

CHAPTER 2

Food Crisis Risk Monitoring Early Warning for Early Action

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KEY MESSAGES

- Early-warning, early-action systems provide alerts of potential food crises – identified as sudden and substantial increases in acute food insecurity – as well as guidance to policymakers and international development agencies about needs for humanitarian action.
 - Use of different methodologies and varying coverage of vulnerable populations mean different early warning systems for acute food insecurity can yield dissimilar estimates of the severity of food crises.
 - Local food security monitoring systems are poorly connected to systems that track global food and agriculture market trends. Monitoring of acute food insecurity and chronic food insecurity are poorly integrated at the country level. This leads to differing interpretations of the nature and magnitude of food crises.
 - Existing systems pay insufficient attention to structural vulnerabilities that determine how different shocks, including global price shocks, affect food insecurity in particular contexts and compound other causes of acute food insecurity, such as poverty, conflict, and climate change.
 - Famines are the catastrophic expression of severe food crises. Today's famine-like contexts are mostly driven by conflict. Conflict typically impedes the data collection required by existing protocols for declaring famine, which can delay humanitarian action, at the expense of a preventable human toll.
- To increase the effectiveness of early warning systems, it is important to:
- Expand the country coverage and frequency of consensus-based acute food insecurity analysis.
 - Revise the protocol for declaration of a famine to ensure it is operational in conflict-affected locations.
 - Better integrate the various types of early warning systems for food crises through much stronger collaborative efforts across responsible international organizations, with support from the research community and in consultation with policymakers, development agencies, and local actors.
 - Improve monitoring of risk factors and structural causes of crises to support the development of real-time early warning systems that are able to anticipate and potentially help prevent food crises through timely and well-targeted responses.
 - Strengthen analysis of factors driving crises in particular places – including global supply and price shocks, how these are transmitted to local contexts, what structural vulnerabilities increase or mitigate their impact, and how they affect acute and chronic food insecurity – to inform long-term responses that build resilience and reduce the risk of food crises.



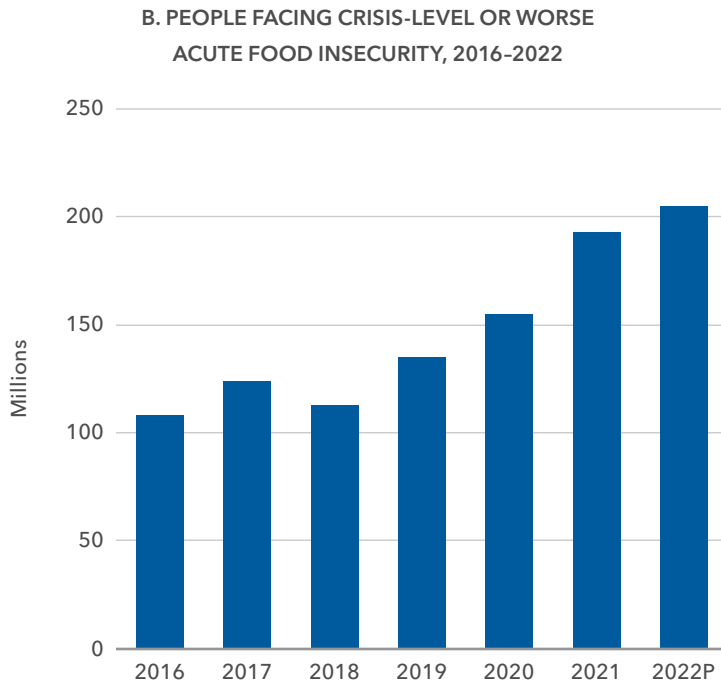
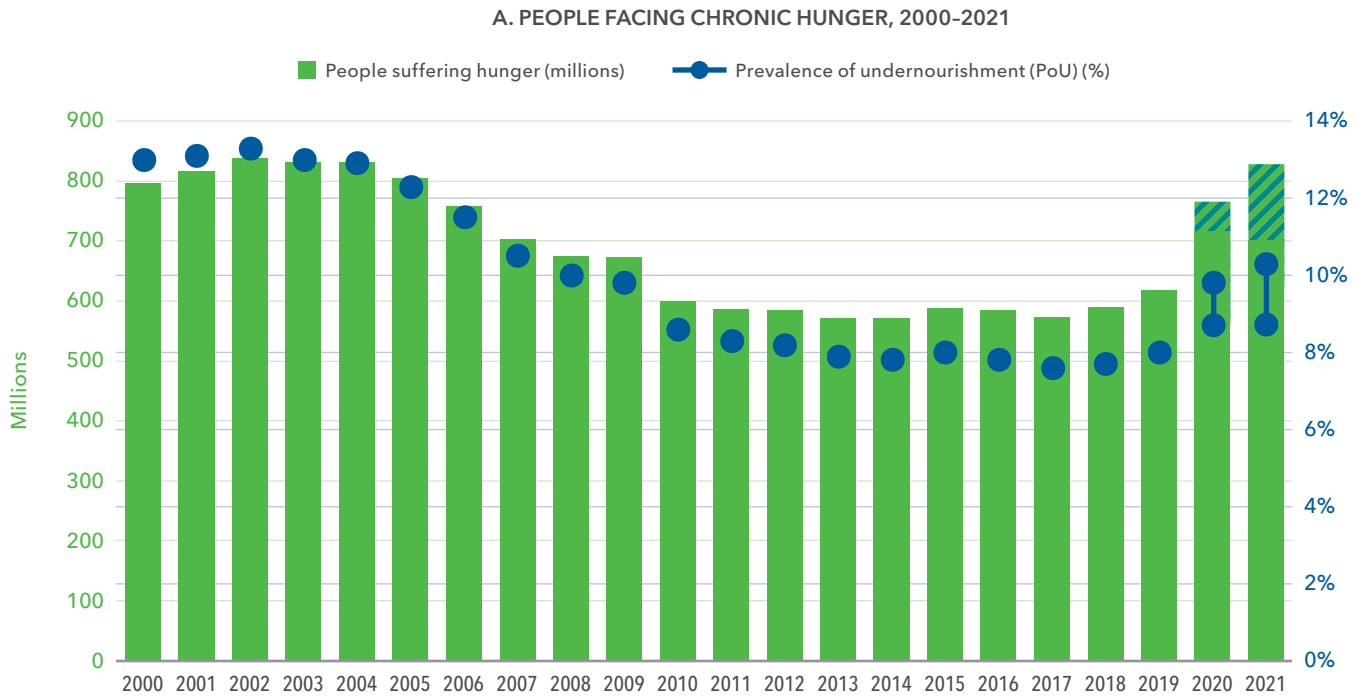
Global and national agrifood systems are vulnerable to a variety of shocks that have caused major disruptions to food production, markets, and livelihoods over the past two decades, and have set back efforts to reduce poverty, food insecurity, and malnutrition. Currently, the world is contending with the global repercussions of the Russia-Ukraine war. In many countries, the impact of the war is compounded by local conflict, weather shocks, lingering effects of COVID-19, macro-economic instability, and weak coping capacity. These concurrent crises have led to a sharp rise in both acute and chronic food insecurity since 2017, especially in developing countries. According to estimates from the United Nations agencies, chronic food insecurity – measured as the number of people with prolonged insufficient food energy intake – rose from around 573 million in 2017 to as many as 828 million in 2021 (Figure 1A). Acute food insecurity – measured as food deficiency affecting lives at any given point in time – almost doubled between 2016 and 2022, from 108 million people in 2016 to 205 million in 2022 in 45 food crisis countries (Figure 1B). Estimates of the World Food Programme

(WFP), which considers more countries, suggest that as many as 349 million people in 79 countries faced acute food insecurity in 2022.¹

This rapid rise in food insecurity has placed tremendous pressure on governments and humanitarian and development partners to respond, despite limited financial resources. These actors are also hindered by insufficient information needed for prioritizing policies, investments, and other interventions and for balancing responses to immediate impacts with investments in longer-term resilience. Governments and international agencies increasingly need more effective early warning systems that provide timely and accurate projections to inform policies for immediate and longer-term responses.

Multiple early warning systems exist to monitor food crisis risks. Among those that directly monitor acute food insecurity, there is considerable overlap and sometimes seemingly conflicting information because of differences in methods, population coverage, and frequency of data collection. Other warning systems focus on global food and agricultural market trends, providing useful information

FIGURE 1 Chronic hunger and acute food insecurity



Source: For Figure 1A, FAO, IFAD, UNICEF, WFP, and WHO, *The State of Food Security and Nutrition in the World 2022* (Rome: FAO, 2022); For Figure 1B, FSIN and GNAFC, *2022 Global Report on Food Crises: Joint Analysis for Better Decisions* (Rome: 2022); and FSIN and GNAFC, *2022 Global Report on Food Crises: Mid-Year Update* (Rome: 2022).

Note: In Figure 1A, numbers for 2020 and 2021 indicate the projected range. In Figure 1B, number for 2022 is projected.

BOX 1 DEFINING FOOD INSECURITY

Food insecurity is broadly defined as the lack of secure access to sufficient safe and nutritious food needed for normal human growth and development and for an active and healthy life.¹

Chronic food insecurity describes a situation where people are unable to meet their minimum food requirements (usually defined as minimum intake of calories) over a sustained period of time – usually over the course of a year or longer. Chronic food deprivation is most closely associated with “hunger,” that is, the prevalence of undernourishment, as monitored by the Food and Agriculture Organization of the United Nations (FAO) and other international organizations.²

Acute food insecurity is defined as any manifestation of food insecurity at a specific point in time of a severity that threatens lives, livelihoods, or both, regardless of the causes, context, or duration.³ Acute food insecurity is highly susceptible to change and can manifest in a population within a short amount of time, as a result of sudden changes or shocks that affect determinants of food insecurity and malnutrition.⁴ Acute food insecurity can be **transitory**, in the sense that it reflects a short-term or temporary inability to meet food consumption requirements related to sporadic crises, which suggests a capacity to recover. However, situations of severe acute food insecurity often emerge in contexts where widespread chronic food insecurity already exists and where affected people have little to no capacity to recover without assistance.

about risks to (global) food availability and affordability, but do not directly link to national and localized food security risks. Better integration of these types of early warning systems and expanded capacity for data collection and analysis of complex drivers of food insecurity are needed to inform policies and rapid action to reduce the impact of, or even prevent, food crises.

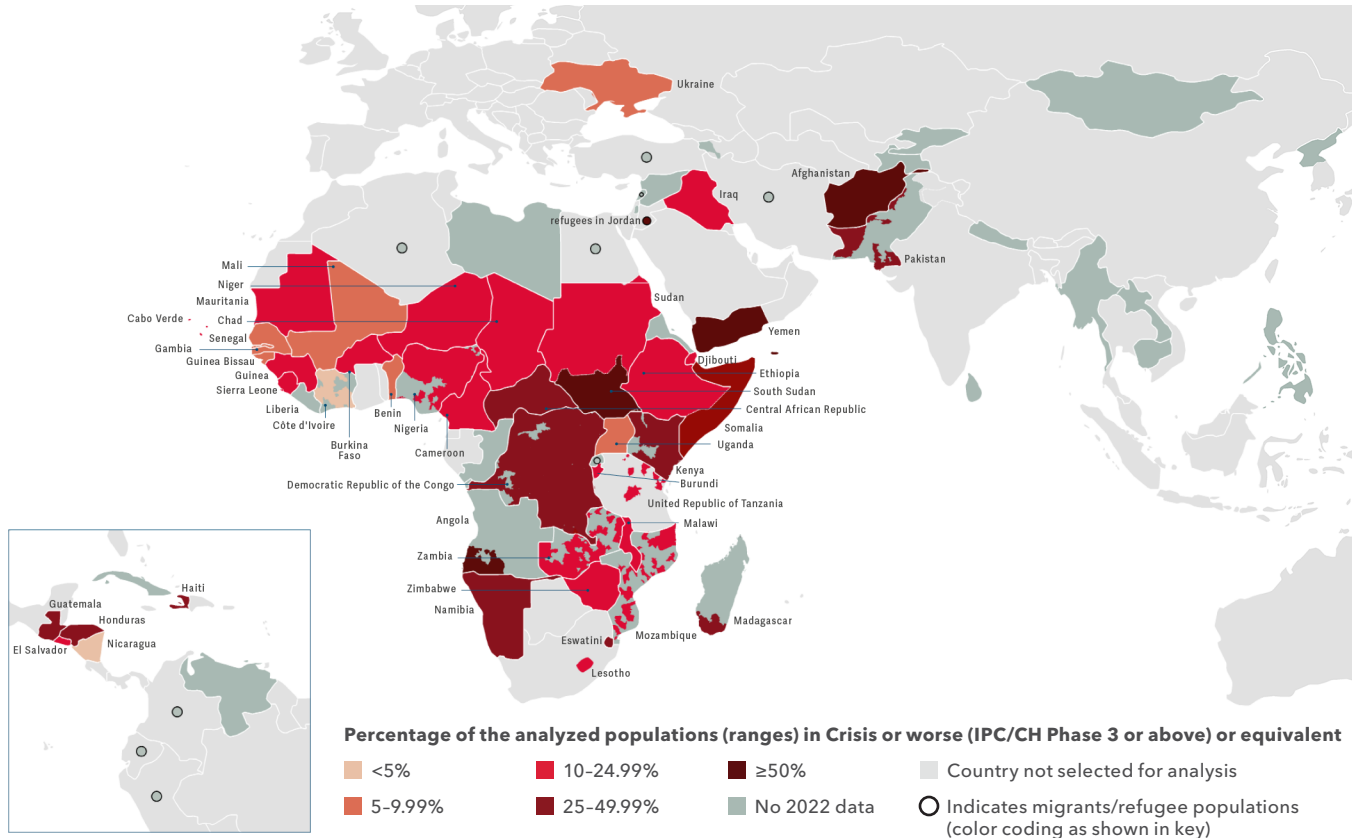
This chapter provides an overview of the main early-warning, early-action (EWEA) systems now in place for identifying food crisis risks and informing responses. We describe what works, as well as the shortcomings of present systems. The chapter then discusses how better integration of currently disjointed food crisis monitoring and analysis mechanisms could create a more effective, real-time monitoring mechanism for identifying and understanding global and national threats to food security. This would allow not only swift palliative action but – importantly – could also inform the design of preventative and preemptive responses that create resilient food systems and livelihoods and reduce food crisis risks. As such, it would overcome the costly drawbacks of traditional approaches that limit early action to humanitarian assistance, which saves lives but does not address the structural vulnerabilities that may contribute to the recurrence of food crises and to the protracted nature of many food crisis situations.

EARLY WARNING SYSTEMS

Food security is a growing global concern demanding policy solutions. A “food crisis” is generally identified when rates of acute food insecurity surge at the local, national, or global level (Box 1).² Of the 45 countries and territories covered in the most recent *Global Report on Food Crises*, 10 reported that the number of people facing acute food insecurity increased by more than 50 percent during 2022, owing to escalating food prices, weather extremes, and conflict or insecurity (Figure 1B).³ For example, at present, a compound crisis is unfolding in the Horn of Africa, where an unprecedented multiseason drought that began in late 2020, combined with conflict, displacement, and macroeconomic shocks, has put the region on the brink of famine.

Increases in global food prices can be an important driver of food insecurity, though the impacts are mediated by local conditions and vulnerabilities. Food prices surged in 2021 as markets faced supply bottlenecks during the COVID-19 recovery and spiked further in the first half of 2022 as a consequence of the Russia-Ukraine war.⁴ Countries already facing protracted food crises before the pandemic and the war have been hardest hit by the recent surge in food prices (see Chapter 1, Box 1). Populations in all 45 crisis contexts saw the cost of a

FIGURE 2 Share of analyzed populations in crisis-level or worse acute food insecurity in 45 countries/territories, 2022



Source: Reproduced from FSIN and GNAFC, 2022 *Global Report on Food Crises: Mid-Year Update* (Rome: 2022).

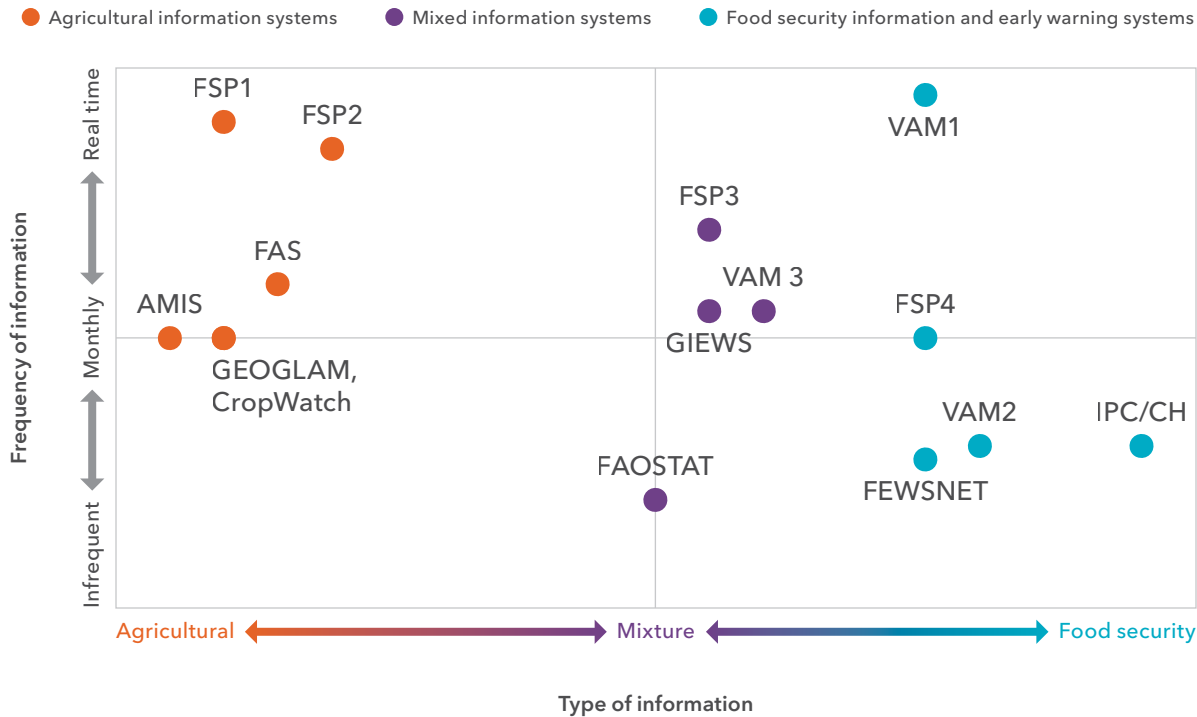
basic food basket increase by at least 10 percent by April-June 2022 (up from the five-year average), but people in Ethiopia, Haiti, Sierra Leone, South Sudan, Sudan, Syria, Yemen, and Zimbabwe faced annualized food cost increases of more than 75 percent.⁵ Many are also suffering high general price inflation (driven by the cost of energy and other basic needs), further eroding their purchasing power.

Most food crisis countries are highly dependent on food imports and have little capacity to insulate their populations from imported food inflation, given their low foreign currency reserves, high public debt burdens, and/or depreciating national currency. International support to address this constraint (such as through additional aid, debt relief, or improved access to contingency financing) is often overlooked as a necessary companion to food assistance. Even if this support comes, it typically arrives late and is inadequate, as we saw during the 2022

food crisis – when the IMF opened its Food Shock Window only after food prices had been falling for more than four months. Consequently, governments of food crisis countries have little scope to expand social protection or other support to vulnerable populations. Protracted civil strife and weather shocks have compounded economic woes in many of these countries, such that the total number of people facing acute food insecurity at crisis level or worse (Box 2) in 45 food crisis countries increased from 155 million in 2020 to 205 million by mid-2022.⁶ In Afghanistan, South Sudan, Somalia, Yemen, and parts of the Democratic Republic of the Congo (DRC), more than half of the analyzed populations at risk are considered to face acute food insecurity or worse, and famine warnings have been issued for Somalia and Yemen (Figure 2).

We focus here on two main types of early warning systems: *acute food insecurity early warning*

FIGURE 3 Agricultural market and food insecurity early warning systems by type and frequency of information



Source: Table A.1 (end of this chapter) and N. Haan, M. Van Dijk, and W. Rossi Cervi, *Food Security and Agriculture Information Systems Landscape Analysis* (London: CASA and UK Aid for the Foreign Commonwealth & Development Office, 2021).

Note: FSP1, FSP2, FSP3, and FSP4 refer to, respectively, IFPRI's Food Security Portal's (1) commodity price and volatility monitoring system; (2) trade and fertilizer restrictions trackers; (3) domestic food price tracker, and (4) vulnerability dashboard and food crisis risk monitoring panel. VAM1, VAM2, and VAM3 refer to, respectively, WFP's (1) VAM/HungerMap LIVE and nowcasting tool; (2) CARI; and (3) Market Monitor.

systems, which directly estimate degrees of food insecurity; and *agricultural market information early warning systems*, which focus on supply and market conditions that could endanger food security. In addition, we indicate how these systems relate to the monitoring of chronic food insecurity. Figure 3 (and Table A.1 at the end of the chapter) charts the most important early warning systems by type of information provided (food insecurity or agricultural markets) and frequency of monitoring (annual, weekly, or daily). We discuss these below.

ACUTE FOOD INSECURITY EARLY WARNING MECHANISMS

Existing EWEA systems, developed and run by several international agencies, humanitarian organizations, and governments, have been instrumental in monitoring acute food insecurity as well as the drivers of food insecurity spikes

in local contexts. These systems have been useful in identifying the need for food assistance and other humanitarian and development aid to stave off the worst consequences of food crises. The Integrated Food Security Phase Classification/ Cadre Harmonisé (IPC/CH), often referred to as the gold standard for classifying degrees of food insecurity,⁷ uses a five-phase scale, with Phase 3 considered "crisis level," where emergency food assistance is needed; Phase 4 is designated "emergency," with urgent action needed to save lives; and Phase 5 identifies a "catastrophe," or famine (Box 2). The USAID-supported Famine Early Warning Systems Network (FEWS NET) incorporates IPC/CH indicators in its forward-looking analyses of populations at risk of acute food insecurity.

The warning systems that monitor current food insecurity conditions in countries identified as

BOX 2 THE INTEGRATED FOOD SECURITY PHASE CLASSIFICATION (IPC): CONSENSUS-BASED IDENTIFICATION OF FOOD CRISES

IPC sets a common standard and shared language for classifying the severity of acute food crisis situations using a five-phase scale, and provides information on the number of people affected and on the drivers of food insecurity.¹ IPC classifications at the country level are based on a convergence of evidence, which works from the premise that various unrelated sources and types of data can “converge” toward strong conclusions. The Cadre Harmonisé (CH) is the IPC-compatible measure applied to food security conditions in West Africa. We refer to IPC/CH as one entity in this chapter. The table describes the five phases of acute food insecurity and the type of priority action expected from governments and the international community for each situation.

IPC/CH acute food insecurity phase description and priority response objectives

Phase	Phase description and priority response objectives
PHASE 1 None/Minimal	Households are able to meet essential food and nonfood needs without engaging in atypical and unsustainable strategies to access food and income. Action required to build resilience and for disaster risk reduction.
PHASE 2 Stressed	Households have minimally adequate food consumption but are unable to afford some essential non-food expenditures without engaging in stress-coping strategies. Action required for disaster risk reduction and to protect livelihoods.
PHASE 3 Crisis	Households either have food consumption gaps that are reflected by high or above-usual acute malnutrition, or are marginally able to meet minimum food needs but only by depleting essential livelihood assets or through crisis-coping strategies. Urgent action required to protect livelihoods and reduce food consumption gaps.
PHASE 4 Emergency	Households either have large food consumption gaps that are reflected in very high acute malnutrition and excess mortality, or are able to mitigate large food consumption gaps but only by employing emergency livelihood strategies and asset liquidation. Urgent action required to save lives and livelihoods.
PHASE 5 Catastrophe/Famine	Households have an extreme lack of food and/or other basic needs even after full employment of coping strategies. Starvation, death, destitution, and extremely critical acute malnutrition levels are evident. (For Famine classification, area needs to have extreme critical levels of acute malnutrition and mortality). Urgent action required to revert/prevent widespread death and total collapse of livelihoods.

Source: Reproduced from FSIN and GNAFC, 2022 *Global Report on Food Crises: Joint Analysis for Better Decisions* (Rome: 2022).

at-risk – including IPC/CH and FEWS NET – typically provide only annual or, at best, quarterly assessments, which international aid agencies consider too infrequent to adequately address acute situations. Both mechanisms rely on combinations of primary and secondary information sources to identify vulnerable populations according to the IPC/CH classification system. The Food Security Information Network (FSIN) and the Global Network Against Food Crises (GNAFC) are important users of these monitoring mechanisms. FSIN integrates data from IPC/CH, FEWS NET, WFP, and other sources to reach interagency consensus

about acute food insecurity situations and reports its assessments in the semi-annual *Global Report on Food Crises*. The GNAFC, which brings together multiple donors and international and regional organizations, uses the report’s findings to prioritize places for assistance.

While the various acute food insecurity early warning systems are similar, they take different approaches to generating alerts. IPC/CH looks at the *current* acute food insecurity situation and then projects improvement or deterioration based on evidence and consensus of expert opinion convened at the country level (including

key stakeholders from national governments, the United Nations, and nongovernmental agencies).⁸ FEWS NET projects how risk factors – such as rainfall, price changes, conflict, and harvest prospects – are likely to affect the extent and severity of acute food insecurity in the *near term*, typically an eight-month period.⁹ FEWS NET’s analysis further differs from IPC’s in that it does not include a consensus-based process.

The Vulnerability Analysis and Mapping (VAM) instrument, which includes Food Security Assessments, a Market Monitor, and a Seasonal Explorer, is a central element of WFP’s early warning mechanism. The VAM brings together assessments of household-level food security conditions, local and global market trends in food supply and prices, harvest prospects, and food security risks associated with geopolitical and economic shocks (VAM1 in Figure 3). The system now also experiments with mobile technology, artificial intelligence, and data analytics to facilitate near real-time food security monitoring across countries, accessible through the HungerMap LIVE.¹⁰

Like FEWS NET, WFP’s monitoring mechanisms combine geospatial, economic, and household data to analyze food security in the organization’s 80 countries of operation. For its acute food insecurity assessments, WFP uses its Consolidated Approach for Reporting Indicators of Food Security (CARI, referred to as VAM2 in Figure 3), which combines food consumption scores, economic capacity indicators, and data on livelihood coping strategies to generate snapshots (“nowcasts”) of existing acute food insecurity.¹¹ Nowcasts are used to identify the need for emergency interventions, including where and how food assistance is needed. WFP’s assessments are used as inputs to the acute food insecurity estimates of all the countries covered by IPC/CH, but also cover many more food insecurity contexts. As a result, WFP’s global estimate for the number of people facing crisis-level or worse acute food insecurity is much higher, 349 million in 79 countries in 2022 compared with 205 million in 45 countries identified in the *Global Report*.

WFP’s assessments feed into its internal corporate alert system to trigger early responses. At the same time, drawing on information from

IPC/CH and VAM1, the Food and Agriculture Organization of the United Nations (FAO) and WFP also issue joint early warnings on acute food insecurity through quarterly identification of “hunger hotspots,” with country-specific recommendations for anticipatory action and emergency response.¹² These early warnings are based on projections of populations at risk, considering the presence of natural hazards, conflict, displacements of people, and economic shocks that are likely to drive acute food insecurity to crisis levels or worse. In the projections for October 2022 to January 2023 (issued in September 2022), FAO and WFP identified 19 hunger hotspots with 195.5 million people projected to be at risk of seriously worsening acute food insecurity. Of greatest concern are Afghanistan, Ethiopia, Nigeria, Somalia, South Sudan, and Yemen, where some vulnerable populations are already in or projected to suffer famine-like conditions.

The hunger hotspot mechanism is a good example of existing interagency collaboration in early warning systems for acute food insecurity and could provide a way forward for avoiding overlap and duplication. Similar collaborative efforts are also needed to better align the monitoring of acute and chronic food insecurity – which is important for avoiding confusion about the two concepts and thus about the magnitude of food insecurity problems – and to support alignment of humanitarian and development action in the fight against hunger. Currently, mechanisms for monitoring chronic food insecurity are disconnected from the early warning mechanisms for acute food insecurity. Standard indicators of chronic food insecurity are the prevalence of undernourishment (PoU) and severe and moderate food insecurity as measured through the Food Insecurity Experience Scale (FIES).¹³ As indicated in Figure 1, many more people face chronic shortage of adequate food intake than face acute food insecurity. At present, these estimates of chronic food insecurity are not suitable for early warning purposes as they are available only with a time lag of a year and only include national aggregates and averages (for this reason, they are not included in Figure 3). Moreover, conceptually, the undernourishment and FIES indicators differ starkly from those for acute food insecurity. These

fundamental differences hamper any analysis of the extent to which the risk factors linked with acute food insecurity and those linked with chronic conditions coincide, and thus, also hinder the alignment of humanitarian and development efforts.

AGRICULTURAL MARKET EARLY WARNING SYSTEMS

Agricultural market early warning systems monitor market trends, such as global price and supply shocks, that affect the stability of food availability and affordability. In many countries, the agriculture sector is a key driver of food security, as it is both the main supplier of food and a critical source of income. Adverse shocks to food supplies – caused by weather calamities such as droughts, fluctuations in global and local food prices, policies such as export restrictions, or other problems – can have significant impacts on food security in vulnerable regions. Unlike most acute food insecurity early warning systems discussed above, several of these information systems use high-frequency or near real-time data to provide alerts of the risk of supply and price shocks (Figure 3).

Several of these mechanisms were developed in the wake of the 2007/08 food price crisis. The most notable is the Agricultural Market Information System (AMIS), an interagency platform launched in 2011 by the G20 Ministers of Agriculture.¹⁴ AMIS provides monthly assessments of global food supplies and identifies needs for coordinated policy action (such as avoiding export bans or managing food reserves) in times of market uncertainty. The GEOGLAM Crop Monitor, a related mechanism, is an international effort to provide open and timely remote-sensing information on global crop-growing conditions and agroclimatic factors, both for major food import and export regions and for countries where food security is at risk.¹⁵ Similar global information services are also provided by, for instance, CropWatch of the Chinese Academy of Sciences, which also feeds into GEOGLAM's early warning system.¹⁶

IFPRI's Food Security Portal is another important platform developed in response to the 2007/08 crisis. The Portal tracks food price volatility in international markets, and its Excessive Food Price Variability Early Warning System (FSP1 in Figure 3) provides alerts of above-normal volatility through a

traffic-light system that is updated daily (see page on IFPRI monitoring tools following this chapter). This warning system has provided early signals of market tightness and of the impacts of export restrictions on global market prices (see Chapter 4). Several additional tools and dashboards have recently been added to the Portal, most notably a Food and Fertilizer Export Restrictions Tracker (FSP2), a Fertilizer Market Dashboard, a Domestic Food Price Monitor (FSP3), and a Vulnerability Analysis tool (FSP4). These were developed in response to the series of recent food system shocks caused by COVID-19, multiple climate-related disasters, and the Russia-Ukraine war.

Other agricultural market early warning mechanisms with long data series include the information on international and national agricultural markets and policies provided by the U.S. Department of Agriculture's Foreign Agricultural Service (FAS) and the International Grains Council's monitoring of grains, rice, and oilseeds market conditions, including daily publication of its Grains and Oilseeds Index. FAO provides regular updates on market conditions for internationally traded agricultural commodities, including through its monthly Food Price Index, and on domestic food market conditions and dependence on food imports through its Global Information and Early Warning System on Food and Agriculture (GIEWS). The GIEWS continuously monitors food supply, demand, prices, and other key indicators at global and national levels and provides basic information for the pre-identification of (potential) food crisis countries covered by IPC/CH and the *Global Report*.

GAPS AND SHORTCOMINGS

While both types of warning systems provide vital information, better integration among these existing systems, addressing key data and analytic gaps, and a redefinition of famine criteria would boost their usefulness for humanitarian and development responses.

NEED FOR INTEGRATION

Insufficient integration of existing agricultural early warning systems with the acute food insecurity warning systems is a critical shortcoming. Joint FAO/WFP Crop and Food Security Assessment

BOX 3 GLOBAL FOOD PRICE SPIKES AND FOOD CRISES

The global food price spike of 2007/08 caught major development donors by surprise. As prices spiraled upward, the uniform response from donors was to provide more food assistance. Donors also recognized that underinvestment in R&D in prior decades had contributed to slow productivity growth and price spikes, and they committed to increasing funding for agricultural research. Despite this commitment, global food prices spiked again during 2010/11. However, the focus on global price shocks left donors blind to the 2011 famine in Somalia – which was driven by conflict and repeated drought, and cost the lives of a quarter of a million people before adequate emergency aid arrived.

The international price surges of 2007/08 and 2010/11 have often been referred to as “global food crises.” This jump to identify a food crisis reflects a common presumption that higher prices in world markets are directly transmitted to domestic markets, raising domestic prices and eroding food access for vulnerable households. However, such price transmission is mediated by many factors, meaning that a spike in global food prices may not be adequate grounds for identifying a food crisis.

Will this time be different? When the Russia-Ukraine war began, food and fertilizer prices spiked in international markets during February–May of 2022. Many observers saw this as a “global food crisis,” and most of the response so far has focused on increasing humanitarian assistance. Yet, the impacts of COVID-19 and the war in Ukraine on global food markets have highlighted the diverse vulnerabilities of food supply chains and other factors contributing to inadequate resilience of vulnerable populations. Better monitoring and understanding of those risks and how they can drive up food insecurity and hunger should be a priority for improving early warning systems.

Missions, which analyze countries’ agricultural production alongside household food security, and the link between the FAO’s GIEWS and IPC/CH are among the few examples of connection points between these two types of early warning systems. Also, WFP’s VAM/Hunger Map LIVE, IPC/CH, and FEWS NET draw on data from the agricultural market warning systems. At present, however, these links remain weak. AMIS, for instance, only monitors staple food price trends in global markets and does not provide alerts regarding how (potential) shocks may be transmitted to domestic food prices at the consumer level (such as those for flour and bread) to signal food security risks. This disconnect may underlie the mistaken tendency to immediately interpret global supply or price shocks as a “food crisis” (Box 3), without examining how local contexts may moderate their impacts.

GAPS IN DATA AND ANALYSIS

At least four critical gaps in the data and analysis used by early warning systems need to be addressed.

CONFLICT AND FOOD INSECURITY. Conflict is known to be a primary driver of acute food insecurity (and identified as such in the main EWEAs for acute food insecurity), and growing evidence on the two-way causal relationship between conflict and food insecurity is becoming available.¹⁷ But major research gaps remain, particularly in fragile contexts and situations of extreme food insecurity (see Chapter 7). Conflict is inherently a complex and politically sensitive phenomenon, and studying food security in conflict situations is difficult. Yet, understanding how conflict and food security interact is vital for analyzing and forecasting future food security scenarios, as well as for conflict mediation, which is an essential part of comprehensive intervention strategies. Lack of clear insight into how climate change heightens the risk of conflict increases this challenge. CGIAR’s Climate Security Observatory and Climate Security Dialogues dashboard could be instrumental in helping to fill this void and strengthening the analysis of drivers of acute food insecurity as undertaken, for instance, for FAO and WFP’s hunger hotspot assessments.

LIVESTOCK AND FISHERIES PRODUCTION AND MARKETS. Existing early warning systems include almost no indicators to monitor conditions in livestock and fisheries production and markets. These are important to the livelihoods of many poor and food insecure people, as well as increasingly important components of diets.

TRANSMISSION OF GLOBAL AGRICULTURAL MARKET SHOCKS. Understanding remains limited of how, and to what degree, these shocks are transmitted to domestic food supplies and prices, and how this affects the food security of vulnerable populations (Box 3). The transmission of global shocks varies greatly across countries and commodities and, hence, responses cannot be enacted with a broad brush. For example, a recent IFPRI study shows that the supply shock to global wheat markets from the Russia-Ukraine war was only very partially and gradually reflected in domestic price surges in most countries, though the impact was dramatic in some (see Chapter 1, Box 1).¹⁸ Such analyses of shock transmission from the global to the more local context should be part of agricultural market early warning systems and should facilitate linkages with food insecurity warning systems.

CONSISTENCY IN ESTIMATES OF ACUTE FOOD INSECURITY. As mentioned, the existence of different estimates of the global number of acutely food insecure people is a source of confusion, reducing the credibility of the numbers and making it harder to communicate the magnitude of the world's hunger problems – ultimately slowing responses. Country coverage is the main reason underlying the difference between the global estimates for crisis-level acute food insecurity of the *Global Report* (205 million in 2022) and WFP (349 million). Hence, while costly in terms of information gathering, expanding coverage of the consensus-based IPC/CH analyses to all of the nearly 80 commonly recognized food-crisis countries would lead to a convergence in country coverage and consistency in estimates of acute food insecurity.

AN ACTIONABLE DEFINITION OF FAMINE

A shared understanding of the situation on the ground is essential for an early warning system to

trigger early action, most importantly where there is a risk of famine. However, the present protocol for declaring famine is no longer sufficiently operational in current contexts. The existing IPC protocol is designed to gather information in slow-onset emergencies, such as prolonged drought. However, in many of today's food emergencies, conflict is the major driver pushing people to the brink of starvation. In these conflict contexts, information to determine whether there is famine must be collected within just a few hours at most. A revision of famine criteria is needed to allow for a consensus-based judgment call without time-consuming collection of detailed survey data.

ACHIEVING REAL-TIME MONITORING OF RISKS AND VULNERABILITIES

While the current suite of early warning systems provides valuable food insecurity projections, addressing the shortcomings could improve predictions and make them more useful for early action. How do we get there?

First, a stronger, clearer analytical framework for weighing the various risks and assumptions that go into short-term forecasts of both agricultural market conditions and acute food insecurity would improve the quality of predictions. Assumptions about how current conditions may relate to risk of future food crises should be analyzed systematically. By focusing on risk factors, vulnerabilities, and resilience, such a framework would better inform responses that address both immediate needs (acute food insecurity) and structural conditions that determine vulnerabilities and coping capacity.

Second, for these early warning systems to support early action that builds resilience before a potential crisis occurs or a current food crisis intensifies, future food security outcomes must be estimated many months in advance to give decision-makers time to plan interventions (see Chapter 3). The need for early alerts, along with the complexity of the factors shaping food security outcomes, complicates the work of projecting food crisis risk to inform early action. Most current systems are not equipped for this, though FEWS NET

and WFP's VAM have taken important steps toward forward-looking estimation of acute food insecurity based on risk analysis.¹⁹

Third, models should be developed for more integrated, quantitative EWEA systems. Some efforts in this direction are already being made. The World Bank's Famine Action Mechanism (FAM) was set up in partnership with IPC/CH and FEWS NET, as well as other organizations, to scale up anticipatory (preventative) and early emergency action for emerging food crises. The FAM has explored statistical analysis and machine learning to help predict crises and inform responses through a new financing modality (Crisis Response Window Early Response Financing, under IDA 19).²⁰ Although this initiative's approach to predicting crises in real time shows promise for the use of forecasting technology, it has not yet produced results that could credibly underpin early action. Nonetheless, the FAM has used the framework to inform country-level consultations in Afghanistan, Chad, Somalia, South Sudan, and Yemen that aimed to identify anticipatory and early action programming. These consultations led to Somalia's shock-responsive safety net,²¹ but unfortunately, this response did not prevent a renewed famine warning from being issued for large parts of the country in 2022.

The FAM shares features with risk-contingent credit lines, like the World Bank's Catastrophe Deferred Drawdown Option,²² and "forecast-based finance" (FbF)²³ schemes that are being implemented by some disaster relief and humanitarian assistance agencies, including WFP, to anticipate disasters and prepare for action.²⁴ These schemes support EWEA decision-making and trigger access to humanitarian funding for early action based on in-depth forecast information and risk analysis. Under an FbF plan, participating agencies agree in advance on the allocation of financial resources for early action, as well on the specific forecast threshold that will trigger release of those resources, and roles and responsibilities of everyone involved (see Chapter 3). FbF schemes are often deployed in well-defined fragile settings, for predefined beneficiaries and geographies. WFP's FbF scheme and other early action responses by governments and humanitarian aid agencies are informed by the

HungerMap LIVE. Real-time monitoring through daily interviews with local informants conducted by call centers is active in 40 countries and complemented by predictive modeling that identifies food crisis risks for another 53 countries. The modeling uses acute food insecurity data as well as other relevant indicators, such as a rainfall-vegetation index, conflict reports, market prices, macroeconomic stability indicators, and nighttime light intensity (an indicator of economic development).²⁵ The near real-time nowcasts of the HungerMap build on machine-learning algorithms to yield information to monitor key drivers of food security risks and to make short-term forecasts of populations at risk of acute food insecurity. Compared with traditional information systems, real-time information makes it possible to identify deterioration in food security much more quickly, enhancing the early warning systems needed for anticipatory action and emergency response. Various research centers are engaging in similar efforts,²⁶ but these either focus only on a subset of risk factors or are as yet far from operational for use as part of EWEA systems. Much more work is needed to improve and tailor these efforts to support effective EWEA mechanisms that can inform concerted responses and align actions along the humanitarian-development nexus.

CONCLUSION

There is simply not enough funding available to address the increasing number of crises and beneficiaries already in need, and the deepening climate crisis will widen this funding gap. If interventions instead remain focused on emergency relief, the world will have to provide more and more assistance with every lean season. Better EWEA systems would allow governments and international agencies to tackle food crises earlier and more effectively, and to reorient interventions toward resilience building.

More work is needed to integrate – or at least to better explain – the different approaches and methodologies currently used by EWEAs to identify acute food insecurity, monitor chronic food insecurity, and incorporate the key information provided by agricultural market warning systems. More intensive cooperation between existing

platforms, such as AMIS, on the one hand, and FSIN and GNAFC, on the other, will be needed to move forward. The importance of adequate agricultural market information and food security monitoring mechanisms has been repeatedly reiterated by multiple global platforms and gained prominence with the 2022 global food crisis, as reflected in the 2022 G20 Leaders' Declaration and the initiative of the G7 Development Ministers for a Global Alliance for Food Security.²⁷ This internationally concerted support is essential but will be most effective if it drives the improvement and integration of existing mechanisms rather than creating new ones.

To effectively and efficiently support responses to food crises, early warning systems must be

enhanced to include real-time monitoring of key risk factors and vulnerabilities that affect food access in rapidly changing global and national contexts, along with analyses of how those risk factors and vulnerabilities increase the likelihood of food crisis situations. Most importantly, they must inform policy recommendations for buffering the most harmful impacts of those shocks in the short run and for building sustainable resilience for the long term. The chapters that follow explore both the types of early action that early warning systems can facilitate and short- and long-term policy responses that can reduce the frequency and impact of food crises.

TABLE A1 Description of early warning and other relevant monitoring systems

Name	Organization	Description	Link
IPC/CH – Integrated Phase Classification/ Cadre Harmonisé	Food and Agriculture Organization (FAO), World Food Programme (WFP), and multiple partners	The IPC provides decision-makers with core estimates of severity and magnitude of acute and chronic food insecurity and malnutrition using evidence and consensus-based analysis to inform emergency responses as well as medium- and long-term policy and programming.	http://www.ipcinfo.org/
FEWS NET – Famine Early Warning System Network	U.S. Agency for International Development (USAID)	FEWS NET provides unbiased, evidence-based analysis to governments and relief agencies that plan for and respond to humanitarian crises. Its analyses also support resilience and development programming. FEWS NET posts monthly reports on several dozen countries, primarily in sub-Saharan Africa.	https://fewsn.net/
VAM1 – Vulnerability Analyses and Mapping and Hunger Map LIVE	WFP	VAM1 provides vulnerability data for food security analysis and monitoring and real-time “nowcasting” of food security situations in more than 80 countries to inform WFP planning and resourcing.	https://dataviz.vam.wfp.org/ https://hungermap.wfp.org/
VAM2/CARI – Consolidated Approach for Reporting Indicators of Food Security	WFP	WFP’s CARI provides “snapshots” of acute food insecurity situations based on multiple indicators, including food consumption scores, food energy shortfall, poverty status, food expenditure shares, and livelihood coping strategies. WFP uses this information to identify need for emergency interventions.	https://www.wfp.org/publications/consolidated-approach-reporting-indicators-food-security-cari-guidelines
VAM3 – WFP Global Market Monitor	WFP	WFP’s monthly Global Market Monitor provides information on changes in the cost of basic food baskets, alerts for price spikes in local markets, and domestic inflation and currency movements as well as an overview of global food commodity price developments. Price information is publicly available and covers more than 1,500 markets.	https://www.wfp.org/content/market-monitor
GIEWS – Global Information and Early Warning System	FAO	GIEWS continuously monitors food supply, demand, prices, and other key indicators at global and national levels for assessing the overall food security situation in most countries of the world.	http://www.fao.org/giews/en/

Table A1 continued

Name	Organization	Description	Link
FAOSTAT	FAO	FAOSTAT provides free access to food and agriculture data for more than 245 countries and territories and covers all FAO regional groupings, from 1961 onward. It includes annual crop production, agricultural trade, and food balance sheets, among other data.	http://www.fao.org/faostat/en/#home
GEOGLAM – Crop Monitor of the Group on Earth Observations Agricultural Monitoring	GEOGLAM	GEOGLAM provides open, timely information on crop conditions in support of market transparency for the G20 Agricultural Market Information System (AMIS) as well as an early warning system for countries at risk of food production shortfalls.	https://cropmonitor.org/
CropWatch	Chinese Academy of Science	CropWatch assesses national and global crop production and related information using remote sensing and ground-based indicators.	http://www.cropwatch.com.cn/html/en/index.shtml
AMIS – Agricultural Market Information System	AMIS (multi-agency, multi-country/ G20)	AMIS is an interagency platform, composed of G20 members plus Spain and 7 additional major exporters and importers of agricultural commodities, to enhance food market transparency and policy responses for food market stability.	http://www.amis-outlook.org/
FAS – Foreign Agricultural Service	U.S. Department of Agriculture (USDA)	FAS links US agriculture to global agriculture and food supplies information to enhance export opportunities and provide information about prospects for global food security.	https://www.fas.usda.gov/
FSP1 – Food Security Portal (FSP) Excessive Food Price Variability Index	IFPRI	The FSP provides a real-time early warning system for price trends and price volatility in international markets for key agricultural commodities. International prices and the volatility index are updated daily.	https://www.foodsecurityportal.org/tools/excessive-food-price-variability-early-warning-system
FSP2 – Food Security Portal (FSP) Food and Fertilizer Trade Restrictions; Fertilizer Market; and Production and Stocks Trackers	IFPRI	The FSP provides daily updates of food and fertilizer trade restrictions, monthly updates of fertilizer prices and market conditions, and monthly updates of global supply and stocks of key staple foods.	https://www.foodsecurityportal.org/tools/COVID-19-food-trade-policy-tracker https://www.foodsecurityportal.org/node/1947 https://www.foodsecurityportal.org/node/1734
FSP3 – Food Security Portal (FSP) Domestic Food Price Monitor	IFPRI	The FSP provides a dashboard with trends in domestic food prices (aggregate and by main food items) with most prices updated monthly. It also includes a dashboard to track transmission of international price trends and other determinants of domestic food price inflation.	https://www.foodsecurityportal.org/node/2089
FSP4 – Food Security Portal (FSP) Vulnerability Analysis Dashboard	IFPRI	The FSP provides a dashboard identifying food insecurity hotspots and vulnerability to different types of global market shocks and other risk factors.	https://www.foodsecurityportal.org/tools/control-panel-for-risk-monitoring

TOOLS AND MODELS

IFPRI has developed a wide set of tools to support early warning, analysis, and food crisis response. The Food Security Portal provides access to databases and alert systems that monitor changes in agrifood markets, fertilizer markets, agricultural production, and stocks as well as country-level vulnerability, and that track policy responses to crises. IFPRI also supports analytic models that provide projections of crisis and policy impacts.

EARLY WARNING AND DATA TRACKING TOOLS

FOOD SECURITY PORTAL

Facilitated by IFPRI and supported by the European Commission, the Portal provides food security alerts and open access to country-level data, analytic tools, and research products to help policymakers and other stakeholders respond to developments in the world food system. The tools described here, along with many others, are available through the Portal.

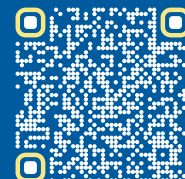
<https://www.foodsecurityportal.org/>



EXCESSIVE FOOD PRICE VARIABILITY EARLY WARNING SYSTEM

Identifies high volatility in markets, which can jeopardize food security, to alert farmers, traders, processors, and policymakers of upcoming uncertainty in prices for staple crops.

<https://www.foodsecurityportal.org/tools/excessive-food-price-variability-early-warning-system>



EARLY WARNING HUB

Brings together a number of major early warning systems from international organizations, providing information on the latest food security alerts and situations on the ground.

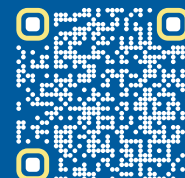
<https://www.foodsecurityportal.org/tools/early-warning-hub>



CONTROL PANEL FOR RISK MONITORING

Allows real-time monitoring of risk factors for food crises, including data on conflict, COVID-19, crop conditions, and climate-related satellite data.

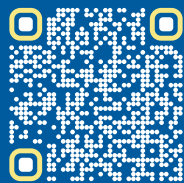
<https://www.foodsecurityportal.org/tools/control-panel-for-risk-monitoring>



FOOD AND FERTILIZER EXPORT RESTRICTIONS TRACKER

Tracks records country policies that restrict food exports and chemical fertilizer exports that can contribute to food insecurity, and their likely impact in terms of US dollar value and kilocalories.

<https://www.foodsecurityportal.org/tools/COVID-19-food-trade-policy-tracker>



FERTILIZER MARKET DASHBOARD

Provides several datasets to monitor fertilizer markets including the latest monthly prices of major fertilizers and natural gas – a key input in fertilizer production – and country profiles of fertilizer trade and use.

<https://www.foodsecurityportal.org/node/1947>



PRICE SHOCK TOOL

Allows interactive exploration of the impact of commodity prices changes on poverty for a set of vulnerable countries.

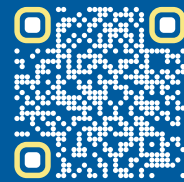
<https://www.foodsecurityportal.org/node/1627>



PRODUCTION AND STOCKS MONITORING SYSTEM

Provides data on four major commodities, covering production, domestic consumption, ending stocks, and stock-to-use ratios by country and across time, to monitor vulnerability of world food markets.

<https://www.foodsecurityportal.org/node/1734>



MODELS

RIAPA

IFPRI's Rural Investment and Policy Analysis (RIAPA) modeling system offers forward-looking, economywide country-level analysis that serves as a simulation laboratory for different policies, investments, or economic shocks. RIAPA covers over 30 countries and includes detailed representation of agrifood systems that allows analysts to measure impacts to food systems, national economies, and global markets. A series of RIAPA analyses on the impact of the Russia-Ukraine war are found here:

<https://www.ifpri.org/spotlight/food-prices-war-ukraine>



IMPACT MODEL

To explore the long-term challenges policymakers face in sustainably reducing hunger and poverty, IFPRI developed the International Model for Policy Analysis of Agricultural Commodities and Trade (IMPACT) Model. IMPACT is a network of linked economic, water, and crop models, allowing it to account for environmental, biophysical, and socioeconomic trends in simulations of national and international agricultural markets. It covers 44 commodities that make up nearly all of the world's food production and consumption. Information on IMPACT and simulation results are found here:

<https://www.ifpri.org/project/ifpri-impact-model>

