Food and Agriculture Organization of the United Nations

Global Forum on Food Security and Nutrition

Report of the online discussion
No. 168
from 16.09.2020 to 18.10.2020

FSN Forum


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Near-real-time monitoring of food crisis risk factors for improved early warning early action

About this online discussion

This document summarizes the online discussion *Near-real-time monitoring of food crisis risk factors for improved early warning early action*, held on the FAO Global Forum on Food Security and Nutrition (FSN Forum) from 16 September to 18 October 2020. The discussion was facilitated by Betina Dimaranan of the Markets, Trade, and Institutions Division of the International Food Policy Research Institute (IFPRI).

This online discussion followed up on a recent Food Security Portal (www.foodsecurityportal.org) webinar that took stock of the advances in tools and approaches for real-time monitoring of food crisis risk factors in early warning early action systems. The discussion was one in a string of policy dialogues organized by the Food Security Portal that seeks to catalyze research and policy efforts to utilize real-time monitoring in food crisis risk assessment and prevention. Over the four weeks of discussion, participants from 10 countries shared 12 contributions. The topic introduction and the discussion questions proposed, as well as the contributions received, are available on the discussion page: www.fao.org/fsnforum/activities/discussions/near-real-time-monitoring

1. How should real-time monitoring be designed and utilized to strengthen existing early warning systems and support preventative policy responses to food crisis risk?

One of the discussants provided a comprehensive examination of threats to food and nutrition security, including conflict, poor weather conditions or severe weather events, natural disasters, inappropriate agricultural practices, labor shortages, food speculation and harmful trade policies. All of these factors affect food security at the local, regional, and global levels, with impacts often crossing borders (Lal Manavado).

Participants were in strong agreement with the need for timely information and data to drive proactive responses to food crisis risk factors in order to prevent crises from occurring. However, they also highlighted the complexities involved in identifying, gathering, and aggregating relevant food security-related data. These complexities include the wide array of data sources and collection methods available

(Tilman Brück), as well as the variety of factors that can drive food crises and about which data need to be collected (Hamad Lyimo, Lal Manavado). In this context, one participant mentioned the potential of weather monitoring tools to inform policy (Hamad Lyimo), while others emphasized the need for monitoring of local staple food supply chains (Jorge Carulla) and identifying ways to track wild animals that pose a threat to crops and livestock (Bhubaneswor Dhakal). In any case, an effective early warning system will incorporate multiple data sources on multiple food crisis risk factors in a simple, easy-to-use way that can provide reliable generalizations to help policymakers respond quickly (Hamad Lyimo, Kamau Wanjohi).

Digital solutions will play a critical role in strengthening near-real-time monitoring efforts. Such solutions can help farmers by providing agronomic recommendations, microfinance services, and micro-insurance services; however, farmers themselves will need to take an active role in data collection efforts by providing real-time data regarding their crops, production levels, etc. (Marco Brini). Technological solutions could include satellite data, the Internet of Things, cloud computing, Big Data Analytics, smart sensors, and advanced geologic survey techniques. These technologies can be used to improve weather forecasting and climate predictions, estimate the impacts of weather on local farming conditions, and lead to more accurate, automatic food production predictions (Marco Brini, Lal Manavado). A participant stressed that technological solutions should be designed with protocols to enable data exchange between technologies and software, which will aid in enhancing data flows from local to global levels (Marco Brini).

Several discussion participants dove deeper into what a robust early warning system could look like. One participant broke the design of an effective early warning system into four stages: 1) identification of appropriately trained spatial data collectors (either individuals or organizations); 2) identification of a central data transfer point, such as a regional research institution that can help in aggregating data and reaching more remote locations; 3) incorporation of regional risk coefficients based on crop loss stemming from various factors, and 4) analysis of aggregated data to identify appropriate policy options and emergency interventions (Sumanth Chinthala).

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A second participant envisioned a staged approach to the functioning of the early warning system itself, in which the system would first determine whether food security trends are deteriorating and then confirms whether or not that deterioration is likely to devolve into a food crisis. Such a system would require the collection of high frequency data rather than standard survey data with significant time lags; however, relying on high frequency data would also restrict the data collection methodologies that could be used and the variables that should be considered. The participant suggested tweaking standard survey methodologies to use remote data collection from a large number of survey panels to allow for near-continuous collection of data (Tilman Brück). However, as another participant highlighted, remote data collection presents its own challenges, namely ensuring representativeness and accurate sampling (Kamau Wanjohi).

A third participant suggested that successful food security risk monitoring could be best achieved through public distribution system (PDS) data management based on artificial intelligence. Such a system would detect gaps in food supply chains and help identify households that are not registered for the PDS. It could also help track the cost and availability of nutritious foods against beneficiaries' locations and wages, giving policymakers a broader picture of household nutrition. Of course, significant investments in research and development would be needed to establish data collection and management schemes based on artificial intelligence (Rajendran TP).

The adoption of improved data collection tools and early warning systems can be driven through government incentives, including subsidies and credits for private sector actors to design innovative data collection, analysis, and aggregation solutions (Marco Brini).

2. What are examples of successful policy responses at country level that have been guided by existing monitoring tools?

Several discussion participants presented examples of existing risk monitoring platforms and early warning systems that are being used to drive policy at the national and global levels. These include the GIEWS tools by FAO (Mario Zappacosta) and tools from CGIAR, Global Open Data for Agriculture and Nutrition (GODAN), IBM & YARA, API-AGRO, Agrirouter, and Agri Exchange, a platform established by the Government of India. These existing systems will need to be integrated with additional local and global solutions from both governments and the private sector (Marco Brini).

3. Local food prices are one way to get a temperature check of local market conditions, but high frequency local market price data is not widely available. Where are the gaps such as this one in real-time monitoring and how can these be addressed both in a research and policy context?

Local food systems have become more critical in the face of the COVID-19 pandemic, as short-term transportation and market disruptions have driven many populations to turn to local production, even at the risk of higher prices (Pathawit Chongsermsirisakul). As a result, monitoring of local food prices has become even more essential for monitoring overall food security and predicting food crises. However, as highlighted by the discussion question, significant gaps exist in terms of real-time data for local food prices. In addition, one participant identified data regarding household purchasing power as another significant gap (Rajendran TP).

Gaps in real-time data can stem from lack of communication capabilities (Hamad Lyimo) and language barriers (Sumanth Chinthala). Establishing dedicated government bodies that are accountable for collecting important data across geographical regions, languages, and populations could be a first step in bridging these gaps (Sumanth Chinthala), as could policies to reduce illiteracy (Hamad Lyimo).

Promoting the use of Internet at the local level is critical in closing information gaps (Hamad Lyimo). In addition, data gaps can be closed through the development of open digital platforms and standards for data exchange (Marco Brini). One participant reiterated the need to monitor supply chain indicators, including availability of agricultural inputs, exchange rate variations, and the state of transportation infrastructure (Jorge Carulla), while a second participant suggested that supply chain monitoring could be effectively conducted using cloud computing (Rajendran TP).

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By closing real-time data gaps, early warning systems will be able to better aggregate local data at the global level to provide worldwide assessment of food prices and availability (Marco Brini). However, this will require financial investment and international cooperation, as well as domestic political will, accountability and regulations to protect food security from market fluctuations (Marco Brini, Rajendran TP).

4. Advances in early warning technologies and data must be matched by developing capacity within institutions at the country and regional level to transform relevant data into preventative actions. What is needed to initiate and scale up the use of real-time monitoring in early warning early action systems by regional organizations, national governments, and other country level institutions? What are the technical and policy-related challenges associated with the use of such tools?

A participant identified several channels through which existing early warning systems have supported agriculture, including production, financing, market functioning, and supply chain logistics. However, much remains to be done to take full advantage of the opportunities presented by advancing technologies for near-real-time monitoring of food crisis risk factors.

First, there is a critical need for greater cooperation, including between the public and private sector and among local, regional, and global governing bodies (Marco Brini). Another participant suggested the need for decentralized civil society organizations to work in partnership with national policymakers (Rajendran TP). Such enhanced cooperation will help to overcome some of the challenges associated with scaling up early warning systems, including potential corruption, lack of data exchange, limited political will, and insufficient funding (Rajendran TP, Sumanth Chinthala).

The need for increased investment, in terms of both financing and capacity building, was also highlighted by multiple participants. Governments need to invest in building citizens' technical capacity to develop and use innovative monitoring systems (Hamad Lyimo) and to employ Big Data and sophisticated databases (Jorge Carulla). In addition, governments need to provide financial assistance to students

and training to volunteers dedicated to collecting and working with real-time data (Sumanth Chinthala). Finally, increased investments can also include incentives for farmers to increase their adoption of digital technologies; such investments could take the form of micro-insurance or subsidies (Marco Brini).

5. Over the years, a series of different early warning early action systems have been developed by various organizations. How could greater collaboration among the various tools and approaches facilitate their effectiveness in driving policy responses?

Discussion participants strongly agreed that standardization and incorporation of data from multiple sources and analyses will be critical in building an effective near-real-time monitoring system (Marco Brini, Hamad Lyimo, Sumanth Chinthala). Collaborative systems can help avoid flaws associated with specific methodologies, programs, or approaches and help policymakers identify and focus on successful interventions that can be scaled up at the local, regional, and global levels (Hamad Lyimo, Sumanth Chinthala). Furthermore, a participant stressed that data platforms should be free and open, and that data should be anonymized with appropriate privacy policies (Marco Brini).

Participants also encouraged the use of private sector incentives and accepted business management approaches to the development and maintenance of early warning systems (Marco Brini, Rajendran TP). The idea of strengthening the engagement of civil society organizations in data collection and monitoring efforts was also reiterated (Rajendran TP).

One participant cautioned against over-generalization of data, however (Jorge Carulla). As individual agricultural and food supply chains differ, policymakers and researchers must be careful to develop responses that are appropriate for each chain's needs.

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