26. Smarter policies for enhanced food security and food system outcomes

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The COVID-19 pandemic has emphasized a multitude of development challenges and opportunities, some of which are new and some ongoing. The disruptions caused by the pandemic have highlighted the interconnections among almost all aspects of society, including the important linkages between food systems and other sectors that are sometimes separately governed and managed. Achieving the desired food system outcomes of health, sustainability, inclusion, resilience, and efficiency (IFPRI 2021) will require alignment and coordination with other sectors such as health, industry, and social development.

For low- and middle-income countries (LMICs), the scope and persistence of COVID-19 is especially challenging. Waves of COVID-19 will persist without much greater vaccination coverage, but, even as vaccine availability increases, distribution will take time and investment to achieve. Public investments will be critical to rebuilding but constrained by limited fiscal capacity (Díaz-Bonilla 2020). Populations in both urban and rural areas will need support to recover from the pandemic: while urban households experienced greater declines in income, approximately two-thirds of people pushed into poverty in select countries reside in rural areas (Pauw and Thurlow, in this book). Food systems represent a significant share of LMIC economies, and governments must address the need for their transformation while simultaneously managing COVID-19 and other important challenges, such as climate.

The experience of the COVID-19 pandemic has exacerbated inequality, demonstrating that we must provide more comprehensive support to poor and vulnerable communities (Sanchez-Paramo et al. 2021; Kumar et al. 2021). These populations face major challenges in meeting basic needs such as short-term food security and income, safe food and water, and, in the longer term, nutrition, health, education, and other social services (McDermott et al. 2021). In addition to direct impacts, measures to control the pandemic were also especially harmful to these populations: beneficiaries of public assistance, laborers, traders, and other workers in the informal sector were disproportionately affected by lockdowns and movement restrictions (Swinnen and McDermott 2020; Kumar et al. 2021). Pandemic-associated disruptions also affected health clinics (Nguyen et al., in this book), schools (Abay et al. on Nigeria school feeding, in this book), and other local social service platforms. As we move toward recovery from COVID-19, stalled and reversed gains for nutrition and health, education, and women's empowerment will carry long-term implications (Swinnen et al. 2021; Kumar et al. 2021).

Responding to these complex challenges will require smarter food policies and system interventions that link different food system components, consider and enhance synergies, and manage trade-offs across the food system. This approach serves as a necessary next step to build on component-specific food system policies and actions undertaken during the pandemic. The need for a more systemic approach to food systems has been increasingly recognized, with considerable international

and national efforts supported by the United Nations (UN) Food Systems Summit process in 2021. In the longer term, strategies must also include resilience measures to make food systems more efficient, inclusive, sustainable, and healthy. Vulnerability, which is associated with the ineffective rule of law, economic or political marginalization of particular groups, gender inequity, and "invisibility" of the informal sector, must be addressed to strengthen resilience, and the most vulnerable communities must be considered in policy design and implementation (Béné et al. 2021; IFPRI 2021).

The pandemic has also exposed current problems with cross-sectoral competition in government and other organizations. The importance of cross-sectoral engagement is widely recognized, yet responses tend to broaden the sectoral perspective rather than foster cross-sectoral collaboration. Amid the COVID-19 pandemic, many governments have taken measures to enhance cross-sectoral coordination, but national coordination can prove challenging (McDermott et al. 2021).

In this chapter, we bring together policy lessons and recommendations from across the CGIAR COVID-19 Hub, which was coordinated by the CGIAR Research Program on Agriculture for Nutrition and Health and the System Office from June 2020 to December 2021. The COVID-19 Hub coordinated major streams of research, engagement, and communications across CGIAR and its key partners. The Hub consisted of four research working groups, three of which were thematic — value-chain fractures, One Health, and food systems resilience — and one that supported national responses in five focal countries (Bangladesh, Ethiopia, Malawi, Myanmar, and Nigeria).

We consider four major food policy recommendations that address lessons learned, as well as future challenges and opportunities. These recommendations build on existing policy actions, which we regard as good current practices that will need to be adapted and improved upon as the COVID-19 pandemic evolves and coalesces with other urgent, longer-term food security and system transformation priorities.

Policy recommendations for greater food system resilience

1. In response to crises, increase coordination that considers cross-sectoral synergies and all segments and actors throughout the food system.

The COVID-19 pandemic has amplified the major policy challenges presented by complex systems. In response, feasible and meaningful policy actions that minimize unintended harm are needed (McDermott and Allison-Reumann 2022). While we acknowledge that governments cannot and should not be solely responsible for all coordination, the following section presents key policy recommendations that can provide critical alignment and/or coordination to address important challenges.

Government coordination bodies

In recognition of the interconnected nature of pandemics and crises more generally, national governments have established coordination bodies with the aim of assembling a wide range of sectors to establish and implement preparedness and response plans for times of crisis. The COVID-19 Policy Response Portal (IFPRI 2020a) showed that numerous countries established committees and task forces in which health ministries worked with other sectors, including commerce, industry, foreign affairs, and urban development. Multiple agriculture policies were implemented, but agriculture ministries were rarely included in coordination bodies (Resnick 2020). Without their inclusion, COVID-19 responses for other sectors may fail to consider possible impacts on agriculture and food systems (Resnick 2020). The potential risks resulting from this missed opportunity to include agriculture — a sector that is key to food security and food system resilience — must be avoided in future crises.

A One Health approach

For many years, public and veterinary health agencies have recognized the importance of the One Health approach, which coordinates human, animal, and environmental health, in preventing and controlling infectious diseases. However, the COVID-19 pandemic has highlighted the ongoing weaknesses in coordination across these domains, with pandemic preparedness representing the obvious challenge. Many emerging diseases in human populations come from animals and have clear links to food systems. The spillover of infections from wildlife to humans, often occurring through domestic animals, is a long-neglected issue that is central to future pandemic preparedness (UNEP-ILRI 2021). Box 1 further outlines issues related to the management of pandemic risks associated with wildlife.

Improving surveillance systems for zoonotic diseases arising from animals used in the food chain, including in live and wet markets, is also essential to avoid future health crises (Naguib et al. 2021). A broader framework for cohesive policy responses that encompasses environmental protection, sustainable and equitable food systems, sanitary protection measures, and targeted efforts to prevent zoonoses is required to address the multifaceted impacts of the current pandemic and other crises (UNEP-ILRI 2020). In many transitioning food systems, food safety is a particular concern for all fresh foods, including foods from animals and fruits and vegetables. Two high-priority food safety issues involve reducing risks to microbial pathogens in fresh foods and managing antimicrobial resistance in food chains (ILRI 2021).

Policy trade-offs and minimizing harm

Due to the interconnected nature of the food system, some of the emergency response policies implemented to protect certain sectors or actors caused harm to others within the system (IFPRI 2021). As policies are enacted to protect one sector, segment of the food system, or particular population group, associated trade-offs must be identified and, where feasible, offsetting measures implemented. Even with the best intentions to minimize harm and find an optimal balance between economic, health, and social trade-offs, however, limited funds, capacity, and the unprecedented nature of the pandemic have made this an immense challenge for LMICs in particular.

BOX 1 Pandemic risks: Wildlife and bushmeat

Recent disease emergences have highlighted the potential of pathogens to cross from wildlife to humans, sometimes through domestic animal hosts (Bett et al. 2021). The zoonotic capacity of SARS-COV-2 to transmit disease across multiple wild and domestic animal species (Fischhoff et al. 2021) illustrates the important epidemic risks of spillovers and the need for smarter policies and actions.

Recent studies in Africa and Asia (Staal et al. forthcoming) provide insights into the nature of wildlife value chains and bushmeat marketing and trade. In Africa, bushmeat primarily provides food but is also a source of income for approximately 40 percent of households living at the forest margins. In Asia, wildlife value chains are more organized, providing meat and other products (such as bat guano). Compared to Africa, Asian wildlife value chains are more formal, and some wild species are commercially farmed.

The COVID-19 pandemic has naturally raised awareness of epidemic risks for humans, but as with other risk mitigation measures, there is great danger that policies and actions for wildlife will increase rather than decrease zoonotic risk (UNEP-ILRI 2021) by pushing people to clandestine activities. Two lessons from other epidemic diseases of humans and animals are relevant for policymakers. First, there is a need to work closely with communities and institutions involved in wildlife markets and trade on mitigation measures that are feasible and address both community welfare and disease risk (Booth et al. 2021). Second, smarter monitoring and decision-making tools should be developed for wildlife and their environments that incorporate the spillover risks of pathogens and link to the multiple social and economic benefits of wildlife — from conservation and ecology to livelihoods and the economy. As we have seen with HIV/AIDs and the eradication of rinderpest in pastoral communities, effective solutions require engaging communities. Not doing so would be harmful to communities and the achievement of risk reduction.

The strict lockdowns implemented to control the spread of the virus are one such example of a well-meaning policy that had unintended consequences. For the world's poor and vulnerable, particularly those who rely on labor for their livelihoods, the impacts of these lockdowns were especially severe (McDermott et al. 2021). Urban food trade was also significantly affected by these restrictions, which included curfews (Liverpool-Tasie et al. 2021), the introduction of permits, the relocation of city markets to less densely populated areas, and, in some cases, the closure of markets for extended periods, as in Burkina Faso, Nigeria, Uganda, and other countries (IFPRI 2020a; Mutua et al. 2021). Movement restrictions affected supply to markets as well. In Addis Ababa, for example, reduced trading at vegetable wholesale markets was likely linked to a decline in trucks entering the city as a result of travel bans and decreased demand due to

restaurant closures, among other factors (Tamru et al. 2020). These measures impacted people's livelihoods and their access to food, which then led to the sudden contraction of demand and wastage of perishable foods, such as dairy products and vegetables (Place et al., in this book).

Individual policy actions for components of the food system were effective in a broader food system context. The expansion of input subsidies (for example, in Kenya and Uganda), food procurement (as in India), and mechanization programs (for instance, in Bangladesh) had favorable effects on production, while improved credit access and terms and investment in digital infrastructure provided support to food value chain companies (for example, in Malaysia). Yet the effectiveness of these expanded or enhanced programs required that enabling policy conditions existed prior to the pandemic (McDermott and Allison-Reumann 2022).

There is little information on unintended consequences for other food system actors beyond the target group and only general information on who benefits from specific policy actions and food system transformation pathways. Impact pathway analysis may contribute to a deeper understanding of unintended consequences. Analyses conducted during the pandemic demonstrate how policy responses that embrace a systems perspective and acknowledge the existence of multiple impact pathways and their differing impact intensities are more likely to be targeted and prioritized in an appropriate way, and thus have a greater chance of being effective and avoiding unintended harm (Béné et al 2021). A systems perspective also allows for the consideration of impacts beyond the target group.

2. Invest in policy responses that strengthen and protect the food system in the short and long term.

Food system interventions need to reflect the rapid and dynamic changes in food systems in LMICs, recognizing increasing shocks such as COVID-19 and other human diseases, as well as plant and animal epidemics, droughts, floods, storms, and conflicts. These shocks must be managed to accelerate systems transformation linking technical and institutional innovations. The pandemic has highlighted many opportunities for systems interventions that strengthen and protect food systems in the short term and hold implications for long-term outcomes. We focus on three lessons: the bundling of technical, institutional, and policy innovations; collaboration to leverage synergies between public and private sectors; and the application of digital technologies and systems to transform food systems.

Bundling technical, institutional, and policy innovations

There is extensive evidence, reinforced by the pandemic, that successful food system innovations require combinations of technical, institutional, and policy elements. These elements are particularly important in transitioning food systems in LMICs where smallholders require institutional and policy support for technical inputs, knowledge management, and marketing (McCullough et al. 2008). As the demands of food systems expand and evolve, so too will the complexity of linking combinations of components into an innovation pathway. Box 2 illustrates how bundling can be applied to achieve a priority food system outcome.

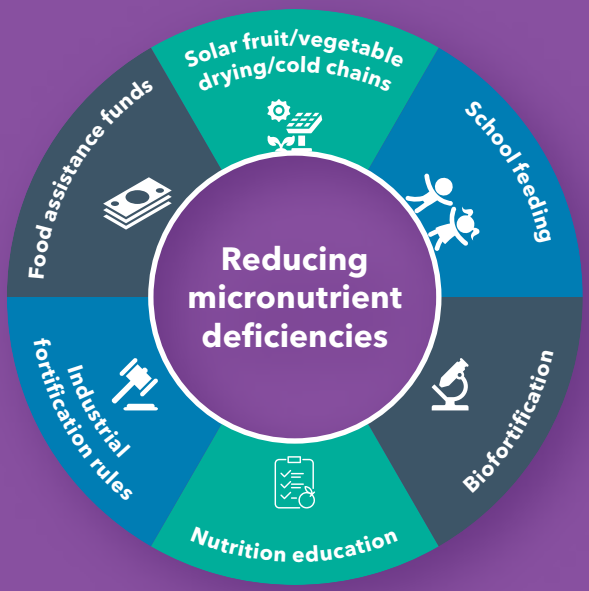
BOX 2 Socio-technical bundles for food system innovation

Numerous technological and policy innovations exist to address food system challenges. These innovations include new applications for digital technologies, improved genetic editing, innovative finance, social protection, and civic engagement. To overcome adversity and maximize positive outcomes, technical and policy innovations must be combined into mutually reinforcing socio-technical bundles. These should be fit to context, creating an enabling environment to scale up existing solutions.

To be successful, however, at least as much time and effort must be devoted to building bundles as to creating their component parts. When implementing sociotechnical bundles, stakeholders must monitor key performance measures and anticipate the need for adaptations to address spillover effects. Bundles also need to include incentives and constraints to steer the actions of independent actors toward mutually beneficial outcomes. Inclusivity and equity among actors is critical to successful coordination, which in turn is important for establishing shared responsibility and a collective action agenda.

As COVID-19 persists and merges with other challenges, innovations for basic food and nutrition security will be needed in rural areas. Barrett and colleagues (2020) describe a bundle designed to reduce micronutrient deficiencies. In this context, a combination of technical innovations may be needed, such as biofortified crops and solar-powered refrigeration technology. These can be complimented by regulations for food processing, such as mandatory iodization of manufactured salt. Social support payments, school feeding programs, and nutrition education would further expand access to healthy foods in addition to promoting healthy behavior change. By combining different solutions, policymakers can address the multifaceted challenge of micronutrient deficiency, and subsequently apply or adapt these solutions in appropriate ways during times of crisis.

FIGURE 1 Example of a socio-technical innovation bundle



Source: Based on Barrett et al. 2020.

Public-private collaboration

Public-private collaboration across the food system is needed to build future food system resilience. The adaptability of the private sector to new business and policy environments is a potentially important driver of the recovery from COVID-19 (IFPRI 2021).

Throughout the pandemic, the food system has proved to be both susceptible and resilient to disruptions (Vos et al., in this book), but innovations from the private and public sectors have helped to lessen negative impacts. Early in the pandemic, for example, China's Ministries of Agriculture and Rural Affairs (MARA), Transport, and Public Security protected the transport of agricultural inputs and outputs by prohibiting unauthorized interceptions, roadblocks, and other disruptions. MARA also prohibited disruptions to the delivery of animal feed, breeding animals, meat, dairy products, and seafood, and it provided incentive measures to support livestock farming (AGFEP 2021; Chen et al. 2020). To ensure the flow of agricultural products and inputs, China opened a "green channel" to distribute fresh agricultural products (Chen et al. 2020). Across countries, large private firms accelerated innovations in response to the disruptions caused by public health control measures (see Liverpool-Tasie et al. 2021; IFPRI 2020a; Mutua et al. 2021; Reardon and Vos 2021). In India, for example, public and private innovations helped the country's large and varied downstream food sector withstand pandemic-related disruptions (Box 3).

While the policy-enabling measures associated with the pandemic have been critical, there has also been demand for the strengthening of existing technical and institutional innovations. For rice supply chains, for example, there has been interest in regulatory frameworks for contract farming, which can facilitate the procurement of outputs (such as high-quality paddies) by midstream actors (such as millers), reduce the number of intermediaries, reduce reliance on informal markets, and encourage the adoption of sustainable production standards (Arouna et al. 2020; Quilloy et al. 2021).

The public sector can play a major enabling role by supporting open access to global, regional, and domestic food markets. The 2007/08 food price crisis showed that export bans from producing countries led to upward pressure on food prices. During the COVID-19 pandemic, many countries followed the advice from IFPRI and other international agencies not to impose export bans (Glauber et al. 2020; Vos et al., in this book), thus helping to avoid significant food shortages and price increases for major traded foods (Laborde et al. 2020). However, some market and trade restrictions have caused food supply disruptions, as shown by border restrictions (Bouet and Laborde 2020) and urban restrictions on fresh food markets in Africa (Resnick 2020).

Digital innovations

Digital innovations in market transactions, business processes, and data gathering (Oldekop et al. 2020) have been facilitated by increased internet access in urban and rural areas. Given the improvements in access to markets during the pandemic, especially through digital services, these efforts should be built upon and accelerated (Reardon, Swinnen, and Vos, in this book). A review of the resilience of agricultural production systems during the pandemic recognized the potential for digital extension and knowledge to support the productivity and incomes of farmers

BOX 3 Food enterprise impacts and responses in India

India has 21 million food enterprises, which generated US$227 billion and employed 25 million men and 10 million women in 2015–2016. The 2020 Periodic Labor Force Surveys (released in 2021) identified the pandemic's impacts on food enterprises in the country, finding that small, micro, and informal enterprises experienced decreased sales as well as reduced access to inputs, including labor, and depletion of working capital.

Among all food enterprises, the food services sector was the most adversely impacted, with year-on-year comparisons showing that earnings declined almost 37 percent and employment contracted 13 percent in urban areas and 15 percent in rural areas. Women's employment declined by more than 38 percent. A report released by the National Restaurant Association of India estimated that the food services industry contracted by more than 50 percent in the 2021 financial year (*Hindu Business Line* 2021). For food manufacturing, the impacts were higher in urban locations. The food retail sector, on the other hand, emerged as a "surge" sector, expanding by more than 60 percent in urban areas, with no measurable negative effects in rural areas. By type of employment, own account (self-employed or family labor) enterprises and casual labor were the most adversely affected by COVID-19.

Notwithstanding these large shocks, food enterprises have also experienced positive organizational changes and innovations. Most importantly, for the first time, food enterprises have come to the forefront of policy as policymakers acknowledge the importance of their role in economic growth and recovery. The COVID-19 policy response package for food enterprises emphasized a cluster approach that developed commodity-specific policy clusters for product supply chains such as *makhanas* (fox nuts) from Bihar, *kesar* (saffron) from Kashmir, and tapioca from Tamil Nadu. The government also launched a central scheme to formalize food processing microenterprises. These enterprises were provided with credit-linked capital subsidies and some seed capital through self-help groups and farmer organizations to develop labs, warehouses, cold storage facilities, and packaging and incubation centers. Support for marketing and branding was also part of the COVID-19 recovery plan. The Operation Greens Scheme, which protects tomato, onion, and potato growers from distress sales (through transport and storage subsidies), was extended to all horticulture.

The use of e-commerce for food supply, which was already growing fast before the pandemic, has experienced the most dramatic changes. Examples of e-commerce suppliers include Jio Mart for grocery delivery and Walmart-Flipkart for wholesale and retail supply chains. While consumers strongly preferred home-cooked food early in the pandemic, online food deliveries rebounded over time to surpass pre-pandemic levels. Indeed, the online food delivery system Zomato had one of the largest initial public offerings when it went public in 2021 (Govindarajan and Srivastava 2021).

(Dixon et al. 2021). However, such knowledge services will require more data, some of which can be collected remotely (Amjath-Babu et al. 2020).

Large firms have mostly been able to adjust their supply chains by accelerating the use of digital tools and other approaches (see Reardon, Swinnen, and Vos, in this book). E-commerce has also greatly expanded during the pandemic (Box 3). There are possibilities for digital innovation from small and medium enterprises (SMEs) as well, particularly in countries with good digital ecosystems, such as Kenya. One such example for fresh foods is Twiga Foods, a business-to-business platform that links farmers, input suppliers, food companies, and vendors (Box 4). Given that in African countries, between 75 and 90 percent of consumed food relies on domestic markets served by SMEs, such platforms and networks can be critical to improving supply chain performance through innovation.

BOX 4 Business-to-business platforms for food system innovation

In Kenya, Twiga Foods provides a business-to-business platform that connects farmers and food manufacturers with vendors (Twiga Foods 2021). Twiga Foods has used mobile technology to gather five years of data on the market demand for 17 fruit and vegetable crops from more than 20,000 farmers and 12,000 small-scale vendors. These data are currently being analyzed to identify inefficiencies in fresh fruit and vegetable production and distribution. These data and analyses will also assist policymakers in identifying sustainable ways to provide healthy, safe, and affordable food to a growing urban population in Nairobi and beyond (CGIAR Platform for Big Data 2021).

3. Develop and strengthen policies that support the basic needs of vulnerable groups.

In many countries, social protection programs were implemented as critical elements of emergency responses, along with other policy actions providing support to many households. However, as the pandemic persisted, additional challenges and opportunities to provide more effective support have been identified (Gentilini 2021). In LMICs, limited administrative and fiscal capacity to implement policies are constraints that must be addressed (Díaz-Bonilla and Centurion, in this book; McDermott et al. 2021). This section discusses two important policy system levers for inclusive development: (1) establishing and adapting robust public programs to support vulnerable populations and (2) building capacity for meeting basic needs through smarter investments and better implementation.

Establishing robust public programs

Throughout the pandemic, vulnerable populations have been supported by a range of public programs that include cash transfers, food distribution, and the provision of water, health, and other essential services. Many countries either expanded social protection programs, provided

larger benefits, or extended them to include more beneficiaries, such as informal workers and the urban poor (McDermott et al. 2021). In South Africa, for example, the government implemented policies to support vulnerable groups such as children, the elderly, and disabled people, because the infrastructure for disbursing grants was already in place. The government increased the levels of existing social grants and introduced a temporary Social Relief of Distress fund to support unemployed people not covered by other social grants or unemployment insurance. Targeting support to lower-income households as a temporary and extraordinary measure during the pandemic led to other benefits as well. A modeling exercise on the near-term economic impacts of extending these social support programs found that this would also lead to greater GDP growth in the country (Gabriel et al. 2021).

In some countries, governments developed innovative programs to assist populations that are frequently marginalized and excluded from public programs, such as informal food system workers in urban areas. In Burkina Faso, one public program established a US$9 million fund to help informal sector workers, especially women, relaunch fruit and vegetable sales, while in Malawi, the government provided US$46 per month for six months for up to 172,000 households working in food markets in major cities. In India, a credit program enabled 5 million street food vendors to access loans of up to US$135 (Resnick 2019; IFPRI 2020a; Kennedy and Resnick 2020).

The pandemic further exposed the gender inequalities and vulnerabilities faced by women (see, for example, Alvi et al. 2021), but the social protection response in most countries has not been gender sensitive. A review of 212 countries showed that fewer than 30 programs across 25 countries included gender-sensitive components, representing only 2 percent of all measures undertaken across the countries studied (Kumar et al. 2021). Complementary programs focused on gender-based violence, mental health, and maternal and reproductive health should be considered in the design of social protection programs — not just in response to shocks but also to foster long-term change that can prevent future financial and health-related crises (Kumar et al. 2021).

Disparities are also reflected in the capacity to provide social protection payments. Social protection cash transfers worldwide doubled relative to pre-pandemic levels, and the number of beneficiaries increased by 240 percent. However, no low-income country reached more than one-third of their population with cash transfers (Kumar et al. 2021). Digital technologies, such as electronic transfers of social protection payments, showed promise during the pandemic but also highlighted the digital divide between low- and high-income households and countries. With many support services being contingent on digital connectivity, they have often been unavailable, particularly to the rural poor who lack digital access (Kumar et al. 2021).

Fiscal support

In the first year of the pandemic, international funds were quickly deployed to poor countries to expand social protection and market functioning (Díaz-Bonilla and Centurion, in this book). Such programs are generally useful for addressing multiple shocks, including those associated with climate, conflict, and other disruptions (Díaz-Bonilla 2020). Ongoing efforts aim to support LMICs with international funds through the use of innovative financing arrangements that involve governments and the private sector, as described by Díaz-Bonilla and Centurion in this book.

As a result of dramatic losses in income during the pandemic, food demand and access experienced the greatest shocks within the value chain (Place et al., in this book). To support demand and address food supply disruptions, social programs provided access to credit facilities that could help buyers, producers, and suppliers access labor, equipment, and inputs to maintain production and business operations. Governments also took actions to support food production and distribution by reducing import duties on inputs, facilitating their procurement through e-vouchers and other innovative credit arrangements, and implementing price and market support through procurement programs (Place et al., in this book). Place and colleagues also describe measures for midstream food supply actors that include grants and credit, investments in new market structures and digital infrastructure, and stimulus packages for fresh foods, including fruits and vegetables in Burkina Faso and fish in India.

4. Use evidence gathered during the COVID-19 pandemic to support information sharing, cross-country learning, and knowledge management that informs decision- and policymaking.

Obtaining information and evidence for decision-making has been a major challenge during the COVID-19 pandemic. Multiple approaches have been used to estimate the impacts of the pandemic and assess the outcomes of interventions. These approaches include model-based scenario analyses, surveys of households and groups of food system actors (often by telephone), and case studies of supply chains and policy indicators (see Vos et al. forthcoming), but basic information is often lacking in some countries (such as deaths and case rates attributed to COVID-19).

The pandemic's many disruptions have demonstrated the need for monitoring that provides robust and reliable information at appropriate spatial levels and time intervals. Countries are also recognizing the importance of information about key food sector components for policy and investment decisions. Such evidence-based policymaking has been integrated into most country transformation pathways developed as part of the UN Food Systems Summit process in 2021.

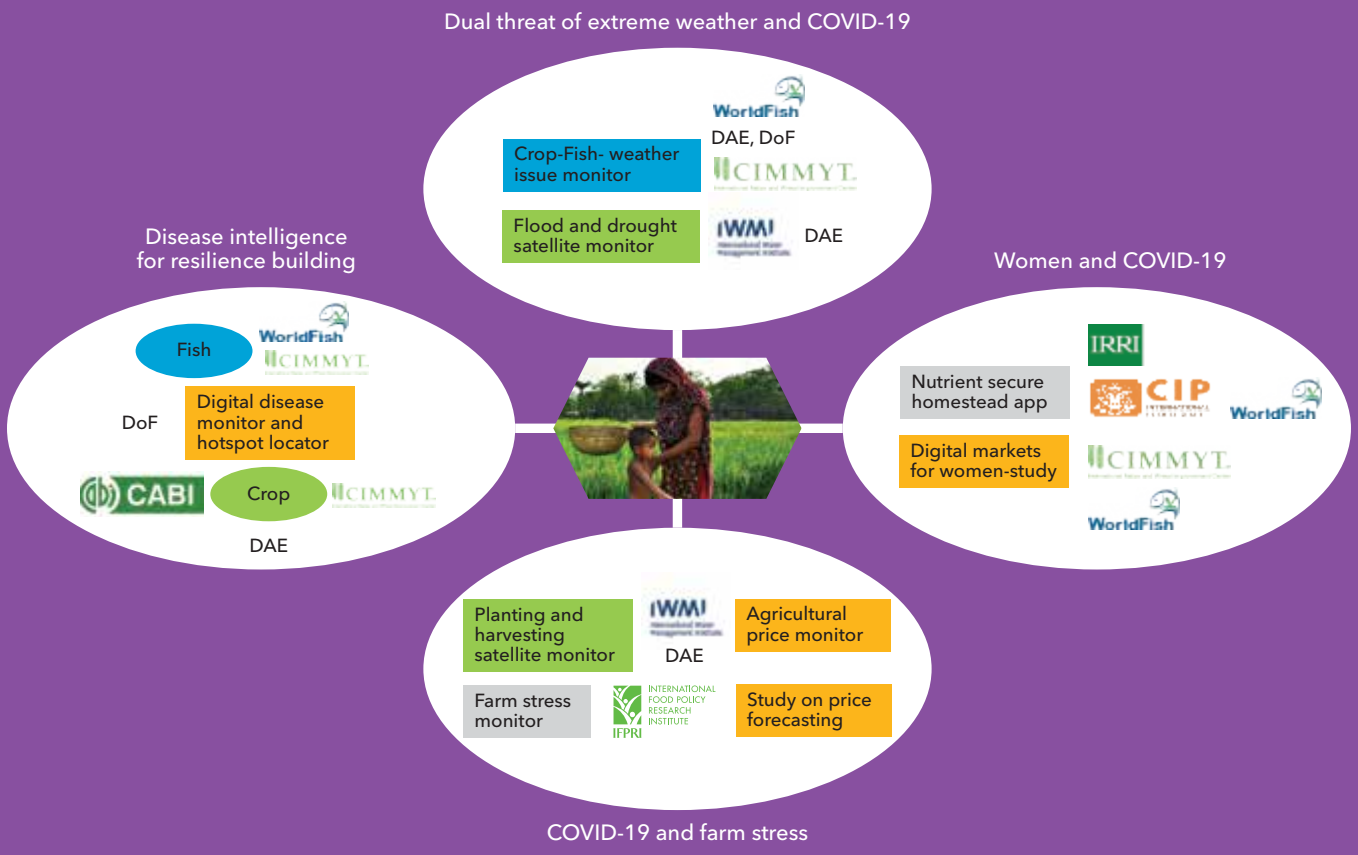
Lessons on data

Capturing representative and robust information has been a central challenge for information and evidence-gathering during the pandemic. Many studies conducted in response to the pandemic built on existing datasets; while efficient and beneficial, this approach cannot replace the need for novel studies. Studies built on existing data should instead be used to complement novel research. While valuable, modeling did not always provide accurate predictions and needed to be revisited as the pandemic became a prolonged crisis (Pauw and Thurlow, in this book). Much of the new data on impacts from COVID-19 was collected through phone surveys, which allowed adherence to social distancing. However, these surveys had high attrition rates and raised concerns about data accuracy (Swinnen and Vos 2021; Gilligan et al., in this book). Many countries have gathered national-level data during the crisis, and numerous international organizations and research institutes have made efforts to collect relevant real-time cross-country and regional data (Box 5) (Pauw, Smart, and Thurlow 2021). This wealth of information should be optimized and used to inform policy- and decision-making at all levels.

BOX 5 Food system monitoring in Bangladesh

In Bangladesh, national food system monitoring was started during the pandemic at the government's request and implemented with national partners, CGIAR, and the Food and Agriculture Organization of the United Nations (FAO) (Amjath-Babu et al. 2020). This monitoring regime will be used in the longer term for climate shocks as well. The regime uses spatial and temporal data on internal farm factors; crop and animal health indicators detected through satellites; external input supply; weather variables; the availability of agricultural services; and processing and market conditions, including price data (Figure 2) (Amjath-Babu et al. 2020). Monitoring consumer data and demand fluctuations are also important to make sure that supply chains are resilient and functional.

FIGURE 2 Bangladesh's food system monitoring regime



Source: CGIAR COVID-19 Hub.

Note: DoF = Department of Fisheries; DAE = Department of Agricultural Extension.

Engaging actors at multiple levels

In many countries, national data and statistical agencies can coordinate the alignment of food system monitoring data across health, food, and economic sectors. These agencies facilitate the valuable exchange of information, personnel, and tools and approaches, all of which enable capacity building and knowledge transfer (OECD 2021). Support to these agencies is critical, as is support for their engagement with similar agencies in other countries. Engaging local stakeholder groups and strengthening the capacity of national and subnational actors through investments in food systems research can lead to a better understanding of interconnections. This research should include a focus on building resilience at multiple levels from productive landscapes to value chains, with the aim of avoiding negative consequences for food security and nutrition in times of crisis.

Given the cross-border implications for food system transformation pathways, a primary aim of information and data gathering should be to identify how successful policies and initiatives can be replicated and scaled across countries, with consideration for local specificities and conditions. Although public expenditure decisions may focus on context-specific responses at the national and subnational levels, international cooperation is also critical due to the complexity of value chains, the global nature of many crises, and transborder environmental challenges, among others. When coordinated actions are undertaken quickly to manage issues detected by monitoring systems, they can foster resilience to complex shocks that affect the food system through multiple pathways (Béné et al. 2021). International governance bodies and international organizations can play a major role in collecting and analyzing data, as well as coordinating and facilitating information sharing and learning. For example, the COVID-19 Policy Response Portal (IFPRI 2020a) and COVID-19 Food Price Monitor (IFPRI 2020b), as well as ongoing analyses of the causes, impacts, and responses to the pandemic by countries and the international community, continue to inform future policy decisions.

Real-time monitoring of key food system components is essential for the future resilience of food systems (Fanzo et al. 2021). Recognizing the need for this monitoring, IFPRI worked with local partners during 2020 to develop economywide models that analyze real-time COVID-19 impacts on economic growth, food systems, and livelihoods in approximately 30 countries (Pauw and Thurlow, in this book; Pauw, Smart, and Thurlow 2021). At the request of the Government of Bangladesh, CGIAR, FAO, and others also supported the monitoring of food production value chains during the pandemic (Amjath-Babu et al. 2020). Such monitoring systems, which inform local and national decision-making, also align with the country transformation pathways developed as part of the UN Food Systems Summit process (UNFSS 2021).

Conclusion

As the COVID-19 pandemic continues to evolve, it will hold lasting implications for food security and other food system outcomes, and overlap with other challenges stemming from climate change, conflict, and the economy. In this chapter, we have proposed four important policy adaptations that arise from lessons learned throughout the pandemic to date. Food systems have been relatively resilient during this time, but as we move forward toward recovery and transformation, practical policies and actions will be needed that correspond to relevant national contexts.

Food policy must be coordinated and linked with other important sectors in order to recognize trade-offs, unintended consequences, and synergies. While coordination across all sectors is not possible, One Health represents an important framework for bridging sectors and, from a pandemic preparedness perspective, it is a neglected area for coordination. The transformation pathways and actions resulting from the 2021 UN Food Systems Summit process provide a meaningful opportunity for countries to use lessons from COVID-19 to strengthen food transformation strategies and actions. Smarter policies and programs must also consider the basic needs of the poor and vulnerable, who suffered the most severe impacts of the pandemic. Neglecting these needs in the short-term will cause severe repercussions for human development in the long term.

While COVID-19 has raised many new complications, it has also presented opportunities for more evidence-based policymaking. Decision-makers need real-time and spatially instructive data to inform their policies, regulations, and investments from macro to micro levels. As novel methods for combining different data-capture and analysis methods evolve, they must be further developed and implemented, and linked to strengthened and inclusive digital infrastructure and approaches.

Despite initial hopes that COVID-19 would be eliminated rapidly, as SARS wasin 2003, it seems increasingly likely that the disease will transition to an endemic form with ongoing waves. The persistence of COVID-19 requires changed thinking and efforts that place an integrated focus on the pandemic and climate, conflict, and other challenges. As we mark the second anniversary of the pandemic's start and consider the future, these four food policy domains represent a useful starting place for smarter policies that build the resilience of global food systems.

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