COMMENTARY

The Vulnerability and Resilience of African Food Systems, Food Security, and Nutrition in the Context of the COVID-19 Pandemic

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Introduction

As the COVID-19 pandemic raged across the globe in the first half of 2020, ebbing and flowing from one region to the next, new infections and deaths reached staggering heights (Johns Hopkins 2020). Some of the first documented cases in Africa occurred in areas frequented by foreign tourists. Early on, the disease also circulated among Africa's jet-setting political classes that had spent time in other regions of the world with higher infection rates. Since these early days, infections took off in the continent's urban areas that were better connected globally via trade and travel. From there, it spread to smaller cities, towns, and then to rural areas, a process known as hierarchical diffusion (Moseley 2020a). Unfortunately, there is another scourge that accompanies COVID-19, and that is a global hunger pandemic. In April 2020, the director of the World Food Programme warned that an additional 130 million people could be pushed to the brink of starvation by the end of 2020 because of the coronavirus. This comes on top of the 821 million people in the world who are already food insecure (Khorsandi 2020). Increasingly, scholars of food security, food systems, and

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poverty have come to realize that the hunger and malnutrition associated with COVID-19 may actually kill or debilitate more people than the disease itself, especially in regions of the world with weaker social safety nets (Fanzo 2020; HLPE 2020a, 2020b; UN 2020).

By examining the key dimensions of food security in Africa, namely, availability, access, utilization, and stability, we assess the current and unfolding impacts of the COVID-19 pandemic on African food systems, food security, and nutrition. The vulnerability and resilience of African food systems is shaped by the particularities of place as well as by the position of various African countries in regional and global systems of economic exchange. Relative to the rest of the world, African food systems are less vulnerable to disruption by COVID-19 in certain regards, including the somewhat later arrival of the disease on the continent (which allowed for some preparation), the youthfulness of the African population, the continent's experience fighting other infectious diseases, the persistence of subsistence food production and shorter food supply chains in some areas, and more limited urbanization in many areas of the continent.[1] Unfortunately, the continent's food, economic, and health systems are also more vulnerable in other ways, including economies and food systems that are exposed to global perturbations because of the increased importance of imports and exports, a limited segment of the population that can work remotely and maintain social distance, the impracticality of prolonged lockdowns, and the abundance of comorbidities.

Food Security, Vulnerability, and Resilience

This article adopts the definition of food security from the Food and Agriculture Organization's (FAO) 2001 State of Food Insecurity Report, in which food security is defined as " a situation that exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life" (FAO 2002). According to the FAO, the achievement of food security depends on four pillars or dimensions, namely, availability, accessibility, utilization, and stability (FAO 2006). According to these criteria, food security is determined by whether there is enough of the right kinds of food available, whether people have physical, economic, and social access to that food, whether they are able to achieve nutritional well-being through access to an adequate diet, clean water, sanitation, and health care, and whether they are able to meet their needs at all times. A recently published HLPE report expanded this four-pillar framework to consider agency and sustainability as further key dimensions (HLPE 2020a). The inclusion of agency requires that food security be considered within a rights-based framework and interrogates issues of power and equity in food systems.

We adapt a vulnerability framework from hazards geography and political ecology (Wisner et al. 2014) to understand the vulnerability of African food systems to the COVID-19 pandemic.[2] Vulnerability is best understood as

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a combination of three factors: 1) the probability of exposure, or the likelihood that the disease will arrive in an area; 2) the degree to which a food system or population would be impacted by an outbreak; and 3) the ability of a population or food system to recover from the disease, also known as resilience.

The probability of exposure, or the probability that the disease will arrive in an area, is more likely in globally or regionally connected cities than in isolated rural areas. Many major African cities have been hit much harder than their rural hinterlands (African Arguments 2020). Early on in the epidemic, we also saw regions frequented by international tourists experiencing more disease outbreaks (Wroughton & Bearak 2020). Some areas also have certain highly mobile populations that have a higher probability of contracting the disease because of their greater propensity to visit infected areas or to be exposed to infected individuals. For example, jet-setting political classes in several African countries saw COVID-19 spread quickly within their elite circles (e.g., one cabinet minister in Burkina Faso was an early victim of the disease). There are also certain classes of food workers, such as supermarket clerks in South Africa, who have a high degree of exposure to the public.

Second, the degree to which a food system or population would be impacted by an outbreak depends on a number of factors. Relatively labor-intensive farming systems, such as horticulture in wealthier African countries, that are often located closer to cities (because of perishability) may see more outbreaks than less labor-intensive systems, such as transhumant pastoralism. Certain populations may also have a greater incidence of underlying health conditions that make them more susceptible to chronic infections.

Lastly, the ability of a population or farming system to recover from a disease likely depends on adaptability to changing conditions and reserves. For example, if global markets collapse for certain products such as cashews, do farmers have reserves to fall back on or other crops to grow?

Food Availability and African Food Systems

A key dimension of food security and nutrition is the availability of food to households, either via the market or through a household's own production. A mix of farmers, farm workers, and farming systems exists in the African context. Understanding these systems gives one insight into the vulnerability of these populations and systems to COVID-19 infections and, by extension, the vulnerability of food supply and availability. It is also important to understand that many African countries are net importers of food; in fact, the continent currently spends between USD35 and 50 billion annually importing food (Gakpo 2020). Despite these international linkages, Reardon and Swinnen (2020) estimate that 75 to 90 percent of food consumed in Africa South of the Sahara is provided by domestic supply chains. While we discuss local food production as it impacts food availability in this section, the

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stability of regional and international food supply chains for food-importing countries will be addressed in the section on stability below.

Farming systems vary enormously across the continent, with a preponderance of smallholders in some regions such as Sahelian West Africa, and large commercial operations in others, such as South Africa. While there are few purely subsistence farmers left in Africa (most so-called subsistence producers farm for themselves as well as for the market), those producing the majority of their own food have been less impacted by COVID-19 disruptions to the food system. With no need to go to the market, wait in long lines, or worry about disrupted supply chains or variable food prices, rurally isolated farmers who produce most of their own food are likely some of the best-positioned households in the world to weather the COVID-19 storm, provided the disease does not arrive on their doorstep.

Labor-intensive commercial operations involving significant farm worker populations may be more susceptible to outbreaks if their workers live and labor in close quarters. Such an outbreak occurred in the Ceres District of South Africa's Western Cape Province, which is known for commercial fruit production, in May of 2020 (Kiewet 2020). Some seasonal farm workers may also be more mobile than permanent workers, which could allow them to carry the disease from one farm to the next. Furthermore, some smallholders who seasonally migrate to cities or artisanal gold mines could potentially carry the disease back to their families when they return to the farm (Moseley 2014).

In high-income countries, the labor demands of farming often vary significantly by type of crop, with horticulture (fruit and vegetable production) or dairy farming demanding significantly more labor than grain farming, which has become highly mechanized. While these distinctions may hold in some African countries such as South Africa or Morocco, they are less relevant in many other African countries where grain farming is still done by hand or using animal traction, where most small farms are highly diversified (meaning they do not specialize in one crop), and where legumes and grains are routinely mixed in the same field. The upshot is that, with the exception of higher-income African countries, it is difficult to say that a disruption to horticulture production is more likely than a disruption to grain production because of COVID-19. In fact, vegetable supplies to rural and urban markets in Africa are probably less likely to be disrupted by COVID-19 than in other parts of the world (Dorning & Skerritt 2020) because they tend to be produced on smaller family farms and within relatively close proximity to urban centers.

COVID-19 tragically intersects with other types of production disruptions in some parts of the continent. Desert locust outbreaks are hitting farmers hard in East Africa, political insecurity is a major problem in Sahelian countries such as Mali and Burkina Faso, and the disintegration of the central government is a major challenge in nations such as Zimbabwe. These issues are generating an enormous amount of food insecurity on the continent already, and these problems are likely to be compounded by COVID-19.

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African women play multiple roles, both in food production and utilization, as well as being caregivers for family members. This gendered dimension is important to consider when assessing the food security impacts of COVID-19 (Moseley 2020b). The majority of Africa's homegrown food is produced by women (70 percent by some estimates). Furthermore, informal employment at food markets in rural and urban settings is often dominated by women. Women also do the majority of cooking in African settings, procure nutrient-dense foods at the market (such as vegetables and meat), and care for children and the elderly. As caregivers for the sick or as hawkers in public markets, women may be disproportionately exposed to COVID-19. Should they fall ill, this will have deleterious effects on food production, food procurement, infant feeding, and food preparation.

Access to Healthy Food

Economic, physical, and social means of accessing food have all been disrupted by COVID-19, making this one of the most vulnerable dimensions of food security in the African context. At this point, the vast majority of Africa's COVID-19 cases have occurred in urban areas, although the food security impacts of COVID-19 extend beyond these urban centers as food systems, economic systems, and social systems are disrupted.

Urban residents in Africa source most of their food via the market (Frayne et al. 2014). For example, recent research in Kisumu, Kenya, found that only 14.5 percent of sampled households sourced food from their own production in the city (Opiyo & Agong 2018). Access to food is primarily determined by access to markets and financial resources to purchase food from these markets. Government responses to COVID-19 in Africa have fundamentally impacted economic, physical, and social access to food. Economic access to food has been reduced as a result of three main factors. The first has been the widespread reduction in income. For example, research conducted in five low-income areas of Nairobi in April 2020 found that 36 percent of participants had experienced a complete loss of job or income, and a further 45 percent had experienced a partial loss (UNECA 2020).

The second factor has been increased food prices. Disruptions in supply chains and closing of informal markets have meant that food prices have increased, precisely at the moment when incomes have fallen. The research in low-income areas of Nairobi referenced above found that 78 percent of participants sampled reported increased food prices as a result of COVID-19 lockdown conditions (UNECA 2020). In South Africa, ongoing food basket monitoring has found that families on low incomes spent 30 percent more on food in May than they had two months earlier (PMBEJD 2020).

The third factor is reduced access to school feeding systems, which has meant that all meals need now to be provided at home, thereby adding to household food expenditure. This has had a particular impact in Africa, where 47 percent of the population is under eighteen years old (UNICEF 2017). The World Food Programme estimates that 56 million children in

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Africa are missing out on school meals as a result of school shutdowns (World Food Programme 2020a). However, many countries are now working to provide some form of mealtime assistance while schools are closed. For example, schools are sending rations home in Cameroon (World Food Programme 2020b).

Physical access to food has also been reduced as markets and street vendors, who play an essential role in the food security of the poor (Battersby & Watson 2018), have been shut down in many countries. In South Africa, lockdown conditions have privileged large-scale formal retailers and criminalized informal sector retailers, thereby making it harder for the poor to access food locally from retail systems designed to meet their needs in terms of unit size, credit availability, and selling prepared foods appropriate for households that experience income, time, storage, and energy poverty (Battersby 2020). Bans or restrictions on markets and street traders have been common across much of Africa and have had significant impacts on food access for urban residents. The shutting down of street vendors and markets without consideration of their role in the food systems of the poor is a manifestation of a much deeper state antipathy toward the informal sector in Africa and its historical efforts to stem, restrict, or tame informality (Kamete 2013). However, civil society groups and some local governments have worked to develop mechanisms to enable safer trade, such as providing guidance on health protocols for traders (WIEGO et al. 2020), provision of masks and sanitizer to traders, and the marking of bays for social distancing. Additionally, activists have mobilized around the importance of these markets, both as providers of essential goods and as vital sources of livelihoods. Many markets have now reopened, albeit at reduced capacity. The disruption of markets has had a significant impact on rural food security, as farmers have been unable to get their stock to market (Reuters 2020).

In addition to economic and physical access, COVID-19-related restrictions have impacted social access strategies commonly used to maintain food security. For example, in the wake of loss of income, urban-to-rural remittances are being reduced, therefore increasing rural vulnerability to food insecurity (Adhikari 2020). Cross-border remittances are also forecast to decline by as much as 23 percent (World Bank Group 2020), which will significantly impact rural and urban food security. Additionally, social networks that have conventionally been used to access food or cash in times of hardship are now less available because of the covariate nature of the COVID-19 economic crisis combined with social distancing and restrictions on gatherings and travel. The combined impact of the sudden erosion of multiple means of access has forced many households into food insecurity, characterized by reductions in dietary diversity and diet quality.

Utilization: The Infrastructure for Healthy Food Preparation

Perhaps the most poorly understood pillar of food security is that of utilization. The FAO defines this as "the proper biological use of food,

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requiring a diet providing sufficient energy and essential nutrients, potable water, and adequate sanitation. Effective food utilization depends in large measure on knowledge within the household of food storage and processing techniques, basic principles of nutrition and proper childcare" (FAO 2006:1).

It is clear that access to water and sanitation impact both food utilization and vulnerability to COVID-19 transmission. Inadequate access to water, sanitation, and hygiene have been well documented as shaping long-term nutritional outcomes through ongoing diarrhea and other health challenges (Cumming et al. 2016). Undernourished people have weaker immune systems and may be at greater risk of severe illness due to the virus (Global Nutrition Report 2020). At the same time, these infrastructural deficiencies hasten the spread of COVID-19 in certain areas.

Households in urban areas have been mitigating the food security impacts of these utilization challenges for years by adapting diets to respond to energy poverty, inadequate water and sanitation, storage, and refrigeration deficiencies through the consumption of foods that are easy to store and require little preparation. Traditional foods, such as dried or smoked meats and fish, dried beans, and maize meal, which were adapted to these lived conditions, are being increasingly replaced by modern ultra-processed foods, which are typically higher in sugar, fat, and salt than traditional foods. This substitution is not determined by utilization issues alone but is the outworking of the rapidly increasing importation of these foods (Thow et al. 2015), marketing and advertising, and increasing time poverty as urban commutes extend in length.

The outcome of these economic, social, and political factors operating across a range of scales has led to massive increases in rates of overweight, obesity, and diet-related non-communicable diseases in northern and southern Africa, most notably diabetes and hypertension. Of the 37 countries in the world with high levels of child stunting (undernutrition), anemia in women of child-bearing age (micro-nutrient deficiency), and adult obesity (over-nutrition), 27 are in Africa (Global Nutrition Report 2020). Obesity, diabetes, and hypertension have been found to be significant comorbidities of COVID-19, and in the African context, a high proportion of recorded deaths have had one or more of these comorbidities (Petrakis et al. 2020; IOL Reporter 2020).

Simply put, chronic food insecurity in the African context manifests both in the form of under- and over-nutrition, both of which increase vulnerability to COVID-19. The COVID-19 pandemic and the responses of governments in Africa and beyond have significantly increased vulnerability to food insecurity on the continent.

The Stability of Food and Agriculture Supply Chains

As a dimension of food security, stability pertains to the regularity of food supplies. While food self-sufficiency (the goal of producing as much food

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within your borders as possible) was a mainstay of African food policy through the 1970s, these policies were systematically dismantled in most African countries during the World Bank- and IMF-imposed neoliberal economic reform (also known as structural adjustment) of the 1980s and 1990s (Moseley, Schnurr & Kerr 2015). Tariff barriers were reduced, as well as subsidies to farmers, leading to declining domestic food production and increasing food imports. The upshot of this reform period is that African countries now import and export more food than they did in the past, not to mention other types of agricultural and non-agricultural products. While this strategy produced fairly stable food supplies and prices in the 1980s and 1990s, global food prices became more variable beginning in the 2000s, resulting in food crises, including the 2007–2008 global food crisis that hit Africa's urban areas hard (Moseley, Carney & Becker 2010).

The COVID-19 pandemic has created problems for global trade and supply chains that are impacting African food systems enmeshed in a global food system. While Africa is a net importer of food, in actuality it depends on a mix of agricultural exports and imports. Prior to the COVID-19 pandemic, Africa's exports of food and agricultural products totaled between USD35 and 40 billion, with imports between USD45 and 50 billion. The continent also imported another USD6 billion worth of agricultural inputs (mainly fertilizers, seeds, and pesticides) per annum (Pais et al. 2020). Unlike the situation in 2007 and 2008, global grain stocks are relatively plentiful in the current period. While grain shipments have been mostly unaffected to date, transit costs have risen steeply, which has increased the overall cost of African exports and imports.

As the global economy sank into a COVID-19-related economic recession, demand for African commodities also declined precipitously. The World Bank predicts that African economic growth will contract by -2.1 percent to -5.1 percent in 2020, down from a 2.4 percent growth rate in 2019. Dragging down continental growth rates are steep declines in commodity exports from South Africa, Nigeria, and Angola (Zeng 2020). Weakening African economies will translate to weakening African currencies, which will raise the price of imports in local currencies, including food. To date, food price hikes have been most severe in the Great Lakes region due to panic buying associated with lockdowns and in areas facing governance crises such as Zimbabwe and South Sudan (Pais et al. 2020). Declines in exports, currency depreciations, and rising transit costs will eventually affect the prices of food in Africa's urban areas, which has serious implications for access to food, as discussed above. That said, African food systems are also resilient. Local and regional production may be able to fill the gaps in some cases. South Africa experienced good harvests last year, and many West Africans were able to plant their crops before COVID-19 disruptions began in earnest (Pais et al. 2020). With sagging global markets, some farmers may also move away from commodity crops and into food crop production, something which has happened before (Moseley 2011).

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Conclusion and Policy Implications

We assessed the vulnerability and resilience of African food systems in the context of the COVID-19 pandemic using the four dimensions of food security, namely, availability, access, stability, and utilization. This vulnerability is shaped by the particularities of place in different regions of Africa, as well as by Africa's position in the global system. The continent possesses certain advantages, namely a youthful population, shorter supply chains and the persistence of subsistence farming in some cases, more limited urbanization, and past experiences fighting infectious diseases. However, the region also faces steep challenges, including more limited social safety nets, the impracticality of prolonged lockdowns as a disease control measure, abundant comorbidities, slumping economies related to the global economic recession and decreased demand for African commodities, and a reliance on net food imports in many cases.

An understanding of the vulnerabilities of African food systems, food security, and nutrition has implication for policymaking. First, with the potential for rising food prices, Africa's urban populations are arguably the most vulnerable to the food insecurity created by the COVID-19 pandemic. While African countries and their global partners have long monitored food insecurity in Africa's rural areas, there is limited monitoring of hunger in Africa's cities. Developing better systems to monitor and address urban hunger is critical.

Second, while hunger, or acute food insecurity, has long been the focus of policymakers in Africa, COVID-19 has highlighted the importance of addressing malnutrition in all its forms, including micronutrient deficiencies and obesity. These other forms of malnutrition have led to significant comorbidities (anemia, diabetes, heart disease) that increase the vulnerability of certain populations to the disease.

Third, African food governance has not always considered the most vulnerable of Africa's people. Rather, food policy has sometimes been captured by corporate agricultural interests, and the response of the state has not been informed by the food practices of the poor. The result has often been the privileging of large-scale agriculture, formal sector suppliers, and supermarketization in some areas. Furthermore, these policies have been reinforced by historical biases against informal sector actors, informed by colonial planning legacies.

Finally, many African countries need to seriously rethink their commitment to trade as a way to best support the food security of their populations. While some trade will always be necessary, greater attention to food production at home will likely lead to a more balanced food system that is less vulnerable to global perturbations, including diseases pandemics. Many Africans countries have deep experience managing infectious diseases, and they surely realize that the COVID-19 pandemic is only the latest, and certainly not the last, disruption of its kind.

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Notes

1. While Africa is the most rapidly urbanizing of the world's regions, it still remains the most rural at around 60 percent (Fouberg & Moseley 2018).
2. Hazards geography is a subfield of geography that emerged in the 1940s to study the impacts of natural hazards on human societies, e.g., floods, droughts, hurricanes, tornadoes, tsunamis, etc. A vulnerability perspective emerged from this subfield, especially as geographers began to realize that hazards are not a purely exogenous phenomenon but are deeply interconnected with the structure of society (Watts 1983; Moseley et al. 2014).

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