



## Ghana's rice value chain resilience in the context of COVID-19

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### ABSTRACT

The 2020 State of the Food Security and Nutrition World report suggests that the COVID-19 pandemic may render 83 to 132 million people food insecure. The global south has been projected to be adversely affected by COVID-19 in terms of food and nutritional security. This potentially renders Africa off track in achieving SDG -2 of zero hunger by 2030. Ghana is a net importer of rice and how the sector responded to the global pandemic has received less traction in the agri-food system literature. There is skewed literature that concentrates on the global north. The paper employed a qualitative approach involving key informant interviews across 6 regions in Ghana. The study covered 48 Agricultural Extension Agents (AEAs) and Monitoring and Evaluation (M&E) officers, 80 farmers, and 48 market leaders. We use one of the country's main food staple - rice to show the food (in)-security situation during the pandemic. We articulate that using the right food security conceptual and theoretical framing remains imperative in understanding food (in)-security. The findings showed price hikes during the imposition of lockdown affected access (physical and effective demand). Rice however remained available during and after the lockdown imposition. Ghana's rice production output was affected during the COVID-19 pandemic in 2020. The ramification of COVID-19 on Ghana's rice sector was not dire but points to the vulnerability of the rice value chain to future pandemics. Important policy actions are needed to consolidate particular gains made in Ghana's planting for food and jobs to minimize rice imports.

### 1. Introduction

Rice constitutes an important staple in most West African countries where per capita consumption witnessed significant increases over the past six decades (Arouna et al., 2020). Kathiresan et al. (2020) posited that rice typically represented a major constituent in household diets. The mention of rice in most African households resonates with foreign rice. This has rendered most African countries to be heavily dependent on foreign rice. But what accounts for the rise in taste and preference for imported rice? Ayeduvor (2018) attributed this to the low quality of locally produced rice. This brings into question the quality of standards and the capacity of rice value chain actors to compete favourably with their foreign counterparts. Notwithstanding, the already existing challenges in the rice sector, COVID-19 was reported in Ghana on 12th March 2020. In a containment effort to curb the spread and spike of the virus, the government introduced travel restrictions, a ban on mass gathering, social distancing, closure of borders and imposition of a 2-week lockdown in two major cities - Accra and Kumasi. COVID-19

ravaged gains made in important economic sectors including agriculture (Ujunwa and Ujunwa, 2021; Egger et al., 2021). This questions the country's resilience and exposes some vulnerabilities to externalities with repercussions on the agricultural food system particularly in the context of border closures that affected international trade. The impositions of lockdowns led to temporal price hikes in both countries of origin and destination. India, Cambodia and Vietnam imposed temporary export restrictions on rice in April 2020 (Arouna et al., 2020). Unlike the 2008 world food crisis, COVID-19 disruption is global and concurrent impacting both supply and demand channels. Indeed, on 11th March 2020, the World Health Organization (WHO) declared COVID-19 as a global pandemic (World Health Organization, 2020). The 2008 food crisis however provided an incentive to boost domestic rice production given the apparent evidence of vulnerabilities witnessed in the global south. COVID-19 has dire ramifications for the attainment of the Sustainable Development Goal (SDG) - 2, i.e. ending hunger and eliminating food insecurity by 2030.

Evidence suggests that the COVID-19 pandemic exacerbated food

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insecurity in the global south (Dabone et al., 2021; Egger et al., 2021). Indeed, in Burkina Faso, COVID-19 contributed to worsening food insecurity among poor households in rural and urban spaces (Zidouemba et al., 2020). In Nigeria, more than 50% of households experienced food insecurity due to COVID-19 in both the rural and urban areas involving 1950 households drawn from the General Household Survey-Panel (Ibukun & Abayomi Ayinla Adebayo, 2021). Huss et al. (2021) indicated an increase of 8% from a pre-COVID-19 food insecurity rate of 40.8%–48.8% following COVID-19 restriction in Kenya within 30 days. Additional literature (Moseley & Jane Battersby, 2020; Power et al., 2020; The Lancet 2020) showed vulnerabilities in the agri-food system resilience that requires fixing. The High-Level Panel of Experts report highlighted vulnerabilities requiring immediate policy action to build resilient food systems (HLPE, 2020).

Other authors further (Ayanlade & Radeny, 2020; Kathiresan et al., 2020) showed SubSaharan Africa (SSA) to be vulnerable to the negative impacts of COVID-19. Countries in West Africa including Ghana continue to be highly dependent on rice imports. Arouna et al. (2020) showed that COVID-19 negatively impacted the rice value chains in procurement, production, distribution, agricultural inputs, finance, labour, processing, marketing and sales.

Contrary views indicate that no matter how well resourced a country may be, the incursive disruption by COVID-19 presents an inconvenience and potential food insecurity for both developed and developing countries and not just the well-resourced global north. Indeed, Gundersen et al. (2021) projected 54 million Americans to be food insecure in 2020. Larson et al. (2021) indicated that 41% of food insecure households in Minneapolis, Minnesota ate less and experienced hunger.

Another strand of literature (Deaton & Brady, 2020; Reardon & Swinnen, 2020, pp. 132–136) argued that the global food system remained resilient to disruptions caused by COVID-19 hence needless to make radical policies but rather intensify the emergency social safety nets. In May, the Economist indicated that:

‘The sophistication of the [food] system, and the foresight of the players within it ..., has meant that, so far, it has held up to COVID-19’s impacts on both supply and demand by dexterously swapping sources and rerouting supply chains’ (Economist, 2020).

The strands of literature present a mixed conclusion. Given the obvious disruption caused by COVID-19 to both supply and demand within food systems, recent attempts have been made to understand the ramifications. Studies have attempted to proffer an understanding of the issues but from a different perspective with limited use of relevant theoretical frameworks (eg. food security and agri-food system). For instance, a seminal study by Pu and Zhong (2020) conducted in China examined the effects of COVID-19 on production from a broader perspective of using a framework of previous pandemics without an explicit application of a relevant theoretical agricultural framework.

Erokhin and Gao (2020) attempted to use a food security model to examine evidence from 45 countries in the global south from a trade and economic perspective. Ayanlade and Radeny (2020) examined the effect of COVID-19 on food security in SSA from a food security framing. This represented a useful attempt to situate COVID-19 with a food systems framework. The literature on COVID-19 and agricultural food systems appears nascent, scarce and scattered. Particularly studies focusing on the global south, apparently perceived to be vulnerable. Additionally, strands of literature that examine SSA staple food crops resilience remain scarce.

Few studies, for instance, Soullier et al. (2020) examined rice value chain upgrading in the context of the COVID-19 pandemic in West Africa. Espitia et al. (2020) predicted a significant effect of COVID-19 on developing countries given their high dependence on food imports including rice coupled with the labour-intensive nature of the production and distribution systems. Kathiresan et al. (2020) examined Africa’s

rice sector and COVID-19 from a broader policy framework perspective. Esiobu (2020) examined how COVID-19 affected rice yield in Nigeria. So far, these articles constitute few articles that explicitly examined COVID-19 disruption in the rice sector. Rice undoubtedly constitutes a single most important staple in West Africa and by extension Ghana, hence an examination of the crop’s resilience in a prolonged global pandemic remains imperative, given the region’s high import dependency. So far the few studies that exist, attempts to either examine COVID-19 and agri-food system from just a single theoretical framework. Amati et al. (2019) and Galanakis (2020) examined COVID-19 from a solely agri-food system framing. Scanty studies (Ayanlade & Radeny, 2020; Erokhin & Gao, 2020) exist on the global south that employs an application of agri-food systems and food security conceptual basis in understanding the region’s current COVID-19 resilience. Devereux et al. (2020) argued that understanding how food security consequences emanate and the design of effective solutions, requires the use of appropriate food security theoretical and conceptual frameworks.

This article makes three main contributions. First, it gives traction to the conceptual use of combining two theoretical (food security and agri-food system) frameworks in understanding the effects of COVID-19 on the agri-food system. This is based on a recent study by Devereux et al. (2020) that argued the need to conceptualize COVID-19 impacts on household food security. Second, it gives direction to the right use of agri-food system conceptual frameworks in understanding disruptions caused by COVID-19 in the global south. Third, it presents an empirical account of the global south’s resilience to supply chain shocks inflicted by COVID-19 using a popular West African food staple crop (rice) as a case study, bringing clarity to the mixed conclusions of COVID-19 effect on the regions agri-food system. The paper aims to examine Ghana’s rice sector resilience to COVID-19 effects from a dual theoretical and conceptual framework of food security and food systems. This is imperative to bring clarity on the effect of COVID-19 on developing countries agri-food systems. A plausible central research question that needs asking could be – What had been the effect of COVID-19 on Ghana’s rice sector taking into account the access to and supply of rice? This is an empirical question, that studies need to answer, and this study addresses the lacuna.

Specific results showed the occurrence of price hikes during the imposition of lockdown in affected access (effective demand). Rice however remained available during and after the lockdown imposition without shortages. Ghana remained resilient in rice production during the lockdown and post-lockdown period (March–June 2020). The ramifications of COVID-19 on Ghana’s rice sector were not dire but one that can neither be described as a mere inconvenience nor famine but a middle ground situation.

The rest of this article is structured as follows. Section 2 presents a description of the theoretical framework. Section 3 discusses the methodology employed. Section 4 presents and discusses the empirical results under key concepts on food security and agricultural food systems. Finally, Section 5 concludes the study by presenting the policy implications based on the major findings.

## 2. Theoretical frameworks

### 2.1. Food security

Brinkman et al. (2020) drew inspiration from the concept of food security employed by the Food and Agriculture Organization (FAO). The FAO food security concept has four basic components covering access, availability, utilization and stability (FAO, 2008). Thus individuals are considered food secured if they have uninterrupted access to adequate and nutritious food all year round. Availability refers to the supply of food, Access refers to the ability (effective demand) to purchase food (economic access) and closeness to market (physical access), Utilization refers to the processing of food into consumable forms which partially relate to dietary quality. Stability refers to the three components being

stable at all times to ensure food security (Devereux et al., 2020; FAO, 2008). This study takes inspiration from the combined framings employed by the FAO (2008) and Devereux et al. (2020).

## 2.2. Food systems

Food systems (FS) is defined “to cover the entire spectrum of actors and their relationship (intra and interlinkages) in specific agricultural value-chain activities including input supply, production, aggregation, agro-processing, distribution, final consumption and post-harvest activities involving storage and disposal of food commodities emanating principally from agriculture, aquaculture, forestry” (FAO, 2018). HLPE (2017) defined FS “to include actors embedded within components of wider economic, social and natural built environments”. This is made up of sub-systems (e.g. input, production, waste management etc.) that interact with other major systems (e.g. health, trade, energy, etc.). Several activities take place relating to production, harvesting, processing, storage, distribution, food preparation and consumption.

FAO (2018), Garnett et al. (2013), Ericksen et al. (2010) and HLPE (2017) justified the need for conceptually using the food system perspective to understand the dynamism, interlinkages, components and sub-components involved in the agri-food sector particularly in the context of changing consumption patterns, climate change and variability, population growth, changes in natural resources management and urbanization. Second, due to the limited use of the food system perspective, most studies remain handicapped in dealing with the complexities taking place within agricultural value chains. What happens in one component of a value chain affects directly or indirectly the activities in other sub-components of the chain and the adjustments thereof. Conceptualization involving the use of a FS analytical perspective presents a more holistic and systematic approach in dealing with complexities and challenges associated with the agri-food system particularly in developing economies. Ankráh and Freeman (2021) argued that actors in the value chain often operate independent of others and lacked reflective learning among actors in taking advantage of opportunities and harnessing synergies.

Traditional food security system approaches in most SSA countries emphasize a production-focused approach dwelling so much on increasing food supply. To an extent, this is justified given the specific case of SSA where production deficits are pronounced. However, given the rapid changes taking place within broader agricultural value chains, a focus on production potentially neglects other sectors equally involved in complex interactions that influence food and nutritional security. For instance, market an important component is often neglected, leading to seasonal gluts and food wastage in countries south of the Saharan. FAO (2018) further asserted that a bias towards production neglects other sectors that interact to cause food (in)-security, thus a failure to leverage and rectify anomalies in the agricultural value chain given the complex interactions. Potential feedback in other sectors is neglected, a situation that further exacerbates risks and problems in other sectors un-noticed. Ericksen (2008) indicated that the FS can give cognizance to the inter-woven relationships among different actors in specific components. This includes feed-back from the loops created and trade-offs. Béné (2020) notes two strengths. First, the FS recognizes that a change in actors within a component affects other actors within other components with often unplanned negative consequences. Second, the FS takes into consideration all segments of existing value chains in a food system. This for example comes in handy to examine the adverse effects or opportunities presented by the COVID-19 pandemic. A combination of the food security and food system both as a conceptual and theoretical framework stands potentially very useful in understanding the effects of the COVID-19 pandemic. This article suggests further exploration of these two frameworks in the current context of COVID-19. In this study, we conceptualize that food security is embedded with four components – availability, access (physical and economic), utilization, and stability. The Food system also encompasses production, processing,

distribution, storage and marketing. The results and discussions are therefore foregrounded in these conceptual frameworks.

## 3. Methodological approach

### 3.1. Research design

We discuss the research design, methods of data collection and the analytical approach in turn. First, the study relied on a qualitative research design that involved Key Informant Interviews (KIIs) and Focus Group Discussions (FGDs) in collecting information from selected Monitoring and Evaluation (M&E) Staff and Agricultural Extension Agents (AEAs) (48 in total) from various Departments of Agriculture (DoA) in 6 administrative regions (Greater Accra, Ashanti, Bono East, Savannah, Eastern and Northern) in Ghana (Table 1). A qualitative enquiry was used because COVID-19 was novel and inflicted differential effects in specific geographical spaces. Given its novelty, there was the need to employ an exploratory research approach, which the qualitative research approach better addresses (Khosla, 2021). Additionally, the study examined the actors’ lived experience as COVID-19 raged. Understanding how specific actors within the agricultural value space responded remained varied and required a detailed narration of how it happened, which rice value chain actors were disadvantaged, how this affected rice access, availability, utilization, stability and consumption. It remained imperative to understand how the production base responded to the sudden surge in increased demand based on a rise in philanthropic activities<sup>1</sup> by government, civil society and faith-based organizations targeting the poor and vulnerable. The objective was to gain an understanding of the nuances surrounding COVID-19 relative to Ghana’s rice food (in)- security and beyond, from the perspectives of stakeholders involved in the rice value chain. Also, 80 farmers and 48 Market Queens<sup>2</sup> were also interviewed to understand the production and marketing dynamics of foodstuffs within the context of COVID-19 (Table 1).

### 3.2. Data collection methods

Data collection took place over a period of five (5) weeks<sup>3</sup> from mid-march to the third week in April 2020 relying on KIIs and FGDs to examine the individuals lived experiences as COVID-19’s raged.

#### 3.2.1. Key informant interviews (KIIs)

Key informants constitute experts with knowledge on a particular issue under investigation. The study made use of KIIs because COVID-19 appeared novel, hence the need to engage with actors who had

**Table 1**  
Summary of qualitative interviews.

Interview Method	M&E/Extension Officers		Farmers		Market Queens		Total
	Male	Female	Male	Female	Male	Females	
Key Informant Interviews & Focus Group Discussions	32	16	48	32	0	48	176

Source: Fieldwork, 2020.

<sup>1</sup> Most Philanthropic activities involved the sharing of rice to the very poor and vulnerable in urban spaces in Accra.

<sup>2</sup> Market queens refer to leaders of organized women trader groups that deal in specific agricultural commodities at the big markets in Ghana. They serve as gatekeepers who represent the interest of their specific constituents.

<sup>3</sup> From the period of the partial lockdown to 2 weeks after the lift of the lockdown.

considerable knowledge and opinion on the subject matter. We purposively selected officers who worked as Monitoring and Evaluation, Agricultural Extension Agents. The use of KIIs in such instances has been given credence by (Jennings, 2020; Yazdani et al., 2018). A key informant interview guide was developed eliciting questions on rice value chain actors' views on the disruptions caused by COVID-19 to the sector. First, we purposively considered regions known for rice production (Volta, Northern, Upper East, Upper West) Participants were purposively drawn with the assistance of agric. Officers who worked at the various Departments of Agriculture under the respective local government. The KIIs constituted the first phase of the data collection where identified key informants were engaged in conversations on phone during the imposition of the 2-weeks partial lockdown. The study was guided by the concept of theme saturation and the willingness of respondents to avail themselves over recorded telephone conversation. Therefore, theme saturation was attained at the point where no new themes emerged. This concept was what led to the total number of respondents engaged. This process helped in identifying and arranging participants that were engaged in the focus group discussion. Developed key informant guides were administered to respondents (See Table 2). The guide covered questions on food availability, access, utilization, stability, pricing, production, processing, distribution, marketing and household consumption patterns. This was guided by the conceptual framework in section 2.

### 3.2.2. Focus Group Discussions

Participants were drawn from communities where KIIs were conducted based on the recommendation from the experts interviewed. Given the recommendation, we further consciously ensured that we had representation from farmers, the Department of Agriculture, M&E officers, and distributors in the discussion. The farmers selected within the community represented geographic distinctions in the community and gender. This was after the lockdown was lifted. A deliberate effort was made to ensure fair gender representation in the FGDs. The FGDs were conducted in-person with participants. Strict COVID-19 protocols were

**Table 2**  
Profile of key informants.

Region/District	Type of Informants				Total
	M&E Officers		Agricultural Extension Agents (AEAs)		
	Male (N)	Female (N)	Male (N)	Female (N)	
<b>Volta Region</b>	1				1
Central Tongu District			2	1	3
Ketu Municipal			2	1	3
Akatsi South Municipal			2		2
Akatsi North District			2		2
<b>Northern Region</b>	1				1
Kpandai District			2		2
Karaga District			2		2
Gusheigu District			2		2
Kumbungu District			2	1	3
<b>Upper West</b>	1				1
Wa Municipal			2	1	3
Wa East District			2		2
Wa West District			2		2
Sissala East Municipal			2	1	3
<b>Upper East</b>	1				1
Builsa South District			2		2
Builsa North Municipal			2	1	3
Garu District			2		2
Bawku West District			2		2
<b>Total</b>	<b>4</b>		<b>32</b>	<b>6</b>	<b>42</b>

Source: Fieldwork, 2020.

observed involving the use of nose masks, physical distancing, washing and sanitizing hands. A maximum of 6 participants constituted each FGD. Questions on identified actors, who benefitted, lost, food production, availability, access, utilization, stability, household consumption patterns, prices, supply and relationship among chain actors were discussed. A semi-structured FGD guide directed discussions. An effort was made to ensure equal/fair participation in the discussions, hence avoided a situation where few outspoken individuals over-shadow discussions. The research team used other FGDs and KIIs to triangulate issues emanating from the discussions. This process helped in confirming, discarding and validating information obtained.

### 3.2.3. Secondary data sources

A synthesis was made from secondary data sourced from the Plant Protection and Regulatory Services Department (PPRSD) of the Ministry of Food and Agriculture (MoFA). The secondary data sourced contained information on imports and exports covering the beginning (January) of the year 2020 till May. This afforded a context analysis of pre-lockdown, lockdown and post-lockdown periods.

### 3.3. Data analysis

The study used content analysis. Krippendorff (2018) described content analysis as an analytical method that allows for replicable and meaningful references considered valid to be extrapolated based on data. Krippendorff (2009) indicated that in content analysis analytical constructs<sup>4</sup> are used to make meaning of texts and images. Various information was recorded via recorders and mobile phones through calls. The information was retrieved and transcribed. All transcribed data were analyzed with major and sub-themes identified and grouped. Researchers familiarized themselves with issues emerging from transcribed data and agreed on major and sub-themes worth categorizing. Statements supporting identified themes were disaggregated. Data analysis was done within the frameworks of food security and food systems.

## 4. Rice production in Ghana

Over the years, rice has gradually become a food staple in Ghana. For example, in 2012 Ghanaians consumed nearly 750,000 metric tons of rice and this increased to over 1,000,000 metric tons in 2018. Despite its importance in the diet of households, a significant proportion (more than half) of rice consumed in Ghana in 2018 was supplied through imports (See Fig. 1). This is quite surprising because there exist ecological conditions in the country which can support rice production to make Ghana self-sufficient. In the last ten years, therefore, there has been a deliberate attempt by policymakers and private sector value chain actors to increase the share of local production in the total rice demanded per annum. First, since 2011 several irrigation facilities for rice cultivation were renovated and others expanded. Second, under the government's flagship programme of Planting for Food and Jobs (PFJ), farmers received subsidized fertilizers and improved seeds since 2017. Third, there were significant media campaigns that targeted the promotion of the consumption of made-in Ghana rice since 2018. Cumulatively, these interventions helped to promote productivity increases from an average of 1.7 tons per ha in 2012 to 3.34 in 2020 (See Fig. 2). Suggesting that the growth of output outpaced the growth of the area cultivated. It must however be noted here that although output increased by nearly 150,000 metric tons between 2018 and 2019, we observed an increase of only 48,000 metric tons between 2019 and 2020. This may be indicative that during the 2020 production season when COVID-19 was intense, production processes might have been affected and hence impacting on output (See Figs. 1 and 2).

<sup>4</sup> Analytical construct is the medium by which inferences are from text relative to the context.

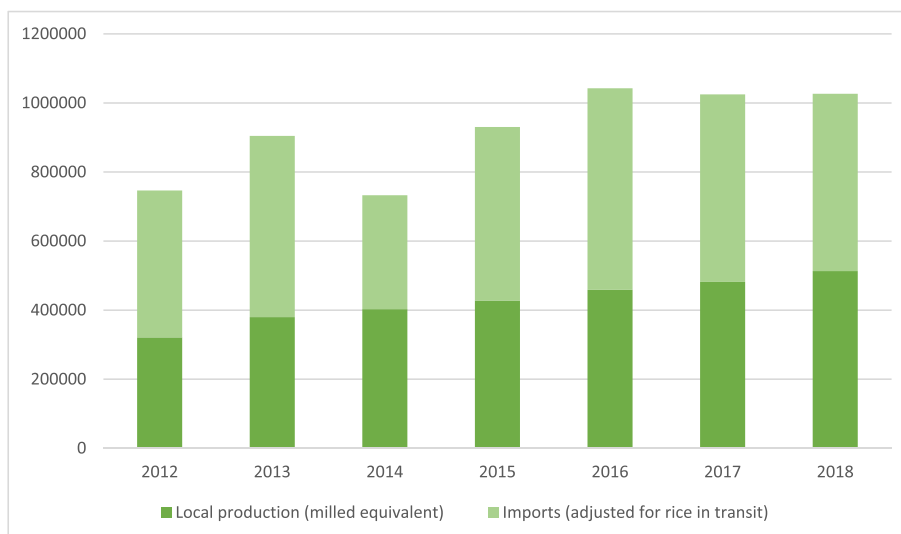


Fig. 1. Sources of domestic rice supply in Ghana (2012–2018).

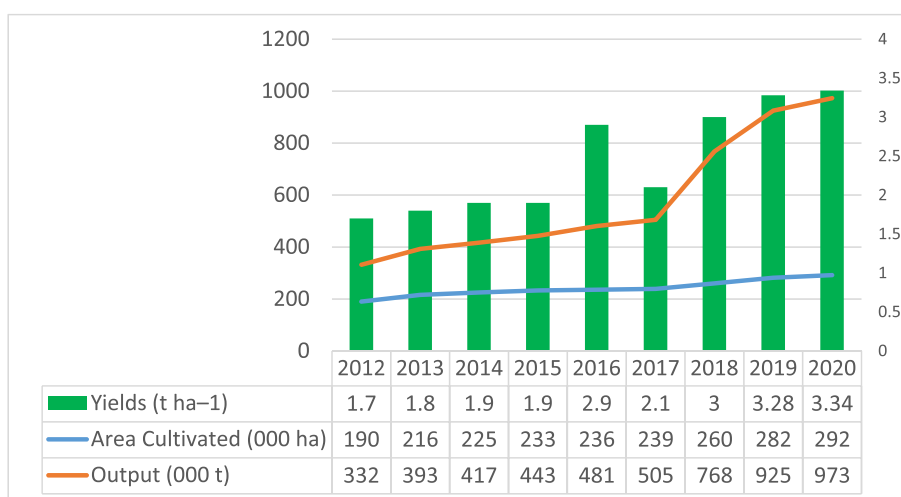


Fig. 2. Rice production in Ghana (2012–2020).

## 5. Results and discussions

The findings are presented based on the four components (availability, access, utility and stability) of food security employed by FAO (2008). First, we present findings and discussions on food availability.

### 5.1. Food availability

India, Vietnam and Pakistan curtailed rice exports onto the global markets which led to a surge in demand for Thai Rice in April 2020. Lockdown imposition in these countries affected rice exports. Glauber et al. (2020) argued against export impositions. For example, these authors indicated that India had a rice stock-to-use ratio of 34% needless of an export restriction. Conversely, Devereux et al. (2020) argued that it is rational for countries to restrict food exports to protect national supplies. These export restrictions were predicted to have negative ramifications for Ghana, heavily dependent on rice exports (See Fig. 1). Undoubtedly, most (75%) of Ghana’s rice imports come from Russia, Ukarian, Vietnam, Thailand, Pakistan, India, the European Union, the United States of America and Canada (Glauber et al., 2020).

In Ghana, we observed that the minor season production began in November 2019 and ended around February 2020. This signalled an end

of production before the COVID-19 spike. Planting and land preparatory activities typically take place from March – mid-April. Ayanlade and Radeny (2020) confirmed this planting period for most SSA countries. Fig. 2 showed that rice output was affected in 2019–2020 recording 48,000 tons relative to 150,000 tons in the preceding year. We observed that agricultural inputs had already been delivered to farmers which posed no immediate threat to rice production and by extension its availability. This contrasts the finding of Adhikari et al. (2021) that showed disruptions to agricultural inputs. The lockdowns triggered an initial panic buying and stockpiling. This caused a sudden surge in demand. This situation did not however aggravate in leading to rice unavailability in major markets in Accra and Kumasi. In a Key informant interview with a market queen, she indicated that:

“During the pronouncement of the lockdown by the President, there was a general rush for rice which caused rice prices to increase astronomically, ironically this did not affect rice availability” (KII/Market queen, Accra, March 2020).

The statement above indicated that although, the imposition of the lockdown triggered panic-buying and increased demand for rice, it did not lead to rice shortages where individuals had to struggle to search for rice. Essentially, prices rose in response to the lockdown but this did not

lead to shortages. This contrasts with [Oyetoro et al. \(2020\)](#) finding that showed that even though food items were available on the Nigerian market, vegetables were not accessible. This points to the negative effects of COVID-19 on food accessibility.

[MoFA \(2020\)](#) report indicated the incidence of food unavailability at certain markets in Ghana owing to the limitation of movement by the law enforcement officials despite the exemption for the agricultural sector. The temporal closures and rationing at the major markets that permitted an adherence to the physical distancing contributed to food availability challenges. The COVID-19 protocols however did not have dire consequences.

In another interview in a typical production center, a farmer indicated that,

“I observed a sudden demand for rice in Accra and Kumasi and we were able to supply to these two major cities, I will say that, COVID-19 was a blessing in disguise because this allowed me to sell most of my local rice and I still had some stored for my household consumption” (Male rice Farmer/North/ March 2020).

On the whole, rice remained available<sup>5,6</sup> during and after the lockdown imposition in Ghana. A situation that contradicted popular predictions ([Arouna et al., 2020](#); [Erokhin & Gao, 2020](#); [Esiobu, 2020](#); [Willy et al., 2020](#)) of unavailability of staples. [Middendorf et al. \(2021\)](#) however showed that in Senegal, about 83% of individuals perceived difficulty in food availability in the context of COVID-19.

[Table 3](#) below shows a considerable reduction in export volumes for rice during the inception of the COVID-19. This decline however picked up and domestic production matched up to avert rice shortages. This was due to the pre-COVID-19 era where there was general advocacy for local consumption of rice. [Ansah, Lambongang, and Donkoh \(2020\)](#) showed that since 2017 when Ghana embarked on an agricultural sector improvement policy dubbed Planting for Food and Jobs (PFJ), positive benefits accrued in many respects. Conspicuously, it helped to improve the productive base for some targeted crops (grains and legumes) through subsidized inputs and technology transfer. Indeed ([Pauw, Rosenbach, and Thurlow 2018](#); [Tanko et al., 2019](#)) proved the immense contribution of PFJ to farmers' livelihood outcomes. [Devereux et al. \(2020\)](#) asserted that global food systems at the macro-level were not plagued by dramatic food unavailability as of July 2020.

## 5.2. Access

During the initial restrictions (lockdown period), there was a general rush by residents in Accra and Kumasi to purchase rice to stockpile amidst fear of limited supply. City dwellers stocked-piled production for the lean season, consequently escalating prices. [Middendorf et al. \(2021\)](#) indicated that 74% of individuals perceived price increases during the lockdown. Two weeks into the lockdown, farm gate prices of rice moved from GH' 180/200 to GH' 220/230 Cedis, for a 50 kg milled rice depending on quality. [Table 3](#) below shows the price trends in major markets in Ghana for local and imported rice. In Accra, the table shows that prices of local rice increased (GHS 424) from November but declined in December. Prices increased again in March (GH' 400), April (GH' 419) and stabilized from May. The increase in March was due to the first reported case of COVID-19 and the subsequent imposition of restriction in containment efforts. In Kumasi however, we observed that prices of local rice were generally lower (GH' 284) in comparison to

<sup>5</sup> The conclusion about rice availability is made against a background that before the COVID-19 pandemic there was a general public outcry about the low patronage of local rice. This led to civil society and the media particularly Citifm leading advocacy and campaign for local rice consumption. This had a kind reception from rice consumers.

<sup>6</sup> The custom value represents the total value of items in a shipment indicative of how much import or export duty to be paid.

Accra. Prices however started increasing from March (GH' 350) and stabilized (GH' 280) in May. [MoFA \(2020\)](#) confirmed increases in prices in some markets. [Agyei et al. \(2021\)](#) confirmed price increases in SSA for both imported and local rice.

For imported rice, the table shows that in Accra prices started increasing (GH' 375) from June. Prices of imported rice in Kumasi were more expensive than in Accra. For instance, a 50 kg imported bag of rice was sold on average for GH' 400 in Kumasi relative to GH' 350 in Accra. Prices of imported rice started increasing in Kumasi from June (GH' 480) but became stable afterward. As explained earlier, price increases during the inception of COVID-19 in Ghana escalated during the period of the 2-weeks imposition of a partial lockdown in the two major cities (Accra and Kumasi). The [World Bank \(2020\)](#) indicated that food prices globally showed marginal price changes because of the bumper harvest in Brazil - a major supplier. [Erokhin and Gao \(2020\)](#) however, showed low access to food in Guinea, Sierra Leone, Mozambique, Ethiopia and Burkina Faso.

The increases in prices during the COVID-19 period had a direct effect on effective demand for most urban dwellers. In an interview with a consumer in Accra, she indicated that:

“I have had to quickly visit the market to purchase food items and store, the number of things that I wanted to purchase were completely cut down due to the increase in prices of the food commodities during the period of COVID-19. I called my husband to inform him if he could send mobile money, but he indicated that he did not have any additional money” (KII/Female/Accra/March/2020).

Another Key informant in the Volta Region indicated that:

“I had several complaints about the rise in food prices in Accra from my relatives due to the imposition of the lockdown” (KII/Male/Volta Region/March/2020).

In a focus group discussion in the Northern Region, participants indicated that:

“Our relatives who live in Accra and Kumasi called to inform us of the sudden rise in food products. Some wanted to re-locate to the north but the lockdown prevented them” (FGD/Northern Region/March/2020).

This assertion was widely reported in most interviews conducted with actors. [Naeem \(2020\)](#) indicated that uncertainties, product unavailability, lead to stockpiling of food items. Additionally, the author indicated that social media platforms heightened individual fears in panic-buying during COVID-19. This fuelled heightened negative perceptions. For instance, [Middendorf et al. \(2021\)](#) showed that about 83% raised concerns about disrupted access to food on regular basis in Senegal.

In terms of effective demand, this affected quantities of rice that individuals purchased relative to income. It further stretched household expenditures on unplanned purchases. The COVID-19 lockdown imposition restricted physical access to markets even though the government granted an exemption. There were market closures and relocations to open spaces in conformity to social distancing and fumigation exercises. Despite the consideration given to the agricultural sector as essential, [Adhikari et al. \(2021\)](#) indicated disruptions to agricultural production supply chains and agribusinesses. [Agyei et al. \(2021\)](#) indicated the restrictions in movement resulted in price hikes in SSA. During the lockdown, there were joint police and military operations enforcing strict adherence. Police and military presence at vantage places however instilled fear and limited access to physical markets. These restrictions did not however lead to the unavailability of food items. The food items were available but came with price increases. The situation marginally threatened physical access in compromising food security.

We conclude that COVID-19 affected physical access to food and few

**Table 3**  
Exports and Imports during the onset of COVID-19.

Rice	Year - 2020				
	January	February	March	April	May
Exports					
Custom Value <sup>6</sup> (GH <sup>1</sup> )	6662.35	2689.72	2106.54	10,689.49	3913.86
Net Weight <sup>7</sup> (KG)	8612.79	11,030.00	4598.50	11,300.00	1322.00
Imports					
Custom Value (GH <sup>1</sup> )	194,303,948.56	236,935,704.89	148,943,597.33	117,872,872.99	110,696,429.60
Net Weight (KG)	114,487,032.78	145,367,411.04	90,200,862.30	78,360,522.63	66,612,695.13

Source: PPRSD, 2020.

households that lacked the effective demand to stock-pile were particularly limited.

### 5.3. Utilization

Food processing into consumable forms changed slightly during the imposition of restriction. Most households had to purchase gari<sup>7,8</sup> - a food ingredient not commonly eaten by households but readily associated with students and the less economically empowered group. The lockdown period saw a surge in the purchase of gari and also the preparation of uncommon food staples over the period. This represented a dietary change strategy<sup>9</sup> common to what was reported by Maxwell et al. (1999) in a study in Ghana. Indeed, the dietary change strategy was reported by most households in Accra and Kumasi but less reported in other parts of the country. The dietary change strategy was reported by Drysdale et al. (2019) as a coping strategy in their study in South Africa where households purchased less preferred foods. The dietary change strategy was short-lived for most households as this remained a strategy to manage the 2-week lockdown period and future uncertainties relating to COVID-19. Oyetoro et al. (2020) confirmed challenges relating to food utilization in Nigeria during COVID-19. The repercussion included panic buying which diverted household expenditures to food items to the detriment of non-food expenditures. This however benefited actors on the supply side but this was not evenly spread across the supply chain actors. Urban supply chain actors benefited most during the lockdown period because they quickly made purchases from the rural parts and given the surge in demand in the two major cities, prices were increased disproportionately relative to the producers. In an interview with a respondent in Accra, he indicated that:

“Typically, I do not remember when I last consumed gari but during the imposition of the lockdown, I had no option than to patronize gari. Surprisingly, the prices of gari shot up astronomically during the lockdown and even though I am not a favourite of gari, I had to rush to get one” (Male farmer/Greater Accra/March/2020).

In a focus group with respondents in Upper East, they indicated that:

“We have reliably been informed that poor households in Accra purchased and consumed a lot of gari during the imposition of the lockdown. We hitherto taught that gari was solely for students. We have learnt that gari can prove very useful in pandemics” (FGD/Upper West Region/April/2020).

For poor households, the quantity of food consumed was cut down to stay afloat. In an interview with a market queen in Accra, she indicated that:

“Even for me who sold foodstuffs, because of the market rationing, my husband and I had to cut down on our food intake because of the

uncertainty that came with the lockdown. We sacrificed so that our children could have their normal food intake. No one knew when we were going to see a lift of the lockdown” (KII/Female/Greater Accra Region/March/2020).

This phenomenon above was however not widespread in all the study areas but however indicative of stress in coping with a detrimental effect of COVID-19. Even for wealthier households, food consumption was exercised with caution in ensuring the replacement of depleted stock it over time.

A wealthy key informant based in Kumasi, indicated that:

“Despite people considering me to be rich, I had to cut down on my household food intake. I had more mouths to feed during the COVID-19 period. So I did this out of caution” (KII/Female/Ashanti Region/March/2020).

Most respondents reported purchasing rice and storing it during the lockdown period and even post lockdown. We conclude that given the cases of dietary change and reduction in the food consumed by households, COVID-19 inflicted changes to food utilization but not to an alarming level.

### 5.4. Stability

Food stability was affected temporarily in terms of access (effective demand) due to restrictions. Supermarkets were opened but patronage was affected during the period of lockdown in the two cities. This was short-lived due to stockpiling by most households. The government intervened in providing cooked meals for urban poor dwellers in cities throughout the period of lockdown. Rice was stable over the period of lockdown and post lockdown. A key informant in Accra reported that:

“I visited ShopRite in Accra and was able to purchase the foreign rice that I am used to. I made additional purchases for needy friends and families but I never experienced shortages” (KII female/Greater Accra/March/2020).

Another Key informant indicated that:

“I personally purchased a lot of rice and donated to vulnerable and poor households in my community but I never came across a situation where retail outlets ran out of stock” (KII Male/Greater Accra/April/2020).

The situation in Kumasi was not different as a key informant indicated that:

“During the COVID-19 period, I really did not care about whether it was local or foreign rice, I just needed food to survive on and prevent any incidence of food shortage so I purchased whatever rice was available. I can confidently say that rice was always available at the retail outlets” (KII Male/Ashanti Region/April/2020).

The lockdown affected food supply chains beyond the two cities. This was because the food available at the supply side, recorded an upsurge during the onset of the lockdown, but suddenly stagnated during and after the lockdown. This was because few distributors supplied foodstuff

<sup>7</sup> The net weight is the total weight of the rice bags imported or exported without the addition of the weight of the container.

<sup>8</sup> Gari is a coarse granular flour processed from cassava.

<sup>9</sup> A Dietary change strategy is the change of diet with cheaper foods relative to the money available.

in strict adherence to the COVID-19 protocols based on fear, caution and uncertainties. The efficiency of the distributing supply channels remained questionable. This was because it remained largely in the hands of the private informal sector actors. Adhikari et al. (2021) indicated the use of 'agriculture ambulance' to convey and market agricultural products in Nepal during COVID-19, stressing the importance attached to the agricultural sector. Philanthropic activities were picked up as a means of supporting the needy by faith-based organizations and rice remained highly patronized, stocks available were able to meet supply. Even though Ghana is ironically import-dependent on rice. This, therefore, mitigated the adverse negative effects of rice stability through an initial increased, erratic but continual patronage. Export restrictions on rice in countries of origin contributed to price differentials (increase). Indeed, Table 4 shows a decline in net imports of rice in April and May indicating the direct restrictive effects of rice exports from countries of origin. This helped to increase patronage in local rice consumption during the onset and peak of the COVID-19. The FAO (2020) report confirmed that the price differentials in some contexts disrupted food system stability. The general rise in demand for staples – rice unequally affected other food items leading to food wastage. This was because the lockdown was accompanied by the closures of the hospitality industries and schools which curtailed regular supply. Indeed, Sharma et al. (2020) confirmed a decline in some types of food items. Here again, we conclude that price, supply stability was compromised during and immediately after the lockdown period. We infer disruptions in household food stability but not to an alarming proportion.

## 5.5. Food systems

### 5.5.1. Production

We first examined the food system from the production perspective. We observed that there were initial disruptions to production in terms of input distribution during the lockdown. The government however counteracted the situation through special exemptions for the distribution of agri-inputs. Most agri-inputs had already been imported from the countries of origin, thereby limiting price hikes and unavailability of agri-inputs. Adhikari et al. (2021) indicated a disruption to agricultural inputs in Nepal. Generally, agricultural labourers were readily available at most production sites because major food baskets in Ghana had no imposition of restrictions. On the contrary, Dev (2020) showed that the non-availability of migrant labourers in northwest India led to disruptions in wheat and pulse harvest. Adhikari et al. (2021) indicated disruptions to agricultural labour in Nepal. Le Nestour, Mbaye, Sandefur, and Moscoviz (2020) provided a counter-argument indicating a positive effect of COVID-19. Their paper argued that the lockdown imposition in the cities plausibly led to labour out-migration to rural areas, which facilitated increased production and productivity. Balde, Boly, and Avenyo (2020) indicated that COVID-19 significantly affected the labor market in SSA, including in Senegal and Burkina Faso. The initial 2-week lockdown delayed production in some parts of the country. In an interview with a farmer, he indicated that:

“Planting delayed for about two weeks. For example, labourers moved in from Kwame Danso and adjoining communities to Ejura - Ashanti Region to offer labour services but the lockdown restricted this. This phenomenon however had no huge impact on production” (Male farmer/Ejura/Ashanti Region/March/2020).

Farmers generally reported that COVID-19 impact on rice production remained negligible even though some disruptions were recorded. In this regard, a female rice farmer indicated that:

“My financier who funds my rice production lost his job in Accra due to COVID-19, he was therefore unable to support my input purchases, I had to fall on relatives and network of friends. It was tough but I managed to secure money to make the input purchase” (Female farmer/ Volta/April/2020).

The assertion above was however not widespread in our study. We however note, that minimal disruptions occurred in the production chain but this did not radically change the structure of the rice value chain. Given the high dependence on agrochemicals imports (HLPE, 2019), indicated that agroecology is a useful strategy to minimize the intensive use of agrochemicals by taking advantage of ecological interactions on-farm to increase crop yields. Altieri and Nicholls (2020) argued that agroecology constitutes an effective response to COVID-19, given import restrictions and border closures that limit agro-input supply. Pu and Zhong (2020) showed shortages of essential inputs among vegetable farmers in Ethiopia, bringing into perspective the need to embrace agroecology as a useful strategy for dealing with impositions that accompanies pandemics.

We observed the development of improved seeds. In the Afife area, for instance, an initial breed-Togo Marshall – lost its vigour and productivity over time. This variety has been overtaken by three new varieties developed by local research institutions. These varieties include Legon 1, AGRA and Jasmine 85. Farmers grow more of the AGRA and Legon 1. COVID-19 did not affect on-farm production substantially contrary to the assertion by Kathiresan et al. (2020) that predicted COVID-19 substantial effect on labour availability, seed production, production activities and the delivery of farm inputs in Africa. Consequently, the authors predicted a reduction in rice area under cultivation and profitability. Ghana witnessed a decreased in output for 2019–2020 (Fig. 2) but pre-COVID-19 advocacies about the need to embrace local rice consumption improved production stocks. Thus farmers could produce and rather had challenges with demand (market). In terms of production, extension visits were affected due to the ban on public gatherings (not more than 25 people meeting) but as suggested by Kwapong et al. (2020) peer-to-peer extension remains effective. Hence, peer-to-peer extension remained the main means that farmers employed to sustain their agronomic needs and challenges that confronted the sector. Adhikari et al. (2021) showed disruptions in extension services in Nepal.

There is potential for Ghana to meet her local rice demand. One regional agricultural M&E specialist suggested that initial assessments of his region (Northern Region) signal that with the right infrastructure and investments, local production in that region alone could wean Ghana off imports completely or significantly reduce it (Table 4 presents an overview of the rice imports). In his opinion, the threats of COVID-19 present an opportunity for dialogue and reconsideration of Ghana's rice production and processing. Also in the Volta Region, a region M& E officer indicated:

“The COVID-19 gave an indication that it is about time that we looked in-ward and put in place the right incentives to boost rice production to feed the nation with stocks that can last for several years with a mind of anticipating a future pandemic. I strongly believe that we have what it takes and this is the time to pull the lever purchase” (M&E Officer/ Volta Region/April/2020).

Access to land for rice production appears to be gendered and discriminates against women. Such differential access needs to be fully addressed to harness Ghana's rice production potentials. Indeed, Ankrah, Freeman, and Afful (2020) indicated differential access to land for agricultural production in southern Ghana. The good development here is that in the last two to three years, rice production in the Northern Region increased significantly. In other regions, more farmers registered with their district agricultural directorates to grow and process rice locally. Probably, the challenge of COVID-19 could pull the lever to raise Ghana's commitment to cultivate rice and feed itself to another level. The areas to watch as we attempt to move things forward include the supply of good quality seeds and on time; supporting farmers with access to machinery and ultimately constructing modern processing infrastructure.

**Table 4**  
Rice prices in major markets in Ghana.

Month/ Year	Food Crop	Unit	Weight (KG)	Accra	Wholesale Prices (GH' )							Average	
					Bawku	Dambai	Kumasi	Takoradi	Tamale	Tachiman	This Month	Last Month	% Change
Sep-19	Rice (Imported)	Bag	50	350	N/A	360	350	320	N/A	373.5	350.7	352.2	-0.43
	Rice (Local - White)	Bag	50	200	157.5	200	145	171	130	131.75	162.18	163.415	-0.38
Oct-19	Rice (Imported)	Bag	50	350	N/A	360	350	318	N/A	392	354	350.7	0.94
	Rice (Local - White)	Bag	50	200	157.5	220	145	168.5	123	142	165.145	162.18	0.915
Nov-19	Rice (Imported)	Bag	50	350	N/A	360	366	322	N/A	400	359.6	354	1.58
	Rice (Local - White)	Bag	50	212	147	220	142	170.5	120	137	164.07	165.145	-0.325
Dec-19	Rice (Imported)	Bag	50	350	N/A	360	400	334	N/A	400	368.8	359.6	2.56
	Rice (Local - White)	Bag	50	203	137.5	220	135	170.5	116	138.5	160.07	164.07	-1.22
Jan-20	Rice (Imported)	Bag	50	350	N/A	360	400	325	N/A	394	365.8	368.8	-0.81
	Rice (Local - White)	Bag	50	181	171.5	200	135	162.5	114.5	144	158.355	160.07	-0.535
Feb-20	Rice (Imported)	Bag	50	350	N/A	360	400	320	N/A	393	364.6	365.8	-0.33
	Rice (Local - White)	Bag	50	176.5	195	206.5	135	160	116.5	148	162.5	158.355	1.31
Mar-20	Rice (Imported)	Bag	50	350	N/A	360	400	320	N/A	399	365.8	364.6	0.33
	Rice (Local - White)	Bag	50	200	176.5	200	140	160	126	152	164.93	162.5	0.745
Apr-20	Rice (Imported)	Bag	50	350	N/A	180	400	320	N/A	400	366	365.8	0.05
	Rice (Local - White)	Bag	50	209.5	175	220	157.5	170	130	150	173.145	164.93	2.49
May-20	Rice (Imported)	Bag	50	350	N/A	360	400	320	N/A	408	367.6	366	0.44
	Rice (Local - White)	Bag	50	197.5	175	220	175	167.5	123	149	172.43	173.145	-0.205
Jun-20	Rice (Imported)	Bag	50	375	N/A	360	480	322	N/A	483	404	367.6	9.9
	Rice (Local - White)	Bag	50	186.5	175	220	175	157	120	143.5	168.145	172.43	-1.245
Jul-20	Rice (Imported)	Bag	50	375	N/A	360	480	322	N/A	490	405.4	404	0.35
	Rice (Local - White)	Bag	50	184	195	220	175	150	132.5	155.5	173.145	168.145	1.485
Aug-20	Rice (Imported)	Bag	50	380	N/A	360	480	340	N/A	480	408	405.4	0.64
	Rice (Local - White)	Bag	50	181.5	209	230	175	150	160	167	181.785	173.145	2.495

Source: Esoko, 2020

### 5.5.2. Processing

Most farmers mill their rice before selling it to middlemen or aggregators. This has been the practice to secure good value. The findings showed that most processing centers outside Accra and Kumasi operated as usual. In some instances, erratic rainfall prevented farmers from harvesting the volumes that they typically harvest and this affected the volumes that were processed. A farmer interviewed in Peki indicated that:

“In our area, the start of our planting is tied to the onset of rains, in 2020 however we had an erratic rainfall which adversely affected the rice that we used to harvest, consequently the volumes of paddy rice sent for processing declined. To me, this was a major issue and not COVID-19” (KII/Male Rice Farmers/Peki/May/2020).

A processor who doubled as a farmer in Upper East Region indicated that:

“During the COVID-19, I observed a reduction in the volumes of rice that I typically processed. Labourers to undertake activities related to carrying the processed rice were affected during the lockdown even though the lockdown was not imposed in our region. Fear restricted individuals from transacting business as usual.” (KII/Male Rice Farmer/Upper East/March/2020).

Another farmer who is a processor in the Northern Region indicated that:

“During the COVID-19, I rather had high volumes of rice to process during the lockdown period. This however reverted to the normal

trend shortly after the lift of the lockdown” (KII/Male Rice Farmer/Processor/Northern Region/April/2020).

Workers who operated mills observed the necessary COVID-19 protocols. The infection rate at most processing centers outside the two cities was low, our finding did not show absenteeism/shut down and illness of processors due to COVID-19. This is contrary to a finding by [Haley et al. \(2020\)](#) that showed temporal closures of food processing facilities and limited mobility of migrant workers who worked at processing sites. [FAO, 2020](#) also showed that social distancing measures led to labour shortages, reduced efficiency and temporal closures of meat processing plants. [Aday and Seckin Aday \(2020\)](#) also indicated labour shortages that disrupted the processing of labour-intensive food crops. In contrast, most of the processing sites where interviews were conducted did not rely on migrant labourers. In some instances, family labour was used in operating processing machines. Indeed, [Arouna et al. \(2020\)](#) indicated that COVID-19 did not alter traditional and upgraded mills processing activities in their study on west Africa. Rice processing was disrupted by COVID-19 but appeared marginal. Rather farmers and major rice actors resonated more with the disruption caused by climate changed relative to COVID-19. We conclude that there was insufficient evidence to summarize that COVID-19 affected rice processing, the effect was made manifest through an indirect route of low yields emanating from climate variability.

### 5.5.3. Finance

Smallholder farmers' low access to capital from banks and micro-financial institutions has received extensive discussion in the literature

(Ali & Nadège Essossolim, 2019; Arouna et al., 2020). Rice farmers are constrained by the limited access to capital which was exacerbated by COVID-19. Interest rates remained high and unsustainable. Farmers interviewed indicated widely the reluctance of financial institutions in approving loan disbursement to farmers. Farmers savings and dependence on family relatives and social networks remain the sole reliable source of capital at the onset of COVID-19.

“As a farmer, I remain reluctant to apply for a loan from a bank or financial institution because the interest rates are high but most farmers do not sit to calculate the interest rate and the profit they make. I believe that if you take a bank loan, it is very certain that you will not make any substantial profit. Ironically, in the initial period of COVID-19, when farmers needed loans most, the banks were unwilling to disburse loans” (KII/Female/Ashanti Region/March/2020).

The lockdown marginally stretched family income, reduced amounts of money that relatives in the two major cities were able to remit due to panic buying and stockpiling. (Please see results –Female farmer/Volta/April.2020 under the section production). We observed that these effects were not widely reported in the study areas. Additionally, the lockdown was not prolonged. This notwithstanding, few relatives lost their jobs (for instance school teachers, the staff of hotels, etc.) with direct implications on farm households that were dependent on them. However, for families that suffered the negative effects, one cannot describe the situation to be marginal since such period involved coping strategies in the medium term which included a reduction in the food consumed and quality of food eaten (See Section on utilization).

Given the uncertainties surrounding the COVID-19, financial institutions took on a “wait and see posture” to clear the future uncertainties associated with the virus. This stagnated financial disbursement to farmers in further worsening their already low access to credit. Some micro-financial institutions were much more concerned about their financial viability. In few instances, austerity measures of laying off workers temporarily were observed. In an interview with a bank officer, it was reported that:

“In fact, as a bank, we even downsized our staff strength and because of the uncertainties associated with COVID-19, we were hesitant to disburse loans to farmers, Already, remember that farming is a high-risk investment and the uncertainties that accompanied COVID-19 made it worse. No one is sure when economies will return to normalcy” (KII/Male/Accra/March/2020).

Ironically, the COVID-19 era represented a period where farmers urgently needed loans and financial assistance but lacked it. Arouna et al. (2020) rightly predicted the reluctance of financial institutions to disburse loans to eligible farmers in the period of COVID-19.

#### 5.5.4. Storage

The study found significant deficits in terms of warehousing space for mobbing up grain surpluses and storage for lean seasons<sup>10</sup>. The government lacks the needed capital to make the required investments in appropriate storage and distribution infrastructure in the short to medium term. There has been a new drive within the last couple of years to expand and formalize the buffer stock system that provides a platform for managing food stocks (especially grains and legumes – maize, rice) efficiently even before the COVID-19 era. The inadequate storage infrastructure questions Ghana’s preparedness for emergencies and pandemics that are prolonged. This exposes the country’s potential vulnerability to food availability, access and stability. However, given the short imposition of the lockdown and mobility restrictions, the

impact of the inadequate infrastructure appeared marginal. This notwithstanding, more investment needs to be channelled to build the necessary warehouses nationwide. Llanto (2012) argued that infrastructural development improves agricultural productivity by inducing agricultural growth, particularly in rural communities. Additionally, the presence of adequate warehouse infrastructure can be leveraged upon in what Jitendra et al. (2017) advocated to be food banks.<sup>11</sup> Although the buffer stock system primarily supplies food to secondary schools and other school feeding programmes, school closure changed the original arrangement. Rather, stocks from the buffer were channelled to serve local communities. In May 2020, the Ghana Education Service (GES) in collaboration with the National Food Buffer Stock Company (NAFCO)<sup>12</sup> aggregated unused food stocks from various secondary schools and delivered them to the Ghana Prisons Service to feed vulnerable inmates. The secondary schools infrastructure’s does not have the capacity of storing enough grains to serve the country, this re-direction of unused food to communities appeared to be a stop-gap measure. More so, the storage facilities in the secondary schools are not dedicated to storing grains over an extended period in serving communities in emergencies.

#### 5.5.5. Distribution

The findings showed inefficiency in distribution and supply chain systems particularly heightened during the COVID-19 pandemic. This is because most distribution channels rely on informal sources and personal arrangements which remain largely inefficient. Private transport constitutes the main distribution channel that conveys both passengers and food commodities. This implies differences in standards and conditions of vehicles based on the car owner’s financial ability and maintenance behaviour. During the lockdown period, drivers were initially hesitant to transport rice to their usual destinations due to the fear of contracting COVID-19 and also lockdown imposition in Accra and Kumasi. This did not however significantly affect supply as most wholesalers already had enough stock to supply during the 2-week lockdown. This period saw marginal price hikes in rice. Even though there were marginal increases in prices, it inflicted temporal food unavailability or substitution of gari for rice in the case of the poor urban dwellers. The findings showed that some informal workers lost their jobs, others were temporarily kept at home because of the lockdown. Few households had to borrow food from friends and relatives. The government was however benevolent enough to supply cooked meals to the very poor city dwellers. Churches and other faith-based organizations also augmented distribution channels by providing means of supplying cereals (rice and maize) to poor households. Arouna et al. (2020) indicated that prolonged lockdown imposition could cause rises in price due to disruptions in distribution channels. Their study confirmed continual increases in rice prices on the global market since the COVID-19 pandemic. In the case of Ghana, the long down was not prolonged hence the price hike was temporal and limited in Accra and Kumasi. Overall, this situation did not appear dire but posed a challenge that surpassed just an inconvenience (middle ground) Galanakis (2020) underscored the need for diversity in food supply chains to sustainably address challenges confronting the sector. Udmale et al. (2020) indicated that COVID-19 has indeed caused major disruptions to supply chains in the global economy. Esiobu (2020) confirmed disruptions of the rice value chain in Nigeria.

#### 5.5.6. Marketing

The marketing of local rice has witnessed longstanding challenges in Ghana. The COVID-19 pandemic presented opportunities for the local

<sup>10</sup> Despite a drive to promote at least a warehouse per district, only 7 out of the 80 warehouses earmarked under the government’s flagship programme of one-district one-warehouse have been delivered to the Ministry of Agriculture.

<sup>11</sup> Food banks constitute a response to hunger through the collection of food which would have otherwise gone wasted and distributing them to community agencies and vulnerable individuals.

<sup>12</sup> NAFCO currently has a storage capacity of 3500 mt and with potential for expansion.

rice market, hence consumption. This was against the backdrop of the rise in philanthropic activities where rice remained the main cereal donated to poor urban dwellers. We observed however that the rice value chain was plagued with inefficiencies that favour and discriminate against some actors in the chain. During the lockdown, Accra and Kumasi particularly recorded a surge in rice purchases due to panic buying. The post lockdown period witnessed a reverse to the normal situation. Smallholder farmers and Farmer Based Organizations (FBOs) had limited bargaining power in pricing, hence they did not maximize benefits in comparison to other actors. Thus the middlemen, wholesalers, retailers and market women benefited immensely from the final wholesale and retail pricing of rice. The period of lock-down indeed saw traders making the most profit out of rice sales. Indirect benefits accrued to farmers through increased quantities purchased within the short period. In an interview, with an FBO, members indicated that:

“We had a rise in demand for our products, during the lockdown civil society organizations, government, churches and individuals out of philanthropic initiatives patronized our local rice. In all this, middle men and traders, particularly in Accra and Kumasi, benefited the most” (FGD/Volta Region/March/2020).

The perceived quality of local rice has been a major concern that has limited its consumption and acceptance. Kathiresan et al. (2020) underscored that it is important to address quality concerns, improve regulatory structures, engage the private sector to invest more into producers and traders in a more organized way to allow value addition.

Another disruption in marketing was observed in the rationing of the market. Major markets in Accra, Kumasi and most parts of the country had temporal market closures and relocations of markets temporarily to school fields and open spaces. The market closure and disruption were not surprising because Middendorf et al. (2021) indicated that about 80% of individuals in Senegal perceived market closure and disruptions to market. This affected sales marginally because regular customers were lost due to the relocation. Overall, this situation was not grave because there was an increased demand for rice which presented a good market share for rice than in the pre-COVID-19 era.

## 6. Conclusion

We conclude that COVID-19 appeared disruptive and affected production, processing, distribution, storage, financing, marketing and supply channels in Ghana particularly during the imposition of the temporal lockdown in Accra, and Kumasi. Using Ghana as a case study, we argue that COVID-19 inflicted disruptions to the agri-food system with regard to the rice value chain. Two cities – Accra and Kumasi were severely affected by the COVID-19. This manifested through the reduction in the food consumed by poor households, dietary changes, labour out-migration, and rises in food expenditures particularly during the lockdown. In revisiting the study’s research question of COVID-19 brought about in the global south? The study concludes that the situation could best be described as a ‘middle ground’ effect where the disruptions incurred moved beyond mere inconvenience but also not famine. The findings further showed stable food supply was thwarted by price hikes during the lockdown that affected access (effective demand). Food prices however maintained stability after the lockdown. Some lapses and weaknesses were discovered in Ghana’s rice agri-food system supply chain coupled with inadequate infrastructure for grain storage. Ghana’s rice production, availability and access were generally stable during the initial period of COVID-19 (March–May 2020). We concur with Devereux et al. (2020) that the use of the food security and food system as a conceptual and theoretical framework is useful in understanding agri-food systems. This has proven to be useful in understanding Ghana’s rice sector, thus should be used radically in gaining a better understanding of the effects of COVID-19 on agri-food systems particularly in the global south beyond the initial scope of this study.

Important policy actions are needed to consolidate particular gains made in Ghana’s planting for food and jobs to minimize rice imports. This should be accompanied by the right investments in storage facilities to store more grains for future pandemics. In this light, the one-district, one-warehouse policy should be given the needed attention and financial commitment from state and non-state actors.

## Declaration of interests

The authors declare that we have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

## 7. Limitation of study

We indicate that this study was conducted from the first week of March to the third week in April 2020. The reference period does not go beyond June – 2020. We understand that some of the issues investigated initially might have changed over time. The findings in this study present the situation during the lockdown and the initial pre-lockdown period.

## CRediT authorship contribution statement

**Daniel Adu Ankrah:** Conceptualization, Methodology, Validation, Software, Writing – original draft, review & editing, Supervision, Visualization. **Andrew Agyei-Holmes:** Conceptualization, Methodology, Validation, Data collection, Formal analysis, Writing – original draft, Supervision. **Alfred Asuming Boakyee:** Conceptualization, Methodology, Validation, Software, Writing – review & editing, Visualization.

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