balance of payment status (strong surplus, in balance, or strong deficit)	Exposure to global fuel price shocks an element of this: degree of self-sufficiency in petroleum and other energy consumption
Importance of food consumption to all household consumption	Food consumption as a proportion of the value of all household consumption	<ul style="list-style-type: none"> <li>• Alternative measure: proportion of food in basket of items used for national consumer price index</li> <li>• Indicates inflationary impact of higher food prices; also the political pressure that government may experience from rising food prices.</li> </ul>
Private supply response to higher food prices	Elasticity of supply in response to price changes for principal domestically produced staple foods	Alternative measure: agricultural population as a proportion of total population
<b>Household</b>		
Net food buyers or net food sellers	Net sales (sales minus purchases) of tradable food as a proportion of household income	In countries where staples are tradable, net buying households lose, net sellers gain, and autarkic households are relatively unaffected. In countries where staples are not traded, little direct effect on households
Agricultural households	Share of income from agriculture	<ul style="list-style-type: none"> <li>• Scope for self-provisioning in face of rising food price</li> <li>• Opportunity to respond to higher prices with increased production</li> </ul>
Options for household response to rising food prices	Poverty level	Poor are constrained in terms of assets and capital, resulting in a more restricted suite of household coping strategies to draw upon
	Food consumption as a proportion of value of all household consumption	Scope for reducing nonfood expenditures
Vulnerability to food insecurity in absence of food price shocks	Households already vulnerable : <ul style="list-style-type: none"> <li>• conflict affected</li> <li>• recent agricultural shocks</li> <li>• certain demographic types (elderly or single-parent households)</li> <li>• already reliant on food assistance before food price increase</li> </ul>	Rising food prices will exacerbate current vulnerability, particularly for those vulnerable households that depend on the market for much of their access to food

More advanced analysis of the impact of these price increases on a nation's expenditures, revenues, and debt would simulate the changes in revenue and expenditure as part of a larger system of equations, thus incorporating interactions between markets and between government programs. This analysis may be a multimarket model describing the main agricultural commodities or a computable general equilibrium (CGE) model describing the economy as a whole. A CGE model can trace the effect of an adverse fiscal impact to households based on assumptions about how the government responds to the fiscal deficit through higher taxes, lower expenditures, increased debt, or some combination of the three. Similarly, such a model can be used to assess changes in demand for targeted public social services as a consequence of changes in the well-being of households due to a global food crisis.

**External balance.** A basic measure of the effect of world prices on the external balance of a country is the terms of trade effect, defined as the change in the value of export revenue minus the change in the cost of imports (based on the actual price changes but no change in the volume of trade), expressed as a percentage of gross domestic product (GDP) (more detail on the computation of this effect is provided in Appendix 1). This analysis would use annual or, preferably, monthly data on the volume of food and fuel imports and exports to calculate changes in the terms of trade on an annual or monthly basis. Expressing the change in the terms of trade as a percentage of GDP provides an idea of the size of the shock relative to the size of the economy, as well as allowing cross-country comparisons. It also can be decomposed to measure the proportion of the impact caused by each commodity (such as wheat, maize, or oil). The likely effect on the exchange rate may be approximated using previously estimated elasticities of excess demand for foreign currency.

A more advanced analysis of these effects would use an economic model, ideally a CGE model. Such a model would generate estimates of the impact of the food and fuel price increases on the terms of trade and the equilibrium exchange rate. An appropriately designed CGE model would also be able to simulate the impact of the depreciation on different types of households.

**Political activity.** The data collection and analytical methods for assessing the political impact of rising global food prices are principally qualitative. Nevertheless, it is important to take these effects into account in understanding the potential range of policy responses that can be considered when evaluating alternative policies to respond to the effects of a food crisis.

## Measuring household effects

The largest and most direct effect of a food crisis on household welfare is likely to be through the prices of agricultural commodities and, possibly, fuel and fertilizer. Thus, most analyses of the impact of a global food crisis at the household level should focus on prices and how changes in prices of various sorts influence household welfare.

In the short run, before a household responds to changing local prices, the impact of price changes on welfare can be estimated using the changes in the price of goods and services and the composition of income and expenditure of the household (see Appendix 1).

An extension of this analysis uses price elasticities of supply and demand to simulate the response of households to the price changes, thus yielding the change in welfare after the household responds to the price changes. This approach corresponds to a simulation of the welfare impact in the medium or long term. The welfare impact in the longer term is generally more positive (or less negative) than the short-run impact owing to second-round effects. As such, the short-run impact generally serves as a lower limit of the possible long-term impact of changing local food prices on household welfare (see Appendix 1).

Both the short-term and the medium- to longer-term expressions of welfare change for a household in the face of rising food prices can also be calculated for a set of representative households or, preferably, for every household in a nationally representative household survey. In the latter case, by estimating the change in income associated with the price change, researchers can estimate the resulting changes in poverty and inequality for the nation as a whole.

The basic data requirements for understanding the household welfare impact of price changes include

- information on the price changes of important goods and services;
- information on the composition of household expenditure; and
- information on the composition of household income.

At a minimum, this information should be available for one or more "typical" types of households, with an emphasis on different types of poor households. It is, however, much more useful to have this information for all of the households in a nationally representative household income and expenditure survey. This type of data set would permit the simulation of the impact of price changes on all households in the sample, and then

aggregate the effects simulated to any desired categories of households (such as by region, by income category, by occupation, and by net position in staple crops). This approach has been used in various studies of the distributional effects of hypothetical or historical changes in food prices, including studies by Deaton (1989) for Thailand, Budd (1993) for Côte d'Ivoire, Barrett and Dorosh (1996) for Madagascar, Minot (1998) for Rwanda, and Ivancic and Martin (2008) for various countries.

The analyses described use exogenous price changes, either historical prices or assumed price changes. A more advanced analysis is to develop a model in which prices are endogenous, being a function of change in world prices, trade policy, technology, weather, transportation costs, or other factors. This type of analysis generates estimates of the detailed distributional impact of selected policies and external shocks. The model may be a partial equilibrium model, such as an agricultural sector model with or without spatial equilibrium built into it (Minot and Goletti 1998). Alternatively, it may be a general equilibrium model that includes all sectors and makes income fully endogenous. Such models require more skills, resources, and data than simpler approaches, but they present the most comprehensive approach to analyzing the impact of policies on households.

### **Measuring individual effects**

The basic data requirements for monitoring the impact of a food crisis at the individual level include a number of administratively collected variables:

- school enrollment by age and gender, collected by primary and secondary schools;
- attendance at health clinics by age and gender, collected by clinics; and
- nutritional status by age and gender, collected by clinics or from nutritional surveys.

These indicators may be poor measures of the underlying variables. For example, school enrollment figures do not indicate the share of each age group in school and may be misleading indicators of trends if there is migration. Similarly, clinic-based nutrition figures are not necessarily representative of the general population.

A preferable but more costly and time-consuming approach to monitoring these individual-level welfare indicators is with household surveys that collect detailed individual-level data. Such surveys can also measure the quantities of food consumption by each member of the household, leading to individual-level estimates of nutritional intake.

An analysis of the impact of a food crisis on individuals would be based on the analysis of the impact of the crisis on household-level welfare (already discussed) and an estimated relationship between household welfare and the individual-level outcomes of interest (such as nutrition or school attendance). This relationship would be estimated using econometric methods and would take into account other factors such as household composition, parental education, access to services, and measures of the role that women play in household decisions.

### **Summary of data and methods**

Table 2 summarizes the data that would be needed to undertake a relatively thorough assessment of the impact of a global food crisis on a country and its citizens. The data listed here represent something of an ideal set. Moreover, the more detailed the data in terms of variables, frequency (weekly or monthly, rather than annual), and spatial resolution (regional or district level, rather than national), the better. Important insights could be gained, however, with a more basic set of information: a nationally representative household budget survey, relatively detailed commodity price series, information on the food trade patterns of the country, and the consumer price index.

The ease with which the basic data sets for a country can be assembled will vary considerably between countries, depending on the strength of their statistical systems and the degree to which quantitative policy analysis is used in decisionmaking. Where data are missing for a country, the final column in Table 2 notes additional sources of data or alternative practical types of information that may be used.

Similarly, Table 3 summarizes the most important analyses to which the data listed in Table 2 could be applied. One can categorize the methods into subsets corresponding to basic, intermediate, and more advanced analyses. The basic analyses are those that can be done without strong quantitative skills or specialized software; the intermediate analysis requires more skills but no econometric analysis or modeling; and the more advanced techniques are considerably more demanding in terms of quantitative skills (econometrics and modeling), data, and specialized software.

**Table 2—Data to assess impact of global food crises on countries, households, and individuals**

INFORMATION	PURPOSE	RESPONSIBLE	ALTERNATIVES
<b>Basic data sets</b>			
Household consumption and expenditure survey (nationally representative)	<ul style="list-style-type: none"> <li>• Composition of household expenditures</li> <li>• Composition of household income</li> <li>• Food group consumption patterns, by population group; importance of imported staple foods</li> <li>• Proportion of population that are net food buyers or net food sellers</li> <li>• Household poverty status</li> <li>• Specification of sectoral or CGE models for advanced policy analysis</li> </ul>	<ul style="list-style-type: none"> <li>• National statistical office (NSO)</li> <li>• Survey analysts at academic and research institutes, if NSO does not do analysis</li> </ul>	<ul style="list-style-type: none"> <li>• Household surveys from NGOs and researchers that are indicative but likely not nationally representative</li> <li>• Estimates from neighboring countries with similar household livelihood and welfare patterns; international databases (UN agencies, ERS/USDA)</li> </ul>
Price series for food, agricultural inputs, and fuel from key national and international marketplaces	Determine national market integration into global trade	<ul style="list-style-type: none"> <li>• NSO</li> <li>• Ministry of Trade</li> <li>• International commodity price databases (e.g., IMF, FAO)</li> </ul>	<ul style="list-style-type: none"> <li>• Primary price data for CPI calculation from NSO</li> <li>• Ministry of Agriculture</li> <li>• Private sector commodity wholesalers</li> </ul>
Import and export data (commodities, amounts, value)	Importance of trade for food security and economic growth—require data on both formal and informal trade	Customs Department	<ul style="list-style-type: none"> <li>• NSO (data on informal trade)</li> <li>• Food security agency (monitor all trade in food)</li> </ul>
CPI	Deflate nominal to real prices or relate to wage rate changes	NSO	International financial databases (e.g., IMF)
<b>Additional data sets</b>			
Agricultural production estimates	<ul style="list-style-type: none"> <li>• Net trade position in food</li> <li>• Variability in national food production</li> </ul>	Ministry of Agriculture	<ul style="list-style-type: none"> <li>• FAO national food balance sheets</li> <li>• National food import and export data (formal and informal)</li> </ul>
Elasticities of supply and demand in response to price changes	<ul style="list-style-type: none"> <li>• Own and cross-price elasticities of supply (can farmers shift to higher-priced commodities?)</li> <li>• Own and cross-price elasticities of demand (can consumers substitute away from higher-priced tradable staples to local nontraded alternatives?)</li> </ul>	<ul style="list-style-type: none"> <li>• National planning authority, Ministry of Finance</li> <li>• Analysts at academic and research institutes</li> </ul>	Global elasticity datasets (e.g., FAPRI, ERS/USDA); elasticities for neighboring countries with similar agricultural production, trade, and food consumption patterns
Nutritional surveys, vulnerability assessments	<ul style="list-style-type: none"> <li>• Pre-crisis vulnerability to nutrition insecurity</li> <li>• Impact of global food crisis on child and maternal nutritional status</li> </ul>	<ul style="list-style-type: none"> <li>• NSO</li> <li>• Ministry of Health</li> <li>• Food security monitoring agencies</li> </ul>	Estimates from neighboring countries with similar household livelihood and welfare patterns (see DHS database, UNICEF, WHO, FEWSNET)
Use of social services	Monitoring the impact of crisis on use of social services that promote learning, health, and good nutrition	Administrative data from Ministries of Education and Health	Household survey data with information on all members' education, health, and nutrition status
Wage rates; labor market structure	Determine scope for response in labor markets to effects of global food crisis	NSO (household, labor, and enterprise surveys)	Ministry of Labor (information on labor regulations)
<ul style="list-style-type: none"> <li>• Import and export transaction costs</li> <li>• Regulations on trade in food</li> </ul>	<ul style="list-style-type: none"> <li>• Identifying barriers to trade</li> <li>• Export and import parity price computations; comparative advantage assessment</li> </ul>	Ministry of Trade	<ul style="list-style-type: none"> <li>• More comprehensive data on costs from private sector importers and exporters</li> <li>• “Doing Business” dataset of the World Bank</li> </ul>
Fiscal position of government	<ul style="list-style-type: none"> <li>• Sources of revenue, nature of expenditures, and how each might change with effects of global food crisis</li> <li>• Specification of sectoral or CGE models for advanced policy analysis</li> </ul>	Ministry of Finance	Sectoral working groups (education, health, agriculture, etc.) for details on program design and expenditures
External balance	<ul style="list-style-type: none"> <li>• National balance of payment status</li> <li>• Assess terms-of-trade effects</li> </ul>	<ul style="list-style-type: none"> <li>• Ministry of Finance</li> <li>• Ministry of Trade</li> </ul>	International macroeconomic databases (e.g., IMF)

Note: CGE = computable general equilibrium; CPI = consumer price index; DHS = Demographic and Health Survey; ERS/USDA = Economic Research Service/U.S. Department of Agriculture; FAO = Food and Agriculture Organization of the United Nations; FAPRI = Food and Agricultural Policy Research Institute; FEWSNET = Famine Early Warning System; IMF = International Monetary Fund; NSO = National Statistical Office; UNICEF = United Nations Children's Fund; WHO = World Health Organization.

**Table 3—Analytical methods to assess impact of global food crises on countries, households, and individuals**

METHOD	PURPOSE	ANALYTICAL SKILLS REQUIRED
<b>Basic analyses</b>		
Monitoring of real food prices (world and local) and wages	To understand the potential and actual magnitude of the price shocks households face and their ability to cope with them	Basic
Cross-tabulations of household survey data	To develop profiles of population groups identified by likely impact of global food crisis (by region, poverty status, livelihood, net-seller/net-buyer status, etc.)	Basic to moderate
Investigations of food group consumption patterns with household survey data	To permit evaluation of the impact of rising food prices on the composition of the diets of various population groups in the country	Basic to moderate
Profile of a country's trade in food	Significance of trade for the food security of a country and for that of its trading partners	Basic
<b>Intermediate analyses</b>		
Price transmission from global to national markets—basic correlation analysis	To assess exposure of national consumers to shifts in world prices of traded commodities	Moderate
Analysis of terms of trade effects	To determine the effect of world price changes on the value of net exports as a percentage of GDP and the impact on real household income	Moderate
Analysis of household-level effects	To understand the impact of world price changes on different types of households based on the composition of their expenditure and income (with or without demand and supply response)	Moderate
<b>Advanced analyses</b>		
Demand and supply estimation	To estimate the effect of changes in prices, income, and other factors on demand for food commodities; to estimate the effect of price and other factors on agricultural supply response	Moderate to advanced
Partial-equilibrium, sector-specific models	To simulate the impact of policies and global price changes on the agricultural sector and (potentially) poverty and distributional effects	Moderate to advanced
Computable general equilibrium (economywide) models	To simulate the impact of global price changes and the policies adopted in response on disaggregated economic growth and poverty; to gain insights on fiscal implications of the crisis and the government's responses to it	Advanced
Price transmission from global to local markets (time-series econometric analysis)	To better understand barriers to trade in food and other commodities for a country	Moderate to advanced

Note: Basic analytical skills should be available in government institutions with planning and budgeting responsibilities. Moderate skills can be expected to be found in stronger ministerial planning departments. Advanced skills are likely to be found only in research universities or other research institutes (local and international).



# Monitoring and Assessing Current and Future Policy Responses

**N**ational governments have responded to the current world food crisis in several ways. Responses intended to reduce the prices faced by domestic consumers in the short term, such as reductions in tariffs or consumption taxes, food price controls, actions against speculators and profiteers, consumer subsidies, export bans or taxes, government food imports, and release of food reserve stocks, have been quite common. Less common are interventions to increase domestic food production by triggering a supply response to the crisis, such as through providing input subsidies or support prices for farmers. A third category of responses has sought to increase food availability for or the income of vulnerable or politically powerful groups through social protection programs such as food rations, food or cash for work, and cash transfer programs. Appendix 2 lists policy responses by different governments to the current food crisis through mid-2008, as well as a listing of political agitation triggered in part by the crisis.

Table 4 illustrates these policy responses, as well as others that could be used in the medium and longer term. The table classifies the interventions according to the types of interventions mentioned—that is, those intended to affect consumer prices fairly directly, those intended to increase food production (with indirect impacts on food prices), and those intended to increase food availability for or the income of target groups. It also classifies interventions according to whether they are likely to have an impact in the immediate or short term, in the medium term (one to three years), or in the longer term.

One point evident in Table 4 is that the set of possible policy responses expands as the time frame for impacts is increased. In the short term, policymakers can little do to change domestic food production if farmers have already made their planting and input use decisions for the upcoming harvest. Policy responses are limited to changes in tariffs, taxes, consumer subsidies, food price controls, export restrictions, government food imports, or the release of public reserve stocks. In the medium term, the scope of action widens—governments can implement price stabilization policies based on the use of reserves, tariffs, or subsidies; promote food production using subsidies, producer price supports, or provision of agricultural support services; and extend social protection programs. In the

longer term, larger sustained impacts can be achieved through broader investments for economic development and poverty reduction.

Given the breadth of possible policy responses to a food crisis in the longer term, the challenge of monitoring and assessing the impacts of such responses is great and hardly distinguishable from the need to monitor and evaluate policies and programs to promote economic development and poverty reduction in general. This report focuses mainly on methods of monitoring and assessing the short-term responses to a global food crisis and their impacts, although it also provides some discussion of the need for and approaches to assessing medium- and longer-term responses and impacts.

## Types of impacts expected from policy responses

Although the purpose of this report is not to present an analysis of the impacts of actual or potential policy responses to the current global food crisis, it is useful to consider the types of impacts that can be expected from policy responses in order to help guide decisions about what information should be monitored and what analytical methods should be used to assess impacts. Table 5 provides a set of hypotheses about favorable and unfavorable impacts that may result from various

**Table 4—Potential policy responses to food crises**

TYPE OF INTERVENTION	TIME FRAME		
	SHORT TERM (< 1 YEAR)	MEDIUM TERM (1–3 YEARS)	LONG TERM (> 3 YEARS)
Reduce food prices for consumers (price-oriented policies)	<ul style="list-style-type: none"> <li>• Reduce tariffs/taxes on food</li> <li>• Adopt food price controls/take action against profiteers</li> <li>• Adopt consumer subsidies</li> <li>• Adopt food export bans or taxes</li> <li>• Pursue government food imports</li> <li>• Release food reserve stocks</li> </ul>	<p><i>Same options as short term plus:</i></p> <ul style="list-style-type: none"> <li>• Establish food reserves and release policy</li> <li>• Establish variable tariffs or variable export subsidies/taxes</li> <li>• Pursue options to increase domestic food production (see below)</li> </ul>	<p><i>Same options as medium term plus:</i></p> <ul style="list-style-type: none"> <li>• Invest in marketing infrastructure, institutions, and information</li> <li>• Invest in increased food production capacity (see below)</li> </ul>
Increase food production (supply-oriented policies)	<p><i>Limited short-term options</i></p>	<ul style="list-style-type: none"> <li>• Adopt input subsidies</li> <li>• Adopt producer price supports and subsidies</li> <li>• Expand agricultural credit</li> <li>• Strengthen agricultural extension</li> </ul>	<p><i>Same options as medium term plus:</i></p> <ul style="list-style-type: none"> <li>• Pursue agricultural R&amp;D</li> <li>• Invest in productive infrastructure and assets (e.g., irrigation, mechanization)</li> <li>• Improve natural resource management</li> <li>• Improve property rights and resource tenure systems</li> </ul>
Increase food availability for or income of target groups (income-oriented policies)	<ul style="list-style-type: none"> <li>• Increase support through existing social protection programs</li> <li>• Increase public sector wages</li> <li>• Increase food aid programs</li> </ul>	<p><i>Same options as short term plus</i></p> <ul style="list-style-type: none"> <li>• Establish new social protection programs or expand/improve existing ones</li> </ul>	<p><i>Same options as medium term and those for increasing food production plus</i></p> <ul style="list-style-type: none"> <li>• Invest in other development and antipoverty programs (e.g., education, promote rural nonfarm enterprises)</li> </ul>

policy responses and about conditioning factors influencing these impacts. As already noted, most of the short-term policy responses aim to reduce consumer food prices, which is a favorable effect from the standpoint of net food buyers. Policies and programs to promote increased food production also have beneficial impacts on net food buyers to the extent that they result in reduced domestic food prices. They also can benefit food producers by reducing their costs of production (such as through input subsidies) or increasing producer prices (such as through price support and producer subsidies), although the net impact on producers depends on the relative strength of these effects compared with the downward pressure on producer prices caused by increased production. Targeted food aid or income-oriented interventions likely have favorable impacts on the direct beneficiaries, and these may have beneficial spillover impacts on other households or individuals such as by increasing demand for goods and services provided by households as a result of the increased incomes of beneficiary households.

All of these policy responses have costs and potentially unfavorable impacts as well. All price-oriented interventions, to the extent they are successful in reducing food prices, will reduce the incomes of net food sellers and the incentive for producers to respond by increasing production. Reducing tariffs or consumption taxes, increasing consumer or producer subsidies, or increasing social protection programs will have direct budgetary costs, potentially increasing government deficits, credit shortages (if budget deficits are financed by borrowing), or inflationary pressures (if budget deficits are financed through monetary expansion). The benefits of interventions may not be well targeted to poorer and more vulnerable households, especially interventions focused on affecting market prices, leading to potentially high costs relative to the improvement in food security achieved. Direct subsidies to producers or consumers or social protection programs have more potential for targeting, although targeting may not always be politically acceptable and may involve high administrative costs. Efforts to control prices and speculative behavior may lead to black markets, and thus be ineffective, and may

**Table 5—Potential national policy responses to food crises: Favorable and unfavorable effects and conditioning factors**

POLICY RESPONSE	FAVORABLE EFFECTS	UNFAVORABLE EFFECTS	CONDITIONING FACTORS
Reduced tariffs or other taxes on food	<ul style="list-style-type: none"> <li>• Lower domestic food prices</li> <li>• Increased domestic consumption and welfare of net food buyers</li> <li>• Contribution to liberalized agricultural trade</li> </ul>	<ul style="list-style-type: none"> <li>• Lower government revenue</li> <li>• Lower income of net food sellers</li> <li>• Reduced food production in longer term</li> <li>• Benefits accrued by wealthier (as well as poorer) net food consumers</li> <li>• Reduced food available on world markets</li> </ul>	<ul style="list-style-type: none"> <li>• Initial level of tariffs and taxes</li> <li>• Availability of offsetting sources of government revenue</li> <li>• Difficulties for low-income countries with lack of other revenue sources</li> </ul>
Export restrictions (including taxes and minimum export prices)	<ul style="list-style-type: none"> <li>• Lower domestic food prices</li> <li>• Increased consumption and welfare of net food buyers</li> <li>• Increased government revenue (if export taxes are used)</li> </ul>	<ul style="list-style-type: none"> <li>• Lower income of net food sellers</li> <li>• Reduced incentives for food production</li> <li>• Benefits accrued by wealthier (as well as poorer) net food consumers</li> <li>• Reduced food available on world markets</li> </ul>	<ul style="list-style-type: none"> <li>• Ability to enforce restrictions</li> <li>• Difficulty of applying export taxes for countries with limited administrative capacity</li> </ul>
Release of food from stocks	<ul style="list-style-type: none"> <li>• Lower domestic food prices (quickly but temporarily)</li> <li>• Increased consumption and welfare of net food buyers</li> <li>• Increased government revenue if government stocks are sold</li> <li>• Reduced cost of storing food</li> </ul>	<ul style="list-style-type: none"> <li>• Lower income of net food sellers</li> <li>• Reduced incentives for production response</li> <li>• Possible undermining of private storage activity if public stocks are used</li> <li>• Benefits accrued by wealthier (as well as poorer) net food buyers</li> </ul>	<ul style="list-style-type: none"> <li>• Availability of food stocks</li> <li>• Expectations about future prices (useful only for countries that have accumulated stocks)</li> <li>• Release of food stocks will not affect the price of a tradable commodity</li> </ul>
Price controls on food	<ul style="list-style-type: none"> <li>• Lower domestic food prices (if price controls can be enforced)</li> <li>• Increased consumption and improved welfare of net food buyers</li> </ul>	<ul style="list-style-type: none"> <li>• Lower income of net food sellers</li> <li>• Reduced incentives for supply response</li> <li>• Market disequilibria leading to quantity rationing</li> <li>• Rent-seeking behavior; black markets</li> <li>• Deadweight efficiency losses</li> <li>• Benefits accrued by wealthier (as well as poorer) net food consumers, if quantity restrictions can be overcome</li> </ul>	<ul style="list-style-type: none"> <li>• Ability to enforce price controls and quantity restrictions (difficult to do this effectively in most countries)</li> <li>• Political attractiveness of such measures</li> </ul>
Consumer food subsidies	<ul style="list-style-type: none"> <li>• Lower consumer prices (if effective)</li> <li>• Increased consumption and welfare of food consumers</li> <li>• Increased producer prices and production incentives for nontradable foods if supported by budget expenditures</li> <li>• Increased income for producers</li> </ul>	<ul style="list-style-type: none"> <li>• High budgetary burden</li> <li>• Benefits accrued by wealthier (as well as poorer) food consumers and producers, if subsidies are not targeted</li> <li>• Political and administrative difficulties of targeting</li> <li>• Benefits leak to food exporters and nontargeted consumers</li> </ul>	<ul style="list-style-type: none"> <li>• Political feasibility of targeted versus general subsidies</li> <li>• Budgetary capacity</li> <li>• Administrative costs and feasibility of implementing targeted subsidies (difficult for low-income countries)</li> </ul>
Actions against or appeals to profiteers, speculators	<ul style="list-style-type: none"> <li>• Possibly lowered food prices (if effective) with benefits to net food consumers</li> </ul>	<ul style="list-style-type: none"> <li>• Possible undermining of private markets</li> <li>• Reduced food storage and marketing by private agents, leading to more volatile food prices or larger food marketing margins</li> <li>• Lower prices for farmers, reducing production and marketing</li> </ul>	<ul style="list-style-type: none"> <li>• Political attractiveness of finding scapegoats in marketing system</li> <li>• Ability to distinguish “profiteering” from reasonable speculation and trading activities and to hold the guilty accountable (very difficult to do this effectively in most countries)</li> </ul>
Cash transfer programs-conditional cash transfer (CCTs) and means-based transfers	<ul style="list-style-type: none"> <li>• Possible targeting of poor and vulnerable</li> <li>• Less costly than food aid, general food subsidies, or tariff/tax cuts</li> <li>• Increased food consumption and improved welfare of recipients</li> <li>• Promotion of use of health and education services and facilitation of long-term human capital investment</li> </ul>	<ul style="list-style-type: none"> <li>• Difficulty of establishing effective programs quickly, especially CCTs</li> <li>• Possible political unpopularity of targeting</li> <li>• Potential for leakages of targeted programs</li> <li>• High administrative and possibly budget costs</li> </ul>	<ul style="list-style-type: none"> <li>• Prior existence of system</li> <li>• Administrative capacity to target and distribute transfers (difficult for most low-income countries)</li> </ul>

POLICY RESPONSE	FAVORABLE EFFECTS	UNFAVORABLE EFFECTS	CONDITIONING FACTORS
Food vouchers or food stamps	<ul style="list-style-type: none"> <li>• Similar favorable effects as for cash transfer programs</li> <li>• Also may serve as a transition from in-kind to cash transfers</li> </ul>	<ul style="list-style-type: none"> <li>• Similar unfavorable effects as for cash transfer programs</li> <li>• More costly to administer than cash transfers, but cheaper than in-kind transfers</li> </ul>	<ul style="list-style-type: none"> <li>• Prior existence of system</li> <li>• Administrative capacity (difficult for low-income countries)</li> </ul>
Food- or cash-for-work and public works schemes	<ul style="list-style-type: none"> <li>• Potential self-targeting to poor individuals with capacity to work</li> <li>• Contributions to valuable infrastructure and other public investments</li> <li>• Maintenance of incomes of vulnerable populations in face of shocks (especially labor demand shocks)</li> <li>• Adjustability of wage payments in response to food price shocks</li> </ul>	<ul style="list-style-type: none"> <li>• Possible exclusion of vulnerable people facing labor constraints (e.g., HIV/AIDS affected, women)</li> <li>• Potential negative impacts on other uses of labor, including agriculture</li> <li>• Possible poor-quality public investments</li> <li>• High administrative demands in general; higher with food-for-work</li> <li>• Lack of complementary nonlabor inputs may undermine effectiveness</li> <li>• Potential for aid dependency</li> </ul>	<ul style="list-style-type: none"> <li>• Administrative capacity to implement and assure quality</li> <li>• Access to source of food aid or funds (usually donor funds)</li> <li>• Availability of surplus labor at certain times of the year (useful option for many low-income countries, especially for those with access to donor assistance)</li> </ul>
Increased public sector wages	<ul style="list-style-type: none"> <li>• Rapid response to impacts on a politically important group</li> <li>• Support for political stability</li> <li>• Spillover benefits to others through increased demand for goods and services by public sector employees</li> <li>• Increased wages</li> </ul>	<ul style="list-style-type: none"> <li>• Failure to target those most vulnerable to food price increases</li> <li>• High budgetary costs</li> <li>• Possible contribution to public deficit and an inflationary spiral</li> </ul>	<ul style="list-style-type: none"> <li>• Size and political clout of the civil service</li> <li>• Budgetary capacity and risk of inflation</li> </ul>
Minimum support prices for farmers	<ul style="list-style-type: none"> <li>• Stimulation of production response (if effective)</li> <li>• Increased income of net food sellers</li> <li>• Increased price stability for net food buyers and sellers</li> </ul>	<ul style="list-style-type: none"> <li>• Possible excess supply and stocks</li> <li>• High budgetary costs</li> <li>• Difficulty of enforcing minimum prices</li> <li>• Possible disproportionate accrual of benefits by wealthier net food sellers</li> <li>• Costs to net food buyers</li> <li>• Contribution to instability in international markets if based on variable tariffs or export subsidies (not if based on stocking policies)</li> <li>• Difficulty of eliminating once established</li> </ul>	<ul style="list-style-type: none"> <li>• Political strength of net food sellers for particular commodities</li> <li>• Dependence on food imports (easier to implement a variable tariff than stocks-based approach)</li> <li>• Fiscal and administrative capacity (especially for stocks-based approach)</li> </ul>
Subsidies to farmers, e.g., input vouchers	<ul style="list-style-type: none"> <li>• Stimulation of production response (if effective)</li> <li>• Increased income of farmers</li> <li>• Reduced prices of nontradable foods, leading to benefits to food consumers</li> </ul>	<ul style="list-style-type: none"> <li>• High budgetary costs if not well targeted</li> <li>• Political and administrative difficulty of targeting</li> <li>• Potential for leakages of benefits to advantaged groups</li> <li>• Difficulty of eliminating once established</li> <li>• Potential negative impacts on private market development (which can be addressed through “smart” subsidies)</li> <li>• Possible inefficiently excessive use of some inputs</li> </ul>	<ul style="list-style-type: none"> <li>• Political strength of farmers and input suppliers</li> <li>• Fiscal and administrative capacity to implement “smart” and targeted subsidies</li> </ul>
Building of food reserves	<ul style="list-style-type: none"> <li>• Stimulation of production in near term (while stocks accumulate) and buffering of future price instability, which benefits domestic food producers and consumers and international markets</li> <li>• Assurance of reliable supply for exporting countries</li> </ul>	<ul style="list-style-type: none"> <li>• Possible price increases in near term</li> <li>• Cost of establishing and maintaining</li> <li>• Limited impacts on prices except for nontradable (or trade-prevented) commodities and large players in international trade</li> <li>• Undermining of private stockholding by government stocks</li> </ul>	<ul style="list-style-type: none"> <li>• Size of country's net supply or demand in international market</li> <li>• Tradability of the commodity</li> <li>• Fiscal and administrative capacity (not likely the most effective intervention for small low-income food importers)</li> </ul>

contribute to corrupt practices by regulators. To the extent that price controls are effective, they can cause shortages that must be addressed by other rationing mechanisms, leading to inefficient and possibly inequitable allocation of commodities. Leakages and spillover effects of interventions may also undermine their effectiveness. For example, export bans may lead to increased contraband food exports, while changes in public food reserve stocks may be offset by induced changes in private stockholdings. Trade interventions such as export bans on staple foods also can precipitate protectionist reactions by other nations, undermining the food security of trade-dependent countries as the international market for food becomes increasingly volatile.

Many political, administrative, and economic conditioning factors can influence the feasibility and impacts of these policy interventions. For example, the ability to use tariff or tax reductions to offset food price increases depends on the initial level of these tariffs or taxes and on the political will and fiscal capacity of the government to offset or forgo the revenues that would have been collected. Budgetary constraints may also limit the use of subsidies, social protection programs, or public sector wage increases. The use of export restrictions depends on the government's capacity to enforce such restrictions. International treaty obligations under the World Trade Organization (WTO) or other trade agreements may also limit national governments' ability to use trade measures to buffer food price changes. The capacity of the government to enforce price controls or regulations on speculators will determine the effectiveness of such measures, while the political context may promote or inhibit their use. The ability to expand the use of social protection programs will depend upon prior experience with such measures and the administrative capacity of the government to implement targeted approaches.

These conditioning factors imply that low-income countries dependent on food and oil imports may be limited in their ability to use most of these potential responses effectively. Budgetary constraints are likely to limit the use of large untargeted subsidy programs, reductions in tariffs and taxes, or public sector wage increases, whereas administrative capacity constraints will often limit the ability to target social protection programs. Some social protection programs, such as food-for-work or cash-for-work, tend to be self-targeted and thus more readily usable than more administratively complex approaches, such as conditional cash transfer programs. Low-income food-importing countries that are large exporters of oil or other commodities whose prices have also increased will have more budgetary

capacity to use subsidies, tariff and tax reductions, or social protection programs to buffer the impacts of food price increases, although they are still likely to face many administrative capacity constraints. Higher-income countries tend to have more budgetary and administrative capacities to implement a range of these options.

## Monitoring and assessing the impacts of policy responses

It is important to clearly distinguish the concepts of monitoring and impact assessment. Monitoring involves collecting data on selected indicators and observing how those indicators change over time. The purpose of monitoring may be diagnostic or prescriptive. For example, changes in food security vulnerability indicators may be used to diagnose a serious problem occurring for some population in some location, whereas such indicators combined with indicators of the conditioning factors affecting responses and outcomes (such as indicators of prior investment and coverage of social protection programs) may help to prescribe promising policy responses.

Monitoring by itself does not tell policymakers what impacts a given policy or program is expected to have (ex ante assessment), is having (assessment during implementation), or has had (ex post assessment). To assess impacts, one must define the counterfactual or baseline situation against which impacts are to be assessed and use analytical methods to measure the difference in outcomes between the situation with the policy or program being evaluated and the counterfactual situation. Conceptually, the counterfactual situation should be the situation that is expected to occur (in an ex ante assessment) or that would have occurred (in an assessment during implementation or ex post) without the intervention. One of the main difficulties in impact assessment work is that the counterfactual situation is not observed (nor is the factual situation—the situation with the policy—observed in ex ante assessments). To address this problem, some assumptions and models, whether explicit or implicit, are necessary. For ex ante assessments, predictive models are needed to predict what will happen with the intervention versus without the intervention. Such models could be as simple as assuming that the quantities of the commodities of interest produced and consumed would be the same in the future as in the recent past and that the only difference between the counterfactual and factual scenarios is in the prices of these commodities (for

example, commodity prices might be assumed to be reduced by 25 percent due to a tariff reduction). Or they could be complex multimarket or general equilibrium models that seek to assess how changes in the market for one commodity affect other commodities and factors of production.

Assessing impacts during or after an intervention offers the advantage that the factual situation is observable. The counterfactual situation, however, is not. Some common ways of addressing this problem are to

- assume that the situation observed before the policy or program is what would have occurred without intervention (before-after comparison);
- assume that the outcomes for some comparator group not directly affected by the policy or program represent the outcomes that would have occurred for the affected population without the program (with-without comparison);
- assume that the changes in outcomes for a comparator group represent the changes in outcomes that would have occurred for the affected population without the program (double-difference comparison); or
- use a model to predict what would have happened without the intervention.

The first approach (before-after comparison) is problematic if other factors besides the policy or program being assessed that affect the outcomes of interest also are changing over time. In this case, the before situation may be a very poor proxy for what would have occurred without the policy or program. For example, food prices may be changing over time as a result of many supply- and demand-related factors, so attributing a change in food prices as due solely to a policy change can be problematic.

The second approach (with-without comparison) is problematic if the comparison group is different from the affected group in ways that affect the outcomes of interest. This problem can be addressed by (1) randomly assigning groups or individuals to “treatment” versus “control” groups using an experimental design, which assures that the with and without groups are statistically similar in all observable and unobservable characteristics; (2) selecting the comparison groups by matching members between the groups on relevant observable characteristics; or (3) using econometric approaches to correct for selection bias. Because it ensures that treatment and control groups are similar in both observable and unobservable characteristics, random assignment is seen as the “gold standard”

approach in impact evaluations of targeted programs (Heckman et al. 1998). This approach is not always feasible, politically acceptable, or appropriate to the nature of the intervention, however. Demand-driven development programs, for example, do not easily lend themselves to the use of supply-driven random assignment.

Moreover, all of these with-without comparison approaches assume that the comparison group is unaffected by the policy or program being assessed. For interventions that affect food prices throughout a country, it is difficult to find counterfactual households in the same country who are unaffected. Even for targeted subsidies or social protection programs, spillover effects of such programs to nonparticipants may affect outcomes for potential comparison groups as well. Such effects are easier to avoid for small pilot programs or small targeted changes in such programs than for changes occurring on a large nationwide scale.

The third approach (double-difference) combines the strengths of the before-after and with-without comparisons, since it nets out the effects of common factors affecting both with and without groups (like the effects of common changes in prices affecting both groups) and fixed factors that may cause differences in outcomes between the groups (like differences in their abilities). This method is also subject to the shortcoming that the comparison group may be indirectly affected by the policy or program, however, and to any measurement error problems in comparing differences (Ravallion 2005).

The fourth approach (using a model to predict the counterfactual) can overcome the problem of not being able to identify a suitable comparison group unaffected by the intervention. This approach is thus particularly useful for assessing the impacts of policies that affect food prices and allows a similar approach to be used as for assessing impacts *ex ante*. The validity of the assessment will depend on the validity of the model and the assumptions on which it is based, however, many of which may not be readily testable.

The preceding discussion points out that no method of impact assessment is free of assumptions or potential problems. The best method to use will depend on the type of policy or program being assessed, the time frame and outcomes of interest, the data available for the assessment, the ability to build on prior assessments and models, and the ability of key stakeholders to use and comprehend the method used. In the next three subsections, this report suggests some methods of monitoring and assessing impacts of the

three different types of policy interventions—price-oriented, supply-oriented, and income-oriented—with these considerations in mind. The methods discussed range from the simple to the complex, depending on the nature of responses and impacts considered. Simple methods require more restrictive assumptions concerning the responses of and impacts on producers, consumers, and others in the economy but are easier to implement.

### **Price-oriented policies and interventions**

Assessing the impacts of policies that affect households and individuals primarily through their impacts on food prices—changes in tariffs, taxes, or subsidies; price or export controls; grain reserve policies; and so on—can be done in two steps. First, one estimates the impacts of these policies on domestic food prices and other national-level outcomes such as fiscal and external balances. Second, the impacts of these price changes on households and individuals can be assessed using the methods discussed in earlier for monitoring and assessing the impacts of food price increases. Because the methods and data needs for the second part of this assessment were discussed earlier, this section focuses only on the first part of the assessment.

A distinction can be made between policies that affect food prices fairly directly, such as changes in tariffs, and policies that affect prices by affecting the quantity of food available in the market, such as grain reserve policies. In the former case, a first approximation of the impact on prices is given by the policy itself. For example, a reduction in the tariff rate of \$10 per ton for an imported commodity can be expected to reduce the domestic price of that commodity by \$10 per ton if domestic markets are well integrated with the international market (perfect price transmission). If this assumption holds, there is no need for any monitoring or assessment to determine the resulting domestic price change. Because of transaction costs, market or government imperfections, and other factors, however, the actual changes in domestic prices of the commodity in particular locations may be different (probably smaller) than the change in the tariff rate. Hence it is useful to monitor what happens to prices in different locations and assess the extent to which the policy change or other factors contributed to such changes.

In the case of interventions affecting the supply of food in the market, such as release of public grain reserve stocks, a different approach is needed. The impacts of these quantitative supply shifts on prices must

be estimated. This estimation can be done using a simple single-commodity partial equilibrium model, assuming that only one commodity is affected, or using a more complex multimarket model, assuming that prices of other commodities may also be affected. Other indirect effects of the policy, such as the effects of releasing public stocks on private stockholding behavior, may also need to be taken into account to draw reliable conclusions about the impacts of the policy.

Table 6 summarizes some approaches to monitoring and assessing the impacts of a change in the import tariff on an imported food commodity and of a change in public food stocks. In the interest of brevity, the table does not describe specific approaches for all of price-oriented interventions mentioned earlier. Rather, it presents these two examples as illustrations of the approaches and issues involved in assessing impacts of, first, an intervention with a direct price impact and, second, an intervention with an indirect impact on prices by changing the available supply.

**Reduction in import tariff.** As noted, with perfect price transmission to domestic markets, there is no need for monitoring or analysis to know the impact of a change in tariff on the price of the affected commodity. The case of imperfect price transmission is thus considered here, along with methods for monitoring and assessing impacts on other commodities.

To assess the potential short run impact of a tariff reduction ex ante, considering imperfect price transmission, one multiplies the percentage import price change due to the tariff reduction by the elasticity of price transmission. For example, if a tariff reduction implies a 10 percent reduction in the import price of rice and the elasticity of price transmission for rice in the country is 0.5, then the predicted impact on the domestic rice price is a 5 percent reduction. This calculation assumes that the elasticity of price transmission can be estimated from available data or from values in the literature and that the elasticity estimated is valid for a change in the tariff. Estimates of transmission elasticities can be found in the literature (for example, Valdés and Foster 2008). It is advisable, however, to use sensitivity analysis with a range of values from the literature estimated for countries having similar economic and policy environments. If suitable values are not available from the literature, the price transmission elasticity can be computed. (More detail on computing the short-term effects of a reduction in tariffs on food commodities is provided in Appendix I.)

Changing the tariff for one commodity may affect the domestic demand, supply, and prices of other

**Table 6—Methods for monitoring and assessing impacts of selected price-oriented policies on domestic food prices**

POLICY	NATURE OF IMPACTS	ASSESSMENT APPROACH	KEY ASSUMPTIONS	DATA AND PARAMETERS NEEDED	SOURCES OF DATA AND PARAMETERS
Changes in tariffs on food commodities	Direct short-run tariff impact with full transmission	No assessment necessary; price changes in domestic market fully reflect tariff change	<ul style="list-style-type: none"> <li>Change in domestic price = change in tariff (100% price transmission)</li> <li>No effects on other commodities</li> </ul>	Level of tariffs before and after change	National trade policies
	Direct short-run tariff impact with partial transmission	<p><i>Ex ante:</i></p> <ul style="list-style-type: none"> <li>estimate % domestic price change using % import price change times elasticity of price transmission</li> </ul> <p><i>Ex post:</i></p> <ul style="list-style-type: none"> <li>Same method</li> <li>Before-after comparison of changes in import price to change in domestic prices</li> <li>Econometric time series analysis</li> </ul>	<ul style="list-style-type: none"> <li>Transmission of change in tariff to domestic markets incomplete due to imperfect market integration, transaction costs, contraband imports</li> <li>Transmission elasticity stable; estimate from past prices represents elasticity for tariff change</li> <li>No effects on other commodities</li> </ul>	<p><i>Same as above, plus</i></p> <ul style="list-style-type: none"> <li>Import price level, before and after</li> <li>Domestic price level, before and after, in different locations</li> <li>Quantity imported, before and after (to compute revenue implications)</li> <li>Time series data on prices in domestic and import markets and on transaction costs affecting price margins</li> </ul>	<p><i>Same as above, plus</i></p> <ul style="list-style-type: none"> <li>Commodity price information system</li> <li>Agricultural trade statistics</li> <li>Media reports, key informants on political and natural shocks</li> <li>Trader surveys on transaction costs and barriers</li> <li>Key informants on contraband trade</li> </ul>
	Indirect medium-run tariff impacts on other commodities	Multimarket model	Changes in tariffs for particular commodities induce changes in prices of other commodities owing to cross-price demand and supply effects	<ul style="list-style-type: none"> <li>No effect of release on private stockholding</li> <li>No effect on production</li> <li>No effect on other commodities</li> </ul>	<p><i>Same as above, plus</i></p> <ul style="list-style-type: none"> <li>Quantities of supply and demand of all relevant commodities (possibly by regions)</li> <li>Direct and cross-elasticities of supply and demand of all commodities</li> </ul>
Use of public grain reserve stocks	Direct short-run effect of increased supply on selected commodity	Single-commodity partial equilibrium model (supply shift leading to change in equilibrium price); estimation using elasticities of demand and import supply	<ul style="list-style-type: none"> <li>No effect of release on private stockholding</li> <li>No effect on production</li> <li>No effect on other commodities</li> </ul>	<ul style="list-style-type: none"> <li>Quantity of stock released</li> <li>Total supply</li> <li>Domestic price</li> <li>Price elasticity of demand</li> <li>Price elasticity of import supply (not commonly available)</li> </ul>	<ul style="list-style-type: none"> <li>Supply and use data for relevant commodities</li> <li>Elasticities estimated from data or literature on similar contexts in this or other countries</li> <li>Public stocks data from the national food reserve agency</li> <li>Estimates of elasticity of import supply from trade and price data</li> </ul>
	Indirect short-run effect of increased supply	Single-commodity partial equilibrium model with supply of private storage included	<ul style="list-style-type: none"> <li>Private stockholding demand affected by prices</li> <li>No effect on production</li> <li>No effect on other commodities</li> </ul>	<p><i>Same as above, plus</i></p> <ul style="list-style-type: none"> <li>Quantity of private stocks of commodity</li> <li>Elasticity of private stockholding demand with respect to price</li> </ul>	<p><i>Same as above, plus</i></p> <ul style="list-style-type: none"> <li>Private stocks estimated from household and trader surveys</li> <li>Elasticity of private stockholding demand computed using price and private stocks data</li> </ul>
	Indirect medium-term effect of increased supply and reduced prices	Multimarket model including supply and demand of substitute commodities	<ul style="list-style-type: none"> <li>Private stockholding demand affected by prices</li> <li>Demand for and production of substitute or complementary commodities affected</li> </ul>	<p><i>Same as above, plus</i></p> <ul style="list-style-type: none"> <li>Supply, use, and stocks of substitute commodities</li> <li>Supply, demand, and stockholding elasticities for commodity and substitutes</li> </ul>	<p><i>Same as above</i></p>



commodities. For example, a reduction in the tariff on imported rice may reduce the demand for other staple commodities, reducing their prices in the near term. The effects on supply may be mixed. Since the price of rice and other staples may fall, their production may also fall in the medium term, although substitution between crops in farmers' supply decisions could lead to expanded area of alternative crops. A multimarket supply and demand model could be used to assess these cross-commodity effects. Implementing such models would require data on the supply, use, and prices of other commodities that are substitutes or complements to the directly affected commodity, as well as information on the elasticities of supply and demand of these commodities (including cross-price elasticities). The supply and use data are likely to be readily available (though not always reliable) in the national statistics of the Ministry of Agriculture or from international organizations such as the Food and Agriculture Organization of the United Nations (FAO). Estimated elasticities of supply and demand may be available for the country from the literature, although typically it is difficult to find estimates of cross-price elasticities. If sufficient data on production, use, and prices are available for the selected commodities, these parameters could be estimated econometrically. Otherwise, it may be necessary to use values based on values for similar countries and commodities in the literature, combined with expert judgment and sensitivity analysis of the results.

Such a multimarket modeling approach could be used either *ex ante* or *ex post* to assess the impacts of a tariff change. If used *ex post*, some of the predicted impacts could be tested against actual data and used to improve the model and estimated impacts. For example, the predicted impacts on prices of substitute commodities could be compared with actual price changes, and the deviations could be used to adjust the model parameters to obtain better predictions. Implementing this approach would be a fairly intensive research endeavor and not something that is likely to be readily implementable by government agencies in most developing countries.

**Food reserve policies.** As in the case of a tariff change, if the domestic market is fully integrated with the international market for an imported food commodity and the country is a small player in the international market, then the effect of domestic food reserve policies are perfectly predictable and no monitoring or assessment analysis is needed. In this case, release or purchase of domestic stocks will have no impact on the

world or domestic price of the commodity, since the change in domestic supply will have an insignificant impact on the world market price, and the domestic price will not change relative to the world market price because the market is fully integrated. Release of public stocks in this case can only reduce the quantity of imports but cannot help reduce domestic food prices. Hence, it makes sense to consider buffer stock policies only in countries where the domestic market is not fully integrated with the world market, perhaps because of trade or transportation barriers.

The short-run impact of releasing food stocks from a reserve can be estimated using a simple partial equilibrium supply and demand model. The only data required to do so are data on the total short-run supply of the commodity, the amount of reserve stocks that will be released, and estimates of the elasticities of demand and supply for the commodity. A similar computational approach can also be used to estimate the price response for the medium- and longer-run cases in which a production response is possible. This calculation can be made by expanding the supply elasticity to be the sum of both the elasticity of import supply and the elasticity of production with respect to price (for more detail, see Appendix I.)

Finally, this estimation method can also be used to gauge the price impacts of public reserve policies, taking into account the responses of private stockholding to prices. A simple formulation would treat demand for private stocks as just another component of demand for the commodity, this demand being typically larger when prices are lower. The elasticity of private stock demand would be added to the elasticity of consumption demand to determine the total elasticity of demand. Since private stockholding demand is likely to increase the total elasticity of demand, the price impact of releasing public stocks is likely to be less when such private responses are taken into account.

Food reserve stock policies can have impacts on the prices of other food commodities similar to the way import tariff changes do. As in that case, a multimarket model could be used to assess impacts on substitute and complementary commodities. The data and parameter requirements to implement these models would be similar to those needed to assess the impact of tariff changes across food commodities. As discussed for the tariff case, these models could be used to predict impacts *ex ante* or *ex post*. In the *ex post* case, the predictions of the models could be compared with observed changes in prices and quantities produced, consumed, and imported,

**Table 7—Methods for monitoring and assessing impacts of selected supply-oriented policies on domestic food prices**

POLICY	NATURE OF IMPACTS	ASSESSMENT APPROACH	KEY ASSUMPTIONS	DATA AND PARAMETERS NEEDED	SOURCES OF DATA AND PARAMETERS
<b>General (nongroup-specific) policies</b>					
Subsidies on inputs—fertilizers, seeds, credit	Direct impact on input prices and costs of food production; effects on other related markets (e.g., labor market)	<i>By level of disaggregation</i>			
		National average farmer	Average farmer captures effects at national level	National-level data: input prices, imports, exports, national production capacity, etc.	<ul style="list-style-type: none"> <li>National Statistical Office</li> <li>Ministry of Agriculture</li> <li>National accounts</li> <li>Trade information</li> </ul>
		Several types of farmers	Selected types of farmers capture most of the heterogeneity in the country	Same as above, plus Data for construction of farmer types	Same as above, plus Household survey and agricultural census
		Individual farmers	Aggregation of effects for individual farmers adds up to national effects	Same as above, plus Data at household and farm level	Same as above, plus
		<i>By level of complexity</i>			
		Food supply response at farmer level	No other effects are present other than farmer supply response	Supply elasticity with respect to input prices	Same as above, plus Estimations of elasticities from previous studies
Food supply response and (equilibrium) effects on other markets	Model selected accurately represents macroeconomic linkages	Same as above, plus Parameters for macroeconomic linkages across markets	Same as above, plus Social accounting matrices from previous studies		
General agricultural research and development	Specific to programs (e.g., improved varieties, soil and water management)	Likely same as analysis of subsidies, reflecting different levels of disaggregation and complexity	Assumptions will be based <ul style="list-style-type: none"> <li>on assessment approach</li> <li>on scenarios analyzed (e.g., high, medium, low yields)</li> <li>on impact pathway examined</li> </ul>	Indicators that are specific to the agricultural outcomes expected	Ongoing agricultural research and development programs
<b>Group-specific (targeted) policies</b>					
Examples include input voucher programs, micro-lending schemes, and small-scale irrigation programs	Direct impact on beneficiaries to achieve a food supply response; out-of-program spillover effects	<ul style="list-style-type: none"> <li>Randomized design</li> <li>nonrandomized designs:                             <ul style="list-style-type: none"> <li>Before/after</li> <li>Matching</li> <li>Double differences</li> <li>Instrumental variables</li> <li>Discontinuity regressions</li> </ul> </li> <li>If general equilibrium effects are expected, similar approaches as above for assessing general (nongroup-specific) policies</li> </ul>	<ul style="list-style-type: none"> <li>Attrition from group of beneficiaries or control group will not affect valid comparisons across groups</li> <li>In nonrandom designs, the control group provides accurate information on what would have happened to beneficiaries if they had not participated in the program being evaluated</li> </ul>	<ul style="list-style-type: none"> <li>Outcome indicator: agricultural production</li> <li>Input indicator (or treatment indicator)—examples include dummy variable for participation, amount received on vouchers, and size of loan</li> <li>Other factors that affect outcome indicator: land size and quality, labor, equipment, human capital</li> </ul>	<ul style="list-style-type: none"> <li>Baseline and after-program surveys of beneficiaries and control group</li> <li>If nonrandomized design, control group can be selected from analysis of a representative household survey</li> </ul>

and the discrepancies used to improve the specification of the model.

### **Supply-oriented policies and interventions**

Higher food prices can potentially benefit farmers and induce more food production and hence trigger a positive chain-reaction effect in local and regional economies. This desirable outcome may require time, however, or may not happen at all if farmers face constraints in gaining access to productive inputs and resources. Typically small farmers are the ones who cannot quickly take advantage of better market opportunities or increase their production because of borrowing constraints or limited access to inputs. Therefore policy actions can help accelerate supply responses by relaxing the key constraints faced by small-scale farmers.

Policy interventions and programs aimed at supporting increased agricultural production include subsidies to farmers for key inputs like fertilizer or improved seeds, agricultural extension and credit programs, investment in small-scale irrigation, and support for agricultural research and technology development. Subsidies for fertilizer and seeds and programs for extension and credit can have impact in the medium run, whereas investments in small-scale irrigation and agricultural research are expected to have longer-term impacts. Moreover, to monitor and evaluate the impact of these programs, it is important to differentiate between targeted policies that apply to specific groups of producers and those that apply to all farmers, such as a general subsidy on fertilizers.

As a summary of the following discussion, Table 7 sketches some approaches to monitoring and assessing the impacts of supply-oriented policies, both general—input subsidies and agricultural research and development—and targeted.

**General supply-oriented policies.** These policies can be directly monitored by observing selected indicators over time and across groups. In the case of general subsidies for fertilizers or seeds, indicators of the input price paid by farmers after the subsidy will be relevant. Because the subsidy is intended to reduce the actual price farmers pay for the input, it is important to confirm this is actually happening. Time-series data on fertilizer prices can be collected at the household level or from commercial suppliers. In some cases or regions, most of the subsidy may be captured by intermediaries instead of reaching farmers. Therefore input prices must be collected nationally to make sure the program is effectively implemented in all regions.

Policies oriented to increase agricultural research and development can be monitored by auditing how additional funding is spent. Indicators such as the ratio of researchers' salaries to total salaries can give an indication of excessive leakage of resources to administrative activities. Depending on the nature of the specific research and development programs, outcome and coverage indicators should be selected, such as the number of farmers adopting new technologies or seeds and the number of publications.

To evaluate the impact of these policies, different methods can be applied. The final output of an impact assessment exercise, however, should be the answer to the following question: What is the food supply response due to the policy or program being implemented? When policies are designed to lower input prices, methods similar to those used to assess the impact of rising food prices can be used. Instead of assessing the varied impacts of increasing food prices, researchers would assess the impact of decreasing prices, say, for fertilizers or credit, on food production and food prices.

Such impact analyses can use different levels of disaggregation: national, assuming a single representative farmer; by farmer group, assuming several fixed types of farmers; or for as many different farmers as are available in a representative survey. On another dimension, the complexity of the analysis can be divided into two levels: the food supply response at the level of the farmer, and the food supply response and equilibrium effects on other markets at the level of the economy.

With regard to data needs, in the case of subsidies to fertilizers, a key parameter to estimate is the supply elasticity with respect to the price of fertilizers—in other words, an estimate of how much food production increases with decreases in the price of fertilizers. The same concept applies for the price of other inputs, including for the interest rate or access to credit. For some farmers changes in input prices might imply a discrete jump in the way they produce—for example, shifting from not using fertilizers or improved seeds at all to making intensive use of them. This supply elasticity with respect to the price of inputs can be estimated or drawn from the literature for a nationally representative farmer, for several types of farmers, or for a whole set of farmers with different characteristics.

In evaluating the impact of agricultural research programs, the methods and indicators must be tailored to the nature of the specific research programs or interventions being evaluated. For example, research programs aimed at increasing yields can be evaluated

using several alternative scenarios, such as high-, medium-, and low-yield increments. In terms of the level of disaggregation, researchers can assume that yield achievements are the same for all farmers or that they vary across different type of farmers or regions. No matter what method is used, however, a good practice is to establish the impact pathway—for example, from research to improved seeds to adoption to higher yields and then to increased agricultural production and food availability.

**Targeted supply-oriented policies.** Programs like input vouchers, microlending schemes, and small-scale irrigation programs, among others, are usually targeted to specific groups of farmers within a country. Similarly, targeted crop insurance schemes may facilitate increased risk taking by farmers and foster an improved supply response. To monitor these types of programs, researchers must identify a set of program-specific indicators and collect data such that the following questions can be answered: How is the project being implemented? How is the project operating in the field? How is the program progressing relative to targets? For example, monitoring input voucher programs will require data on the number of beneficiaries relative to the target population, average time to deliver a voucher, number of regions covered by the program, timing and capacity to use the available program funds, and quality and quantity of data collection for ex post impact evaluation, among other information.

For impact assessment the focus must be on the expected final outcomes, including higher food production by the targeted farmers. As long as the target groups and participants are clearly identified, the impact assessment can be directly applied to them. The key objective is to know how much the food production of participant farmers increased owing to the intervention. To answer this question, the impact evaluator needs to estimate what the output of these farmers would have been had they not participated in the program. As discussed in considerable detail at the start of this section, a range of different methods can be applied to gain such an understanding.

Two special considerations must be mentioned when assessing the impact of targeted policies and programs. First, ex ante evaluations of expected impacts can be made using evaluations of existing programs or similar programs implemented in the past or in other countries. To minimize errors in extrapolating results from other programs, a good practice is to extrapolate from programs where participants were, on average,

similar to the participants in the targeted program one wants to evaluate. Second, when the policy response implies the scaling up of existing programs, then an assessment of impacts outside the program may be relevant. As an example, imagine that a successful microlending program allows farmers to improve their farming equipment in such a way that they can save on their labor demands. If this program reaches a large scale of operation relative to a given region, it is likely that some effects of the program will operate through the labor market by changing the aggregate regional labor demand, affecting equilibrium wages in the region. In this case, researchers should combine the impact evaluation methods proposed here for targeted programs with those for the general policies and programs discussed earlier.

### ***Income-oriented policies and interventions***

By income policies, we group together those policies that are intended to compensate the most vulnerable groups for their real income loss and erosion in their access to food due to higher food prices. These policies include cash and conditional cash transfer programs, food vouchers or food stamps, food or cash for work and public work schemes. Table 8 outlines some approaches to monitoring and assessing the impacts of such income-oriented policies and programs. Essentially, the same considerations as for assessing targeted supply-oriented policies and programs hold for the assessment of the effects of most income-oriented policies.

As already mentioned, when monitoring programs with well-defined target groups and participants, researchers must define a set of process indicators to help answer a set of central questions. How is the program being implemented? How is the program operating in the field? How is the program progressing relative to targets? Hence it is important to choose indicators that will meaningfully measure progress toward objectives. With a monitoring system in place built around such indicators, the information collected can be used to adjust program implementation to better attain program targets. Indicators such as the number of participants, the number of those participants who should not have qualified for the program, the time since identification of participants until delivery of actual program benefits, and the share of expenditure on administrative processes out of total program costs would be relevant.

For impact assessment, a range of different methods can be used. An extensive literature describes

**Table 8—Methods for monitoring and assessing impacts of selected income-oriented policies on domestic food prices**

POLICY	NATURE OF IMPACTS	ASSESSMENT APPROACH	KEY ASSUMPTIONS	DATA AND PARAMETERS NEEDED	SOURCES OF DATA AND PARAMETERS
Examples include cash transfers, conditional cash transfers, food vouchers or food stamps, food- or cash-for-work schemes, and other public work schemes	<p>Direct impact on beneficiaries:</p> <ul style="list-style-type: none"> <li>• More real income</li> <li>• Greater, more diverse food consumption</li> <li>• Improved nutritional levels</li> <li>• Higher calorie intake</li> </ul> <p>Also, out-of-program spillover effects may be important</p>	<ul style="list-style-type: none"> <li>• Randomized design</li> <li>• Nonrandomized designs: <ul style="list-style-type: none"> <li>• Before/after</li> <li>• Matching</li> <li>• Double differences</li> </ul> </li> <li>• Instrumental variables</li> <li>• Discontinuity regressions</li> <li>• If general equilibrium effects expected, similar approaches as for assessing general supply-oriented interventions can be used</li> </ul>	<ul style="list-style-type: none"> <li>• Attrition from group of beneficiaries or control group will not affect valid comparisons across groups</li> <li>• In nonrandom designs, the control group provides accurate information on what would have happened to beneficiaries if they had not participated in the program being evaluated</li> </ul>	<ul style="list-style-type: none"> <li>• Outcome indicators are program specific: <ul style="list-style-type: none"> <li>• Real income</li> <li>• Food consumption and nutrition levels</li> <li>• Calorie intake</li> </ul> </li> <li>• Input indicators (or treatment indicators): <ul style="list-style-type: none"> <li>• Dummy variables for participation</li> <li>• Amount of cash transferred</li> <li>• Amount of food transferred</li> </ul> </li> <li>• Other factors that affect outcomes: <ul style="list-style-type: none"> <li>• Demographic variables</li> <li>• Education levels</li> <li>• Other human capital factors</li> <li>• Environmental factors</li> <li>• Social service access</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Baseline and after-program surveys of beneficiaries and control group</li> <li>• If nonrandomized design, control group can be selected from analysis of representative household survey</li> </ul>

the design of impact evaluations, and the accumulated experience on evaluating income-oriented social programs across the developing world is large. Several key points on best practices for the impact evaluation of social programs are mentioned here. First, such programs should be evaluated based on an assessment of how different the situation of participants (and sometimes nonparticipants) is relative to what their situation would have been had the program not been implemented. To answer this question, one needs to evaluate the meaning of “situation” in this context. Hence, one crucial element is to identify outcome indicators to define the situation of the participants. These indicators could be measures of food expenditure, income, nutritional levels, or calorie intake, among others.

Second, identifying a control group from whom evaluators can acquire information on the counter-

factual situation the participants would have experienced had the program not been implemented becomes central. The challenges of correctly identifying a control group for comparison were discussed in detail earlier in this section.

Finally, the data needed for impact evaluations will depend on the evaluation design. Data should be collected on outcome indicators and on variables that help explain or condition those outcome indicators. This information must be collected from both the beneficiaries and the selected control group and for at least two points in time, before and after the program, to enable the use of a double-difference approach. If possible, it is ideal to collect data on multiple points in time after the program has been implemented to help determine the duration of any attributed impact to the program.

# An Implementation Plan for Action on Monitoring and Impact Assessment

**A**ccess to comprehensive and detailed information on a timely basis is vital to influence and inform policy responses to the current and future global food crises. Although abundant data are available on food issues, relevant information is often outdated, spotty in coverage, and insufficiently disaggregated to local levels. Further, much of the information is collected in an uncoordinated fashion by different international and regional organizations. In some contexts, even when information is available, the principles of freedom of access to information about the vital issues related to food security are not always followed and public, civil society, and corporate actors are not sufficiently informed for sound decisionmaking in their domains. It would also be unrealistic to assume that all the needs for information collection, policy analyses, and policy and program monitoring are met by appropriate human capacity in most developing countries affected by food crises. Therefore, coordinated action is needed not only to get the data and to conduct timely analysis so that it can be shared with decisionmakers, but also to identify mechanisms for obtaining advice and for cross-country learning and capacity strengthening. Many actors are already engaged in such efforts, including multilateral and bilateral agencies. Yet knowledge about where to get advice, for instance, on the implementation of sound context-specific food production investments, on trade policy measures that do not backfire, or on the design of targeted food and income transfer programs or effective nutrition interventions is still often out of reach for developing countries. Learning from the experiences of other countries, based on sound research, can often help, but mechanisms for doing so are lacking.

This section of the report sketches out the main elements of a global initiative to develop the means to provide reliable, appropriate information and decision-support tools for national policymakers so that they can respond quickly to changes in world food markets.<sup>1</sup> The implementation plan's objectives and components are outlined in Table 9.

An important element of the initiative is to set up an Internet-based open access policy information portal to provide comprehensive and detailed information on food crisis and related developments, including formal and informal responses, country by country. In today's Internet world, many useful websites and portals exist, including important ones operated by FAO, the World Bank, the CGIAR, and others. The portal will not

duplicate them but add specific value. The portal should become a reliable information- and decision-support tool to strengthen the ability of policymakers in the developing world to respond quickly to dynamic developments in world food system, especially crises. The portal will also facilitate monitoring of actual donor-supported investments (and pledges) that address the current food crisis at the country level. Salient elements of the portal are as follows:

- **Capacity-strengthening toolbox.** In the initial stages of the development of the information portal, existing tested tools for analysis will be brought together in a capacity-strengthening toolbox. These tools will include key questions to ask, decision-support for specific well-defined

**Table 9—Main objectives and activities of the implementation plan for providing information and decision-support tools to respond to global food crises**

OBJECTIVES	ACTIVITIES
1. Information strengthening and monitoring	<ul style="list-style-type: none"> <li>• Development of an Internet-based portal</li> <li>• Development of a capacity-strengthening toolbox</li> <li>• Facilitation of urgent advisory action</li> </ul>
2. Advisory services for policy actions	<ul style="list-style-type: none"> <li>• Assessment of impacts of high and volatile food prices in countries</li> <li>• Identification of risks and vulnerabilities</li> </ul>
3. Closing of important specific information gaps that limit appropriate food crisis responses	<ul style="list-style-type: none"> <li>• Specific studies designed to strengthen actions and implementation in countries, such as on women and food crisis, supply response, moving from emergency to social protection, and others to be identified as the program is built</li> </ul>

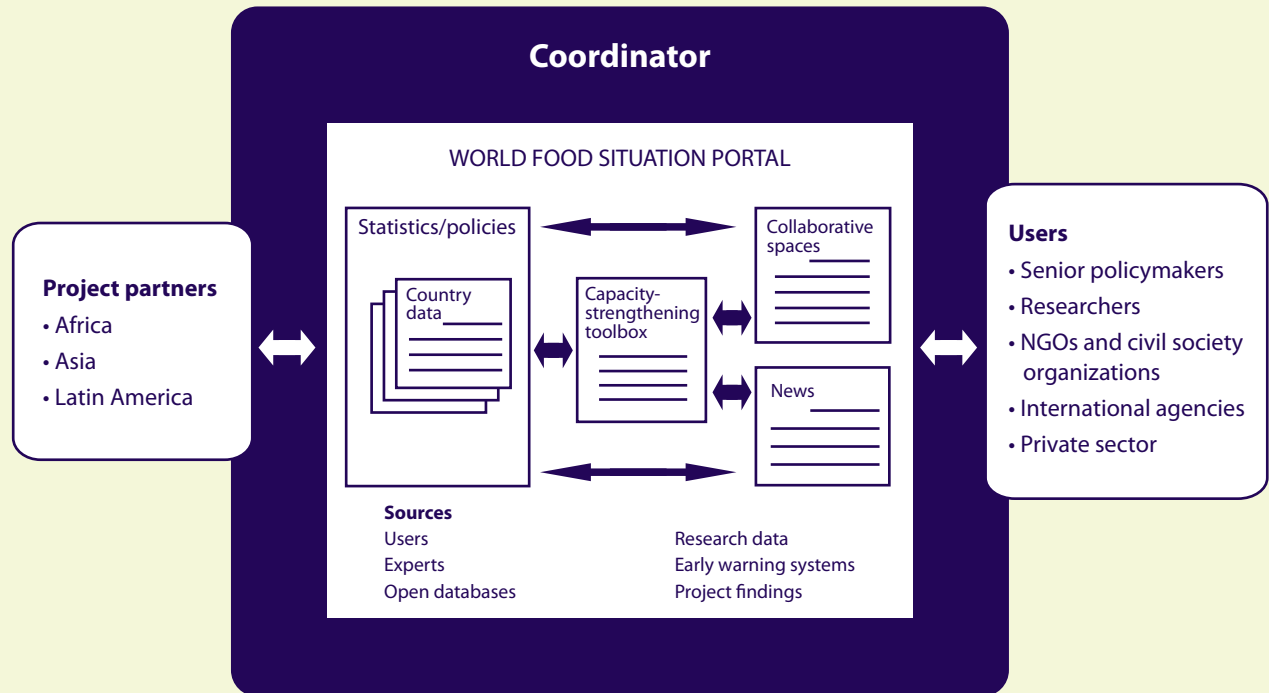
problems, and comparisons between countries and issues. As the information portal is expanded and strengthened, new or adapted tools will be added, including many of those described earlier in this report. This toolbox will allow portal users to learn how to use different tools of analysis and employ those techniques with country-specific data collected and presented elsewhere on the portal.

- **Country-by-country food policy information.** Vital food statistics and trends will be made available through the portal or, where sources already exist, through links. These datasets will include statistics on food prices, production, consumption, stocks, markets, and trade, as well as poverty and food security information, at global, regional, and national levels. Both historical and current data will be presented, as well as projections of some current trends. Also, data on the policy and program measures taken by various countries in responding to the current food crisis will be provided.
- **Food policy in the news.** This element of the portal will contain latest news reports on the food situation across countries, including on food-related protests and other manifestations of the current food crisis, and on policy and program actions under consideration. ‘In the news’ here means not only the formal media, but also the fast-evolving informal media such as blogs. This part of the initiative is significant because in a crisis open communication is crucial for maintaining trust and for sound decisionmaking by all actors.

- **Key players.** The portal will provide technical links to the public information bases of major national organizations in each country and of global institutions addressing the effects of food crises at global, regional and national levels. Such institutions include the FAO, the World Food Programme (WFP), the International Fund for Agricultural Development (IFAD), the United Nations Children’s Fund (UNICEF), the World Health Organization (WHO), other UN organizations, the World Bank, regional development banks, the Consultative Group on International Agricultural Research (CGIAR), nongovernmental organizations (NGOs), and the private sector.
- **Research findings.** This section of the portal will contain key publications by organizations working in this field to allow users to quickly retrieve the latest knowledge resources for assessing and responding to the effects of food crises.
- **User forums.** Users of the portal will be able to submit specific questions, suggestions, and comments. The forum will not only provide help in using the portal, but also serve as a platform to discuss global food price issues and connect with other users and experts. The forum will be monitored and moderated by technical and content experts.

A conceptual flow chart of the information portal is presented in Figure 3. An initial needs assessment, including interviews with the primary target audiences and users, will be undertaken to fine-tune the structure of the portal and the information provided. The portal will

**Figure 3—Conceptual framework for the policy information portal**



also be designed to allow contributions from all users. Users will be able to suggest changes to any part of the site, and the portal will have built-in feedback mechanisms, such as user satisfaction surveys, to ensure that the data provided serve the needs of the portal's users. In addition, Web statistics will be used to evaluate the performance of the portal to determine which sections and types of information need to be further developed. Working together with partners, the portal's managers will adjust it to respond to national and regional needs.

All information on the site will be searchable, and the site will abide by standards for low-bandwidth environments to be accessible in areas where Internet connectivity is a problem. Information provided will be translated into various languages (first French and Spanish, and later Chinese and Arabic), and offline versions in the form of CD-ROMs will be made available.

The portal aims to assemble information from a wide array of sources. In addition to information and data on the Internet, the portal will contain information assembled directly from a wide range of national (such as national statistical agencies and relevant ministries),

regional (such as regional economic commissions and organizations), and global sources. In addition, it will provide organizations working on food and agricultural policy issues with the opportunity to join this initiative and to integrate their expertise and information into the site, given its open access format. In this regard, the portal will be designed in an open Wikipedia-type fashion. Access to the portal both to obtain and to add information and tools will be open as an international public good to the wider public, including civil society, policymakers, and the private sector.

The portal will be rolled out with information on a number of countries in three regions—Sub-Saharan Africa, Asia, and Latin America and Caribbean—selected based on criteria such as high share and number of undernourished people and diversity in size, economic and social conditions, and geographic location. Once established, the portal will quickly embrace a larger set of countries, including about 45 countries where most of the world's food-insecure people live. Over time it will be broadened to serve as a self-monitoring device for other countries.



Key partners and sources of policy advice and support for this initiative include policymakers, policy advisors, and food, nutrition, and agricultural researchers well connected to national and regional food and agricultural policy processes. Their networks and linkages to policymakers will be important, not only for providing information to policymakers, but also for indicating where there might be knowledge gaps that would require extra information and capacity strengthening. Collaboration between partners will facilitate the exchange of relevant information, strengthen capacity, and support mutual learning. Moreover, policymakers' needs, related to the policy processes in which they are engaged, will guide the nature and expansion of the advisory services, based on sound assessments of policy options and actions delivered through consultative processes that will be an element of the initiative.

An international steering committee composed of policymakers and advisors will guide this initiative from the beginning. This committee will help ensure that the implementation plan is well embedded in partner organizations and adds value without duplication.

A step-by-step approach is envisioned to build this initiative into a sustainable international public good. There will be three distinctive phases to this initiative:

1. the build-up phase during which functions, processes, and organizational designs will be tested and established;
2. the maintenance phase during which the initiated functions and designs are optimized; and
3. the "auto-pilot" phase during which authority, accountability, and responsibility will be handled by the user community with minimal coordination.

As a contribution to the monitoring and assessment of national policy responses to world food crises and to provide support for obtaining high-quality information and knowledge management for appropriate policy responses, the International Food Policy Research Institute (IFPRI), in collaboration with national, regional, and international partners, proposes to begin implementation of this action plan by December 2008.

# Conclusion

**D**ecisionmakers who serve leaders of national governments need information and analytical tools in order to assess the risks and opportunities that their country and its citizens face from the current and future global food crises, to determine how they might respond to those risks and opportunities, and to monitor both the impact of a food crisis and the effects of governments' policy responses. Although the implications of a global food crisis differ across countries and population groups, there are relatively well-defined sets of information and analyses that governments can employ to manage such crises in their respective countries. As such, economies of scale can be captured at the international level through joint action to collect data on food crises and on their national-, household-, and individual-level effects; to build capacity in the analysis needed to guide policy formulation and program design; and to evaluate the effectiveness of those policy responses. Similarly, there are a relatively small number of types of policy responses that governments might take in the face of these crises. Here too there is scope for international action—the lessons learned from effective and failed policy responses by national leaders can be shared to aid countries considering similar policies. The proposed global initiative to provide reliable, appropriate information and decision-support tools to enable national policymakers to respond quickly to changes in world food prices sketched out in the preceding section was formulated in recognition of the gains that can be realized through joint action across countries and institutions to address the crisis.

It is hoped that the description in this document of the information sets and analytical tools needed to guide policy responses to global food crises will contribute to a further fleshing out of this and related frameworks for action on the current global food crisis at international and continental levels in coming months. Ultimately,

however, it is in the use of the information detailed here—in the collection of basic data and its use in analysis—at national and more local levels that will lead to long-term resilience to the effects of rising and variable global food prices and contribute to sustained global food security.

## APPENDIX I

# Methods for Measuring the Impact of Food Crises

This appendix provides additional detail on how to implement some of the basic analyses described in this report. In particular, it explains the equations for calculating the terms-of-trade effect of changes in world prices, the short-term and the long-term welfare effects of changes in prices, the effect on prices of a reduction in the tariff for a food commodity, and the impact of releasing food stocks onto the market on food prices.

**Terms-of-trade effects.** One way to measure the terms-of-trade effect is to calculate the change in the value of net exports due to changing world price (assuming that the country maintains the same volume of imports and exports) as a proportion of the size of the economy. This effect can be calculated as follows:

$$\text{terms-of-trade effect} = [\sum x_i (\Delta p_i/p_i) - \sum m_i (\Delta p_i/p_i)]/\text{GDP}, \quad (1)$$

where  $x_i$  is the value of export commodity  $i$ ,  $\Delta p_i/p_i$  is the proportional change in the world price of export  $i$ ,  $m_i$  is the value of import commodity  $i$ ,  $\Delta p_i/p_i$  is the change in the world price of import  $i$ , and GDP is the gross domestic product of the country. Equation (1) can be applied to individual commodities (such as maize and wheat) or to broad categories (such as agricultural commodities). As a simple example, if a country has agricultural exports of US\$0.1 billion, agricultural imports of US\$1 billion, and a GDP of US\$10 billion, the terms of trade effect of a 50 percent increase in agricultural prices would be  $(0.1 \times 0.50 - 1.0 \times 0.50)/10 = -0.45/10 = -4.5$  percent. Thus, the loss due to terms of trade effects is about 4.5 percent of GDP.

**Short-term welfare effects of higher food prices.** The proportional change in welfare in the short run (before the household responds to the new prices) can be expressed as follows:

$$\text{short-run } \Delta y/y = \sum f_i (\Delta p_i/p_i) - \sum s_i (\Delta p_i/p_i) = \sum (f_i - s_i) (\Delta p_i/p_i), \quad (2)$$

where  $\Delta y/y$  is the proportional change in household welfare (usually expressed in terms of the value of household consumption),  $f_i$  is the share of income from the sale of commodity  $i$ ,  $\Delta p_i/p_i$  is the proportional change in the price of commodity  $i$ , and  $s_i$  is the share of expenditure going to the purchase of commodity  $i$ . This implies that  $(f_i - s_i)$  is the net sales of commodity  $i$  divided by household income or expenditure. Deaton (1989) calls this the net benefit ratio and notes that it can be considered the short-term elasticity of welfare with respect to the price of  $i$ . The impact of changes in wage rates can be incorporated into this framework by assuming that one of the “commodities” is labor and its “price” is the wage rate.

**Medium-term welfare effects of higher food prices.** In the medium term, the welfare impact of price changes must take into account the response of the household to the new prices, but it can be calculated by an extension of the preceding equation:

$$\text{long-run } \Delta y/y = \sum f_i (\Delta p_i/p_i) + \sum 0.5 f_i \varepsilon_{S_i} (\Delta p_i/p_i)^2 - \sum s_i (\Delta p_i/p_i) - \sum 0.5 s_i \varepsilon_{D_i} (\Delta p_i/p_i)^2, \quad (3)$$

where  $\varepsilon_{S_i}$  is the elasticity of supply of commodity  $i$  and  $\varepsilon_{D_i}$  is the price elasticity of demand for commodity  $i$ . Thus, the only additional information needed to estimate the medium-run impact is estimates of the price elasticity of demand and the supply elasticity. This expression can be easily estimated with information about the composition of demand, source of income, and the elasticities. Equation (3) does not, however, take into account shifts in spending patterns due to changes in income, cross-price effects in supply and demand, changes in the wage rate, changes in the exchange rate, or other general equilibrium effects.

Both the short-term and the medium-term expressions of welfare change can be calculated for a set of representative households or, preferably, for every household in a survey. In the latter case, by estimating the change in income associated with the price change, one can estimate the resulting changes in the incidence of poverty and other measures of poverty and inequality.

**Short-term impact of a tariff reduction.** To assess *ex ante* the likely short-term impact of a reduction in tariffs for food commodities, considering imperfect price transmission from global to national markets, one multiplies the percentage import price change due to the change in tariff by the elasticity of price transmission:

$$\Delta P_d/P_d = \varepsilon(P_d, P_i) \times \Delta P_i/P_i \quad (4)$$

where  $\Delta P_d/P_d$  and  $\Delta P_i/P_i$  are the proportional change in the domestic and import price, respectively, and  $\varepsilon(P_d, P_i)$  is the elasticity of price transmission.

This calculation assumes that the elasticity of price transmission can be estimated from available data or from values in the literature and that the elasticity estimated is valid for a change in the tariff. If suitable values are not available from the literature, the price transmission elasticity can be estimated. A simple method for estimating the elasticity is to calculate the ratio between percentage changes in domestic food prices and import prices over some specified time period in the past (see, for example, Dawe 2008).<sup>2</sup> More complex methods use econometric analysis of time-series price data (for example, Syrovátka and Lechanová 2005). The first method is simpler to use and requires less data but produces only a point estimate for the elasticity, which could be biased because of the selection of unrepresentative time periods for the comparison or effects of other factors affecting the relative changes of import and domestic prices. Econometric methods can help address these problems. Nonetheless, neither the simple two-point method nor econometric methods may produce a valid estimate of the elasticity that would apply to a change in tariff, because the elasticity evident in the historical price data may have been affected by other factors besides changing tariffs that do not apply in the present period. Such problems will be difficult to overcome in an *ex ante* assessment. An *ex post* assessment, however, could be used to check the validity of *ex ante* predictions, producing estimates of the elasticity of price transmission specifically in response to a change in tariff.

**Short-run impact of releasing food stocks.** The short-run impact of releasing food stocks from a reserve can be estimated using a simple partial equilibrium supply and demand model, as illustrated in Figure A.1.<sup>3</sup> In the figure, release of the quantity  $R$  from the reserve increases short-run supply from  $S$  to  $S + R$ , causing the market equilibrium price to fall from  $P(S)$  to  $P(S + R)$ . Assuming that the demand and supply functions have constant price elasticities (or assuming small changes), the proportional change in price resulting from the change in supply is given by

$$\Delta P/P = (\Delta Q/Q)/(\varepsilon_D - \varepsilon_S) = R/[S \times (\varepsilon_D - \varepsilon_S)], \quad (5)$$

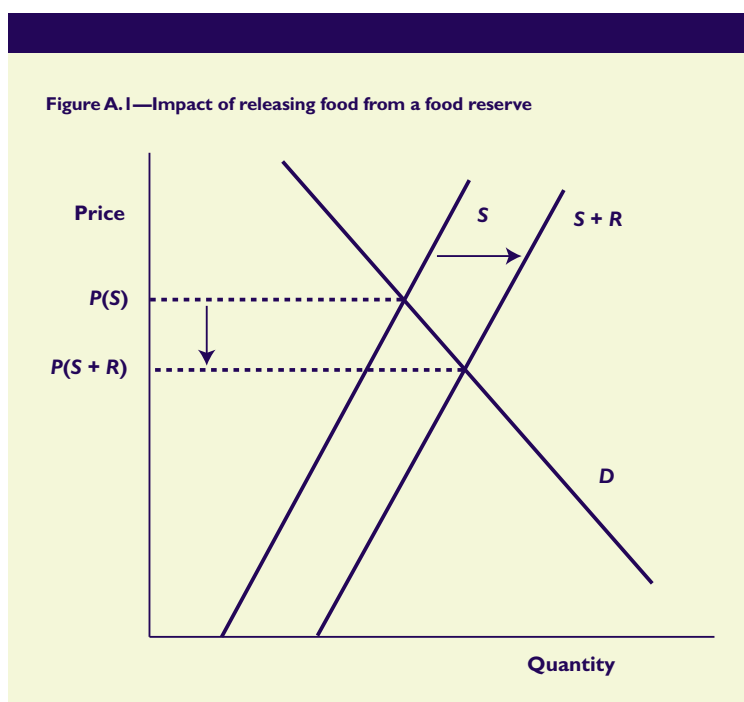
where  $\Delta P/P$  is the proportional change in the domestic price of the commodity resulting from the increase in supply,  $\Delta Q/Q$  is the proportional increase in supply, and  $\varepsilon_D$  and  $\varepsilon_S$  are the price elasticities of demand and supply for the commodity, respectively.<sup>4</sup> For example, if the price elasticity of demand is -0.2, the price elasticity of supply is 0.3, and releasing the reserve stock increases supply by 10 percent, then the predicted impact on the price is -20 percent.

To use this approach, the only requirements are data on the total short-run supply of the commodity, the amount of reserve stocks that will be released, and estimates of the elasticities of demand and supply for the commodity. Relevant estimates of the elasticity of demand may be available in the literature or could be estimated econometrically. The elasticity of supply in this case includes the responsiveness of the supply of imports to domestic price changes and is related to the elasticity of price transmission (see endnote 3).<sup>5</sup> This elasticity is not commonly estimated, so it may be difficult to find appropriate values in the literature. It could be estimated econometrically using data on imports of the commodity and domestic prices, controlling for levels of production and import prices.<sup>6</sup> It is important that any elasticity estimates used are subjected to sensitivity analysis.

A similar computational approach to Equation (5) can be used to estimate the price response for the medium- and longer-run cases in which a production response is possible. In this case, the supply elasticity will be the sum of the elasticity of import supply and the elasticity of production with respect to price. Estimated elasticities of

production with respect to price are commonly found in the literature or could be estimated econometrically using appropriate data.

Finally, equation (5) can also be used to estimate the price impacts of public reserve policies, taking into account the responses of private stockholding to prices. A simple formulation would treat demand for private stocks as just another component of demand for the commodity, this demand being typically larger when prices are lower. The elasticity of private stock demand would be added to the elasticity of consumption demand to determine the total elasticity of demand. Since private stockholding demand is likely to increase the total elasticity of demand, the price impact of releasing public stocks is likely to be less when such private responses are taken into account. Estimates of the elasticity of private stockholding are less common than estimates of consumer demand, as this elasticity requires data on private stockholding levels, which may not be very reliable. Hence, addressing this issue may require collection of new data on private stocks in many countries. Data from household production and consumption surveys (which often include food stock levels) and trader surveys could be used for this purpose.



## APPENDIX 2

# Government Policy Responses to the Current Global Food Crisis

Table A.1—Government policy responses to the food crisis and the symptoms of political actions triggered by the crisis, 2006–August 2008

COUNTRY	GOVERNMENT RESPONSES					PROTESTS	
	Trade restriction	Trade liberalization	Consumer subsidy	Social protection	Increase supply	Violent	Nonviolent
Afghanistan		X		X	X		X
Algeria			X	X			
Angola					X		
Argentina	X	X	X		X		X
Armenia					X		
Austria							X
Azerbaijan	X						
Bahrain		X	X	X	X		
Bangladesh	X		X	X	X	X	X
Belgium							X
Benin		X	X		X		
Bolivia	X	X	X		X		X
Brazil	X	X			X		
Burkina Faso		X	X	X		X	X
Burundi				X			
Cambodia	X	X	X				X
Cameroon		X		X	X	X	
China	X	X	X		X		X
Comoros			X				
Congo, Rep.		X			X		
Côte d'Ivoire		X		X	X	X	
Cuba			X				
Dominican Republic				X			
Ecuador	X	X			X		
Egypt	X		X	X	X	X	
El Salvador		X					X
Ethiopia	X		X	X	X		X
The Gambia		X					
Germany							X
Ghana		X			X		
Guatemala		X			X		X
Guinea				X		X	

**Table A.1—Government policy responses to the food crisis and the symptoms of political actions triggered by the crisis, 2006–August 2008**

COUNTRY	GOVERNMENT RESPONSES					PROTESTS	
	Trade restriction	Trade liberalization	Consumer subsidy	Social protection	Increase supply	Violent	Nonviolent
Guinea-Bissau		X					
Haiti			X	X	X	X	
Honduras		X	X			X	
India	X	X	X	X	X		X
Indonesia	X	X	X				X
Iran	X		X				
Italy							X
Japan							X
Jordan		X	X	X			X
Kazakhstan	X		X	X	X		
Kenya					X	X	X
Kuwait				X			
Lebanon				X			X
Liberia		X		X	X		
Madagascar	X		X				X
Malawi	X				X		
Malaysia	X		X		X		
Mali	X	X		X	X		
Mauritania						X	
Mexico		X	X		X		X
Mongolia		X	X			X	X
Morocco		X	X			X	X
Mozambique						X	
Namibia			X	X			
Nepal	X						X
Netherlands							X
Nicaragua		X	X				X
Niger	X	X		X	X		X
Nigeria		X	X		X		
North Korea							X
Oman			X	X	X		
Pakistan	X	X	X	X		X	X
Panama			X		X		
Paraguay		X	X				
Peru		X	X	X		X	X
Philippines				X	X		X
Qatar				X			
Russia	X	X	X		X		X

**Table A.1—Government policy responses to the food crisis and the symptoms of political actions triggered by the crisis, 2006–August 2008**

COUNTRY	GOVERNMENT RESPONSES					PROTESTS	
	Trade restriction	Trade liberalization	Consumer subsidy	Social protection	Increase supply	Violent	Nonviolent
Rwanda					X		
Saint Lucia					X		
Saudi Arabia		X	X	X	X		
Senegal		X	X		X	X	X
Sierra Leone	X	X	X	X	X		
Singapore							X
Somalia	X					X	X
South Africa			X	X			X
South Korea		X	X				X
Sri Lanka			X		X		
Sudan					X		
Suriname		X					
Switzerland							X
Syria				X			
Tajikistan		X	X	X			
Tanzania	X	X	X				
Thailand	X		X		X	X	X
Timor-Leste			X				
Togo			X		X		
Trinidad and Tobago					X		X
Tunisia			X	X		X	
Turkey	X	X			X		
Turkmenistan					X		
Uganda				X	X		
United Kingdom							X
Ukraine		X	X				
United Arab Emirates				X	X	X	
Uruguay		X	X				
Uzbekistan	X		X				X
Venezuela		X	X	X	X		
Vietnam	X	X			X		
Yemen			X		X	X	X
Zambia	X				X		
Zimbabwe		X	X				

Sources: Government responses: International Monetary Fund (IMF), FAO, and news reports, 2007–08; food-related protests: news reports, 2007–08.



# Notes

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1. Teunis van Rheenen, Klaus von Grebmer, and Rajul Pandya-Lorch contributed to the design of this plan.
2. This method uses equation (4) in a modified form:  $\varepsilon(P_d, P_i) = (\Delta P_d / P_d) / (\Delta P_i / P_i)$ .
3. Although domestic production is assumed to be fixed in the short run, the supply curve in Figure A.1 is upward sloping (rather than a perfectly inelastic vertical line) because the supply of the imported commodity responds positively to increases in prices. This assumes that the elasticity of price transmission from the world to the domestic market is positive but less than one. If the elasticity of price transmission is one (perfect transmission), the supply curve (including imports) will be an infinitely elastic horizontal line and the release of stocks would have no effect on the domestic price. If the elasticity of price transmission were zero, imports would not respond at all to domestic prices and the short-run price elasticity of supply would be zero. In this case, the change in prices would be determined by the elasticity of demand. In the medium or long run, the supply is more price elastic because production can respond to price changes in the longer term. Hence, the price impacts of releasing reserves or other shifts in supply or demand are likely to be smaller in the long run than in the short run.
4. The second equality follows because  $\Delta Q / Q = R / S$ .
5. In the short-run case, production is fixed and the elasticity of supply is equal to the price elasticity of imports. In the medium or longer run, the elasticity of supply equals the sum of the elasticity of production and elasticity of imports.
6. This elasticity could be estimated using an equation of the form:  $\ln(\text{Imports}_t) = b_0 + b_1 \ln(P_{dt}) + b_2 \ln(P_{it}) + b_3 \ln(\text{Production}_t) + u_t$ . The estimated value of  $b_1$  would be the estimated price elasticity of import supply, controlling for production and import price level.

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