

DEVELOPING ALTERNATIVE TEACHING CONTINUITY PLANS TO MOVE CLASSROOMS ONLINE AT COVID-19 ERA IN NIGERIA

THE GLOBAL IMPACT OF COVID-19 ON FOOD SECURITY AND INNOVATION IN FOOD SUPPLY CHAIN

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Abstract

The COVID-19 pandemic is a global humanitarian crisis with tragic loss of life and enormous economic repercussions. The unanticipated shock of COVID-19 underscores the urgency of a shift from ‘business as usual’ policies to a more forward-looking policy package for global food systems. The pandemic called COVID-19 disease has a great impact on the actions and activities of humanity; agriculture is not outside this impact. This article x-rays the impact of COVID-19 pandemic on food demand, food security as it greatly affected mobility restrictions, reduced purchasing power, and with a greater impact on the most vulnerable population groups. As cases of contagion increase, this work elucidated that various governments of the world take more drastic measures to stop the spread of the virus, also influencing the global food system. The article expresses that the premise of any measure adopted is to protect the health and food security of the population, but as it tends to be this write up noted some of the measure adopted by member nations are to the detriment of economic growth while some governments go in the opposite direction. Global food systems are faced with a formidable “triple challenge” this paper highlighted how some governments simultaneously provided food and nutrition to a growing global population, ensuring the livelihoods of millions of people working along the food chain from farm to fork, and ensuring the environmental sustainability of the sector are sustained. COVID-19 is compelling policy makers to make urgent decisions to ensure food supply chains continue to function. From the foregoing it was suggested that fundamentally, government of nations should set up task to address the immediate disruptions while also investing in the long-term goal of a resilient, sustainable and productive global food system. Ending inefficient and environmentally harmful support should be free from resources for a more forward-looking policy package. Global food systems are also under stress; hence measures should be put in place to limit the spread of the disease having spill-over impacts on the movement of people and products. Food systems have made remarkable achievements, but much more are needed by government of nations to immediately face the COVID-19 crisis and longer-term to meet the triple challenge.

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Keyword: Covid-19, Impact, Food security, Food Supply Chain, Innovation

Introduction

Agriculture is one of the important sectors of the world economy. Agriculture serves as the most important economic sector endorsing food security and human development. Agriculture is one of the most important sectors in human development and is related to food security (Abdelhedi & Zouari, 2020). Food and Agricultural Organization (FAO) has estimated that more than 60% of the world population relies on agriculture for survival (Zavatta,2014). The coronavirus pandemic has vastly affected the major economic sectors such as agriculture. hence, the objective of this research is to know all the possible impact of COVID-19 on food and agriculture in global context and analyse the relationships between agriculture and food security and how these relationships are being affected by events related to the disease of COVID-19. The COVID-19 pandemic has resulted in immediate, serious, and worldwide human health issues. Necessary counter measures to the virus, e.g. quarantines and other restrictions will remain in place for many months and have uncertain end dates. International efforts to control the virus by limiting human movement is inevitably causing economic shocks and social costs that will affect the functioning of agricultural and food systems worldwide.

Nation of the world are already witnessing the indirect effects of the pandemic on agricultural systems across the globe. Massively decreased demand for restaurant and commercial food services in combination with restrictions in labour, processing capacity and/or storage has led to farmers discarding their output *en masse*. Food and nutritional security depend on production and trade, and requires well-functioning supply chains to make sure food is available to consumers. Over the past few decades, global food availability has outpaced population growth, leading to increasingly affordable food. COVID-19 pandemic containment measures have disrupted food production and trade, although global food availability has held up remarkably well so far. (Kogo *et al.*, 2020; Lopez-Ridaura *et al.*, 2019) Quarantine measures are severely affecting labour availability for key time-critical farming from sowing vegetable crops to picking fruit. As the crisis develops, these impacts are likely to become more widely and deeply felt in agricultural sectors and national economies.

The significance and severity of the pandemic, and its likely impact on agriculture worldwide calls for substantial reflection in both the short- and long-term. There is need to understand the immediate consequences for the global network of agricultural and food systems on which we rely so heavily. Unexpected risks should be tracked as well as weaknesses and systemic shifts to understand short-term effects as well as those that may

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be long-lasting or permanent. The measures to control or mitigate the pandemic have affected food supply chains, with slower harvests and disruptions (both production and processes) due to the lack of seasonal labour force, especially for high-value supply chains; higher price volatility, which may adversely impact low-income and countries dependent on food imports; potentially reduced pools of capital for smallholders which provide about 80% of the food supply in Asia and Africa; higher food losses due to trade disruptions, blockages to transport routes and lockdowns; risks for the life and livelihoods of all workers.

As reported by FAO, IFAD, UNICEF, *et al.*, (2019), the nutritional status of the most vulnerable population groups is likely to deteriorate further due to the health and socio-economic impacts of COVID-19. Experts say that during the pandemic a myriad of factors, including reduced access to high-value foods, higher food prices (especially for nutritious, perishable foods) and the higher consumption of ultra-processed foods, has led to a risk of declining dietary quality globally. Several dimensions of concern has been identified with respect to COVID-19 pandemic and agricultural systems - although this list is early and limited and is inevitably incomplete affordable for three billion people in the world. Logistical challenges within supply chains, particularly cross-border and domestic restrictions of movement, as well as labour issues, may lead to disruptions in food supply, especially if they remain in place long-term. High-value, especially perishable commodities, such as fresh fruit and vegetables, meat, fish, milk and flowers are likely to be particularly affected. The Food and Agriculture Organization (FAO, 2020a) states that COVID-2019 pandemic is affecting agriculture in two significant aspects: the supply and demand for food. These two aspects are directly related to food security, so food security is also at risk.

1. Food Supply

The food supply chain is a network that connects an agricultural system (the farm) with the consumer's table, including processes such as manufacturing, packaging, distribution, and storage (Chen et al., 2020). Food and nutritional security depend on production and trade, and requires well-functioning supply chains to make sure food is available where consumers are. Over the past few decades, global food availability has outpaced population growth, leading to increasingly affordable food. COVID-19 pandemic containment measures have disrupted food production and trade, although global food availability has held up remarkably well so far. At the national level, the necessary health and safety measures to protect the workforce from exposure to COVID-19 pandemic have affected the availability of farm labour and the livelihoods of seasonal farm workers has also led to reduced productivity in food processing and distribution plants, or even meat processing

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plant closures (due to outbreaks of illness at facilities and the measures necessary to enable re-opening). Processing plant closures in some countries in turn have caused important backlogs on farms, with serious implications for the management of ongoing harvests, production, and animal welfare. Equally, processing restrictions would eventually impact the availability of products to consumers. Further issues in food availability have resulted from the closure of hotels and restaurants, which are an important source of food donations to food banks, reducing supply to these emergency food providers at a time when demand is increasing as people suffer loss of incomes. For international food trade, food safety and certification check and new biosecurity arrangements are increasing costs and time at borders. Transport and logistics have been slower and are more expensive due to a reduction in available drivers, the reduction in international air cargo and unforeseen port closures.

Effective responses to COVID-19 pandemic should first ensure that global food systems remain open and operational, so that food can move to where it is needed. This task cannot be achieved by any country acting alone: international co-operation is essential. This in turn implies increased transparency and information sharing across governments – information sharing on markets, on policies, and on possible future actions. Co-operative solutions will help avoid policy mistakes that will make a bad situation worse. In particular, experience with the 2007-08 food price crisis showed that export restrictions should be avoided: they create volatility in regional and global markets, penalise domestic producers, and are ultimately self-defeating. In the context of COVID-19, some countries have introduced export restrictions on agri-food products or inputs; however, a number of these have subsequently been removed and there have been no significant impacts on markets to date. Practical measures are also needed to speed up border procedures and increase border agency cooperation in risk management to ensure the smooth functioning of global supply chains (Cullen, 2020).

Before the COVID-19 pandemic outbreak, more than 800 million people worldwide were undernourished as poverty, conflict and civil unrest undermined their access to food. COVID 19–related production shocks and increased poverty could have serious implications for food security particularly in many low-income countries. In OECD countries, vulnerable populations may also struggle with access to food because of reduced incomes and mobility. According to the United Nation World Food Programme, COVID-19 risks increasing the number of people facing acute hunger from 135 million to 265 million, unless urgent action is taken. International cooperation is thus needed to avert a humanitarian crisis (World Food Programme, 2020).

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The persistent problem of undernourishment underlines the fact that food production and trade are necessary but not sufficient to achieve food and nutrition security. The long-term, sustainable response requires further action to tackle poverty and, in some countries,, conflict resolution well-functioning social safety nets are needed to ensure that the most vulnerable in society have access to food. Since the COVID-19 pandemic began, OECD countries have been implementing a range of policies to ensure food can get to consumers, and in particular the most vulnerable groups such as low-income households, people with health conditions, and elderly citizens. In some cases, this is to make sure that food is available where consumers are by alleviating supply chain bottlenecks and arranging the delivery of food parcels to the vulnerable. In other cases, it was meant to provide financial safety nets so that the consumers can maintain access to food. For example, countries have been providing additional funding for existing food assistance programmes including for food banks, as well as extra money during school closures (including *via* electronic vouchers) for families of children who usually benefit from free or discounted meals at school. Some OECD countries have also temporarily loosened eligibility requirements for receiving domestic food assistance.

Food Demand

Demand implies the willingness and ability of consumers to pay money for a particular good or service, during any particular period (Gottheil, 2013). The demand for food has decreased due to uncertainty and the reduction of people's spending capacity, although this decrease is still slight; the situation could worsen if the pandemic continues for a long time, due to reduced income and job losses (FAO,2020b). Since China represents an important market in world trade and where the COVID-19 disease started, the experience shows an increase in online demand in the food and beverage sector, due to quarantine policies (FAO, 2020a). In situations like these, where a virus spreads on contact, contactless delivery services become preferred by consumers. For example, those who use drones for the product delivery.

A) Demand-Side Risks

1) **Access to Nutritious Foods** – The poorest segments of the population in developing countries often depend on income from casual labour both on farms and in firms that may be unavailable under lockdowns. A reduction in income is likely to result in reduced access to foods. Since nutritious, fresh foods are often more expensive than non-perishable staples, it is expected that the price of nutritious foods will rise faster and become less accessible for the more vulnerable segments of the society. Further, since the desire to buy goods at a higher price due to increased demand is less common in poorer countries, if prices of

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nutritious foods rise faster than non-perishable foods, and incomes decline, then lower overall spending on nutritious foods can be expected. Reduced access to nutritious foods could further impact immune response in populations already most vulnerable to COVID-19 pandemic, including the elderly, those with underlying health conditions, and the already immune-compromised.

2) **Global Industrial Capacity and Purchasing Power**—A sharp global economic slowdown appears unavoidable as a result of lockdown measures to control the virus, and the damage to developing country agriculture sectors is expected to follow. Unlike the 2008 food crisis, a significant threat to the global food system today is crashing commodity prices due to decreased global industrial capacity and international purchasing power.

In 2008, rising global food commodity prices were closely correlated with a spike in oil prices — a key input in food production globally. Today, as global industrial capacity shuts down, oil prices are cratering, and there are signs that food commodity prices are following suit. For instance, the Cornell Alliance for Science has noted that as cashew processing factories in India, China, and Vietnam shut down, the market price of cashews has fallen 63 percent since January. Many producers in cashew producing countries such as Ghana are now struggling to break even.

In addition to slowing industrial capacity, a simultaneous decline in global aggregate demand could further exacerbate falling prices of export-oriented foods. As many developing countries are reliant on agricultural exports for foreign exchange, declines in food exports will not only impact export-oriented farms and firms, but will also influence broader macroeconomic performance that will have ripple effects through the agriculture sector.

3) **Domestic Panic Buying** – While global commodity prices are falling, there is also anecdotal evidence emerging of domestic panic buying in developing countries that is driving food prices up. For instance, according to Ghana’s Daily Graphic, panic buying in domestic food markets has caused the price of certain staple foods to rise significantly. It is unknown how widespread this behaviour has been or how long it can be expected to last, but rising domestic food prices along with a collapse of global commodity prices could have a devastating impact on food security in the least developed countries.

Food Security

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Food security implies that everyone has unrestricted access to food that allows them to satisfy their basic needs (Rosales & Mercado, 2020). Not taking quick action implies an imminent food crisis, with a greater effect on the most vulnerable population. Measures should focus on keeping global food supply chains active and mitigating the impacts of the pandemic across the food system. Social programs act as an umbrella that minimizes the effect of short-term crises. Affordability is a key aspect of food security and a key determinant of food access, which depends not only food cost but also on the disposable income spent on food. Among the major impacts of COVID-19 pandemic on food systems, is the rising food costs especially in urban centres that are home to over half of the world population, as rural supply is unable to reach properly urban demand. Increased food prices have a direct impact on the quality of diets, preventing access to fresh fruits and vegetables, but also dairy, meat and fish due to the failure in reaching wholesale and retail markets, with loss of income for those operating in the food sector, especially for smallholder farmers and small-scale producers, and led to disruptions in production. FAO has crucially pointed out that the cost of the diet increases incrementally as the diet quality increases, a key issue that needs to be tackled worldwide as healthy diets are not

Immediate concern is the disruption to food systems and impact on food security (Torero, 2020). Food distribution channels of almost all countries across the income spectrum have been highly disrupted, with strong negative consequences for the most vulnerable. There is widespread media coverage of sudden decreases in food security due to:

- 1) Loss of income from workers who are fully or partially furloughed affecting their ability to purchase food;
- 2) Stay-at-home orders and restricted physical access to food markets and/or indigenous food gathering activities;
- 3) Closure or diminished capacity of institutions that support food social safety nets, such as food banks and school feeding programs; and
- 4) Market disruptions such as issues with the ability of supermarkets to rapidly restock from centralised distribution systems following unprecedented demand (i.e. panic buying) for pantry staples.
- 5) Wastage of fresh vegetables, fruits and milk due to inability by farmers or entrepreneurs to transport them from point of production to local markets or supermarkets in nearby towns or cities.

Labour Availability

A second emerging issue concerns labour availability in the Agri-food sector. Impacts of measures to contain the virus ripple through economies, affecting livelihoods all along the food chain. These impacts are likely to hit farmers especially hard in regions where food

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production systems are more labour intensive (and hence more vulnerable to the reduced availability of farm labour) and where there may be less institutional capacity to cope with the health and subsequent economic shocks (Siche, 2020) Farmers in both developing and developed countries may also have lower off-farm income due to the pandemic. Labour has been suddenly restricted in many regions due to quarantine measures and loss of workforce from COVID-19 deaths and serious illness. There have been substantial restrictions on international labour movements and worker programs that are critical to agricultural production in some sectors or that have caused bottlenecks. Anecdotally, this seems particularly severe in horticulture, livestock production systems, and processing but also for planting and harvesting of crops that are relatively labour-intensive. The timing of labour needs is often inflexible for seasonally produced foods. Resolving these labour shortages and designing working conditions that are safe for workers and the community, is of critical importance in order to secure future growing seasons and avoid disastrous consequences for future food security and supply.

Agricultural System Connectivity

The COVID-19 pandemic is having an impact on international relationships far beyond the Agri-food sector's labour force. This includes announcements of export restrictions across several countries that limit global agri-food trade and market access (Laborde & IFPRI, 2020). The agri-food sector is highly connected internationally. Ports that shut down or reduce activity, vastly reduced freight capacity on commercial flights for agricultural goods, and other broad global supply chain disruptions due to the COVID-19 crisis (Ivanov, 2020) have the potential to limit critical access to agricultural inputs and markets. This may negatively impact agricultural productivity for current and future seasons. The suddenness and severity of these shutdowns leave little scope for identifying suitable domestic substitutes in the short term but may spur less reliance on global agri-food value chains in the future. Some nations are also exploring more domestic 'food sovereignty' in order to address emerging domestic food security concerns due to COVID-19. These actions have serious implications for our current globalized agri-food trading system and is potentially one of the most important impacts on the current food system (Lopez et al., 2019).

COVID-19 Pandemic Pressures and the Reinforcing Efforts to Address Long-term Sustainability Challenges

Given the urgency to address the COVID-19 pandemic public health crisis, there is a risk that environmental policies are weakened or abandoned. But this would be a costly mistake. Global food systems generate significant environmental pressures, both in local ecosystems (such as water pollution caused by excessive fertiliser use) and at the global

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level (notably through their contribution to climate change). As noted above, agricultural production accounts for 11% of GHG emissions; once associated deforestation and other land use changes are factored in, this rises to an estimated 16-27% of total anthropogenic GHG emissions. All other inputs to and stages of food systems (such as energy, transport, processing, etc.) contribute an additional 5%-10% (IPCC 2019). Agriculture also accounts for the vast majority of global water use, and uses up to half of the world's ice-free land surface, far more than any other human activity. Land use change caused by expanding agricultural activity is also a major threat to biodiversity. Environmental sustainability is important in its own right, but it is also in the long-term interests of producers in global food systems, as climate shocks and climate-related disasters pose challenges to the sector's resilience and create vulnerabilities, which are set to eclipse those of COVID-19 (OECD 2020).

Over the coming decades, as the world's population becomes more numerous and potentially more prosperous, additional demand for food is expected to put even more pressure on the environment. This requires moving beyond business as usual to action to reform agricultural policies, which will be important, in combination with efficiency gains, in limiting the environmental impact of global food systems. Poor policy choices stimulate inefficient input use, as when water for irrigation is delivered free of charge; many existing agricultural support policies exacerbate the environmental impact of agriculture; and agriculture has generally been exempted from efforts to mitigate climate change. Moreover, productivity growth rates have fallen and remain well below potential in many countries, in part due to reduced public investments in agricultural research and development in high-income countries. While progress has been made in several dimensions of agricultural sustainability, environmental pressures remain high.

While COVID-19 pandemic presents immediate challenges for food systems, efforts to invest in their resilience going forward should not only take account of the wide range of risks faced by the sector, but also the need to invest in making the sector more sustainable. This includes taking the opportunity to reform existing policies that jeopardise sustainability and reduce resilience; to revisit current resilience toolkits for farmers faced with shocks to ensure they promote sustainable practices going forward; and ensure that global food systems are able to produce food where it can be done most efficiently and with the least damaging environmental impact. Action now should reinforce, and not distract policy makers from, the urgent task of investing in the long-term sustainability of global food systems.

COVID-19 Pandemic and Resilience Innovations in Food Supply Chains

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A food supply chain or food system refers to the processes that describe how food from a farm ends up on our tables. In a food supply chain, food moves from producer to consumer via the processes of production, processing, distribution, retailing and consumption; thus, food moves from farmer to consumer in a domino-like fashion. The COVID-19 pandemic has triggered intense discussions about the vulnerability of the world's food systems and Food Supply Chains (FSCs) and about the roles of different types of supply chains, e.g. local vs. global, in providing food security. It is known that the spread of the novel coronavirus and government-imposed lockdowns and other restrictions have had a range of impacts on Food Supply Chain, and triggered a variety of creative innovations to keep supply chains running. To guide government policy responses going forward, and to facilitate a shift to more resilient Food supply chains in the long run, asserted that there need to understand several things which include; The role of various types of supply chains in food security; how resilient they have—or have not—been to the pandemic's impacts; and what innovations are now emerging to improve their resilience.

Here, distinguished between global chains (where the food or agricultural raw material is produced in one country and consumed in another) and domestic chains (where food is produced and consumed in the same country). Within domestic chains, it is useful to distinguish between those relying on small and medium enterprises (SMEs) in logistics, trade, processing, and retailing; and those dominated by large-scale enterprises, including fast food chains, supermarkets, large processors, and big logistics firms. While there are obviously important differences across commodities and countries, available data suggest that domestic supply chains, especially those dominated by small medium enterprise, are by far the most important for supplying food to consumers in developing countries.

Pandemic-related disruptions in supply chains are concentrated in their labour-intensive segments. In general, supply chains in rich countries have been more resilient because they are more capital and knowledge-intensive. Global Food supply chains have been more resilient because trade is mostly undertaken by large enterprises in coordinated and capital-intensive supply chains that can mostly adjust to disruptions geographically and temporally, and somewhat in product composition. While there is much concern about COVID-19 affecting trade in perishables, most extra-regional trade is organized through large capital-intensive firms (World Food Programme, 2020). These large trading companies can reduce risk and adjust to shocks as they are more flexible in switching global sourcing and destination regions and in diversifying and shifting stocks to manage risk—as they already do to manage risks from climate shocks (Reardon & Zilberman 2018).

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Within domestic food supply chains, COVID-19 and lockdowns have mixed effects. Large-scale companies are generally less labour intensive but rely more on hired labour (affected especially by lockdowns), while small medium enterprise (SMEs) are more labour intensive, but use more family labour. Wholesaling and logistics operations, such as third party (3PLS) logistics firms in trucking and transport, which are very important for food transport in Africa south of the Sahara, are disrupted by mobility restrictions and wholesale market restrictions. These also affect farm input distribution in rural areas. These differences matter for processing, trade, and logistics, and also apply to the farm sector. Larger mechanized farms are less affected by pandemic restrictions, but those that depend on hired labour have felt an impact. Hired farm labour is relatively rare in Africa south of the Sahara, except for labour-intensive poultry and horticulture operations, compared to India, for example, where farms depend much more on hired labour (Reardon. et al. 2020a).

Supermarkets and large processors in developing countries depend largely on small scale enterprise (SME) wholesalers, but the largest companies—such as Future Group, a leading supermarket chain in India—tend to have their own logistics and procurement units. This allows them more control and coordination to maximize their sourcing in the face of constraints. Small medium enterprises have to take what they can get.

Innovations and Food Chain Resilience

Supply chain participants have introduced a series of innovations in response to COVID-19 pandemic and restrictions. So far, there is little systematic data available on these entrepreneurial and creative institutional responses. Anecdotal information suggests that these innovations are important and could have a major impact on the future of food supply chains (FSCs) in developing countries—in particular buttressing their resilience. Entrepreneurs are telling us that “what we thought would only be possible over the next two decades is now being introduced in a few months.”

As asserted by FAO, IFAD, UNICEF, et al., (2019). There are several kinds of mutually supporting innovations:

Social Innovations: Labour interactions in value chains are being reorganized to reduce shortfalls of access to labour, while guaranteeing worker safety. This involves:

- a. Increased flexibility of labour sourcing and timing, including facilitating the movement and safety of workers. For example, in Nigeria large chicken processors are busing workers to plants and increasing the number of shifts so there are fewer workers in the plant at one time.

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- b. Increased flexibility by replacing workers with machines. This is easier for large farms and large firms, as they are more mechanized to begin with. This of course implies a challenge of reduced employment both in the short and long term.

Business Strategy Innovations in systems of input procurement and output or service marketing. The business adjusts its systems to mitigate risks such as a rapid drop in demand among its usual clientele, or a sudden blockage to its sourcing a key input. The changes are parallel to those it does for labour:

- i. Increased flexibility in marketing by diversifying the customer base and ways to reach consumers. For example, restaurants quickly moved from on-site service to delivery (as we discuss more below). Likewise, a supplier might have previously targeted only food service and then shifted to retail or direct sales to consumers.
- ii. Increased flexibility in sourcing by diversifying logistics; diversifying input types to get what's available; and diversifying geographic sources to reduce risk. The latter resembles actions firms were taking pre-pandemic to address climate risk (Reardon and Zilberman, 2018).

Technological Innovations: Introducing technologies that improve hygiene while requiring fewer personal interactions between workers, and between the firm and customers. Examples include contactless delivery and e-commerce for customers.

Financial Resilience Innovations: Large companies are also creating financial resilience innovations for SMEs. In India, Swiggy, a fast-growing food delivery app and logistics company, delivers for 40,000 restaurant partners, helping them with its “jumpstart package” to recover sales, while the Swiggy Capital Assist Programme helps pay for hygiene and distancing upgrades. In Singapore, Unilever Foods Solutions partnered with e-commerce platform Carousell to launch #SupportLocal, enabling 180,000 food and beverage firms in South East Asia to connect online with local diners. Unilever also shifted to advance payments to small farmers and credit to small retailers to support their resilience over the past three months.

Growth of E-commerce

E-commerce is a particularly vibrant example of innovation. While the use of e-commerce in most developing countries has generally been low, in some it was growing rapidly even before COVID-19. For example, in China—with more than 1 billion people now online—e-commerce was increasingly widespread, even in rural areas. Apart from COVID-19, the demand side drivers of e-commerce are similar to those of the “supermarket revolution”: increasing opportunity costs of time for shopping, magnified by traffic time with urban

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congestion, enhances the benefits of making one-stop-shops at supermarkets—and now e-commerce. The supply side drivers are (1) rapid diffusion of digital technologies, internet, computers, and mobile phones; (2) intense competition and investments in the past decade by e-commerce multinationals (first Amazon, then also Alibaba) joined by e-commerce domestic firms (such as Flipkart in India and Jumia in Nigeria); (3) e-commerce by supermarket chains (such as the Walmart-Flipkart joint venture in India); and (4) complementary investments by logistics firms (such as FedEx and local counterparts) and delivery firms (such as Instacart and Deliveroo), and mobile money firms.

COVID-19 has accelerated the first wave of e-commerce diffusion already underway led by large companies, and—encouraged by governments and NGOs facilitating e-commerce platforms—created a second wave into the realm of SMEs in trade, logistics and delivery, and mobile money firms. E-commerce is growing fastest in Asia, but is increasingly spreading in Africa. Large e-commerce companies are rapidly developing both retail services and intermediation services to help SMEs. In response to COVID-19, Alibaba has scaled up local deliveries of fresh produce to Chinese consumers. It adapted its online shopping site Taobao to provide deliveries in “one hour” with “hyperlocal fulfilment” including from SME retailers and independent chains (Song 2019; Chou and So, 2020). In India, Flipkart is growing fast during the COVID-19 crisis and developed a “hyperlocal delivery” grocery service linking SME suppliers with domestic supermarket chains like Vishal Mega Mart with its e-commerce operations (The Economic Times, 2020a, 2020c). In Nigeria, Jumia has seen its year-on-year sales quadruple with COVID-19 (Kazeem, 2020).

SMEs are also starting their own e-commerce services to cope with COVID-19. In Thailand, SMEs are selling food direct to consumers via Facebook and local delivery apps over mobile networks (Leesa-Nguansuk, 2020). Malaysia-based MyFishman.com provides fresh seafood subscriptions and delivery services to local fishermen (Harper, 2020). Business associations and governments are also facilitating e-commerce during COVID-19. In China, the China Agricultural Wholesale Market Association began working with e-commerce and mobile chat groups to link suppliers and buyers (Fei and Ni, 2020). In Myanmar, the Myanmar Pulses, Beans & Sesame Seeds Merchants Association started an e-platform to link domestic suppliers and processors and exporters). In India, the National Informatics Centre created the “Kisan Rath” mobile app to help farmers and traders find vehicles to move their fruits and vegetables to market (Financial Express Online. 2020).

Suggestions

From the foregoing it was suggested that:

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1. fundamentally, government of nations should set up task to address these immediate disruptions while also investing in the long-term goal of a resilient, sustainable and productive global food system.
2. Ending inefficient and environmentally harmful support should be free from resources for a more forward-looking policy package.
3. Global food systems are also under stress; hence measures should be put in place to limit the spread of the disease having spill-over impacts on the movement of people and products.
4. Food systems have made remarkable achievements, but much more are needed by government of nations to immediately face the COVID-19 crisis and longer-term to meet the triple challenge.
5. The countries should ensure there is resilience of domestic supply chains is crucial to food security in developing countries.
6. The private sector both large firms and small medium firm should take steps to introduce flexibility in labour access, in product procurement, in marketing, in technology, and in financial resilience.
7. Ministries of Agricultural in member countries should encourage innovations by large firms, such as with e-platforms and credit, in order to make small medium firm suppliers and retailers more resilient.
8. Ministries of Agricultural in member countries should make hired labour important in order to avoid the disruption of downstream in food service, retail, moderately in processing and much less in farming.
9. The nation governments and development partners should do well to support innovation with investment in soft and hard structure.
10. The provision of enabling business and commerce environment for both small and large companies eager to play their part in resilience for food security during the pandemic and recovery and in the building for the future is needful.

Conclusion

Food safety and security are the global concern at present scenario. The supply chain has been hit hardest by COVID-19, which causes food security of most vulnerable segment of population at risk. As the pandemic evolves, the impacts on food security and nutrition have also been observed. For example, reduced access to high-value foods, such as fruits and vegetables; higher food prices, especially for nutritious (perishable) foods; reduced food affordability and accessibility, with particularly adverse impacts on low-income households; higher consumption of ultra-processed foods, as access to healthy food becomes more difficult; increased household food waste due to food hoarding during lockdowns. Transforming food systems encompasses changes across all the three dimensions of sustainability: social, economic, environmental. There is evidence that the

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quality of diet worsens with increasing levels of food insecurity. Low-income- and lower-middle-income countries rely heavily on staples like cereals, roots, tubers and plantains, which represent the largest share of food available (over 60 percent in some cases), and often fruit and vegetables are not enough to meet the requirement of a minimum intake of 400g/day. Therefore, the government of nations should enforce the measures to control the pandemic without disturbing the food supply chain and considering the food security of their citizen. A sustainable food system was suggested to ensure access to affordability of nutritious food at all times, thus preventing hunger, while at the same time preserving and stewarding the natural resource base. Adopting a policy package that includes investments in technological development and regulatory reform, governments can create more conditions supporting productive, sustainable and resilient food systems able to withstand future shocks.

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