
The Threats of Covid-19 Pandemic to Agribusiness in Nigeria

BY

ETIM, Grace Johnson
Department of Agricultural Education,
Akwa Ibom State College of Education,
Afaha Nsit

&

IBANGA, OsongonoAbasi Okon
Department of Agricultural Economics and Extension,
Akwa Ibom State University, Obio Akpa

ABSTRACT

The study sought to measure the threats of the COVID-19 crisis, with particular focus on its effects on agribusinesses, and ways of mitigating these effects. The study adopted Expost-facto research design. The population of the study consisted of all farmers (such as manufacturers of agricultural products, retailers and distributors of agro-based products) in Nigeria. Simple random sampling technique was used to select 45 respondents which constituted the sample size. The instrument used for data collection was an interview schedule titled "THREATS OF COVID-19 PANDEMIC TO AGRIBUSINESS QUESTIONNAIRE" (TCPAUAQ). The instrument so developed was made to pass through face and content validation by experts. Instrument reliability was tested using Cronbach reliability test at 0.86 coefficient. The data obtained was analyzed using the descriptive statistics for the research questions and simple regression for hypothesis. The result tested for significance at 0.05 alpha level. The study concluded that as restrictions tightens because of COVID-19, transportation capacity may not be adequate to provide just-in-time deliveries to animal feeding operations, food processing and manufacturing plants, distribution facilities, export facilities and retail outlets, and also, there is significant effect of COVID-19 on the operation of agribusinesses in Nigeria. It was therefore recommended that road access should be granted to agribusiness migrant workers, who continues to ensure food availability in the State. In addition, agribusinesses workers need cash income support, the government should provide financial support sufficient for their operation and survival during the lockdown period.

KEY WORDS: Threats, Covid-19, Pandemic, Agribusiness, Food Security, Supply chain.

INTRODUCTION

According to the WHO (2003), both lives and livelihoods are at risk from the COVID-19 pandemic. The disease is spreading quickly. It is no longer a regional issue—it is a global problem calling for a global response. We know that it will eventually retreat, but we don't know how fast this will happen. We also know that this shock is somewhat unusual as it affects significant elements of both food supply and demand in ways such as: (a) Supply will be

disrupted due to the disease's impact on people's lives and well-being, also the containment efforts that restrict mobility and the higher costs of doing business due to restricted supply chains and a tightening of credit; and (b) Demand will also fall due to higher uncertainty, increased precautionary behavior, containment efforts, and rising financial costs that reduce people's ability to spend. With its impact on all areas of human endeavors, a global health crisis has now become global economic crisis. As food is the mainstay of any nation it has now become imperative to look into the impact of the virus on food supply system and especially on smallholder farmers. According to Del Rio (2020), while working to feed the world, many agricultural workers are unable to lift themselves out of poverty and food insecurity with regards to the effects of the virus. As the pandemic spreads, the continued functioning of food supply chains is crucial in preventing a food crisis and reducing the negative impact on the global economy. Coordinated policy responses are needed to support agribusiness and the livelihoods and working conditions of millions of agricultural workers in line with relevant international labor standards. The pandemic is impacting global food systems, disrupting regional agricultural value chains, and posing risks to household food security.

Statement of the Problem

On daily basis, new cases of coronavirus (COVID-19) emerge around the world. People are being affected by the rate at which the virus spreads, they are being quarantined in hospitals, and the movement of labor and vital supplies has been significantly distorted. Nigeria response to the spread of COVID-19 has included reintroducing border controls and limiting the free movement of people within their national territories in a bid to slow down the spread of the infection. While these measures have affected some products more strongly than others, they have also disrupted the functioning of the entire agricultural sector, including agribusinesses. The study therefore focuses on the threats of COVID-19 pandemic to agribusiness in Nigeria, with particular focus on ways of mitigating these effects.

Purpose of the Study

The main purpose of the study was to assess the threats of covid-19 on agribusinesses in Nigeria. Specifically, the study sought:

1. To determine the extent of COVID-19 in Nigeria.
2. To examine the nature of threats of COVID-19 on agribusinesses.
3. To find out the mitigation strategies against COVID-19 impacts on agribusinesses in Nigeria.

Research Questions

1. What is the extent of COVID-19 in Nigeria?
2. What is the nature of threats of COVID -19 on agribusinesses?
3. What are out the mitigation strategies against COVID-19 impacts on agribusinesses in Nigeria?

Hypotheses

H₀₁: There is no significant effect of COVID-19 on the operation of agribusinesses in Nigeria.

Concept of Coronavirus

Coronaviruses are globally distributed and are found in humans, other mammals and birds. They are enveloped RNA viruses classified in alpha, beta and gamma genera. Up to one third of mild upper respiratory tract infections in adults are caused by human coronaviruses. The zoonotic severe acute respiratory syndrome (SARS) beta-coronavirus (SARS-CoV) caused the SARS outbreak in 2003 when over 900 people died. Human coronaviruses are transmitted through direct contact with secretions and via aerosol droplets. Infected patients also excrete virus in faeces and urine and under certain circumstances, airborne transmission can occur from aerosolised respiratory secretions and faecal material. Coronaviruses cause a variety of diseases in animals including gastroenteritis, respiratory tract, and central nervous system disease, but in humans the coronaviruses (CoV) are proven to be associated with respiratory tract illnesses only. According to Akerstrom, Tan, and Mirazimi (2006), the most aggressive human coronavirus is SARS-CoV which causes Severe Acute Respiratory Syndrome (SARS), an often-fatal lung disease in humans. SARS-CoV probably originated from a wild animal reservoir, most likely bats, and was transmitted initially to humans via infected civet cats. Having caused about 8000 illnesses and at least 800 deaths in 2003, SARS clearly demonstrated the potential for a novel coronavirus to jump the species barrier to humans and cause high morbidity and mortality. Fortunately, the epidemic was controlled by a highly effective global response that employed traditional public health measures of case isolation, contact tracing, and selective quarantine. In general, coronaviruses are very stable in a frozen state according to studies of other coronaviruses, which have shown survival for up to two years at -20°C . Studies conducted on SARS-CoV and MERS-CoV indicate that these viruses can persist on different surfaces for up to a few days depending on a combination of parameters such as temperature, humidity and light. For example, at refrigeration temperature (4°C), MERS-CoV can remain viable for up to 72 hours. Lu (2019) states that according to the current evidence on other coronavirus strains shows that while coronaviruses appear to be stable at low and freezing temperatures for a certain period, food hygiene and good food safety practices can prevent their transmission through food. Specifically, coronaviruses are thermolabile, which means that they are susceptible to normal cooking temperatures (70°C). Therefore, as a general rule, the consumption of raw or undercooked animal products should be avoided. Raw meat, raw milk or raw animal organs should be handled with care to avoid cross-contamination with uncooked foods. SARS-CoV and MERS-CoV are susceptible to the most common cleaning and disinfection protocols and there is no indication so far that SARS-Cov-2 behaves differently.

The Concept of Covid-19 Pandemic

COVID-19, subsequently named SARS-CoV-2 is defined as illness caused by a novel coronavirus now called severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2; formerly called 2019-nCoV), has rapidly spread to almost every region of the world. The disease is caused by a new and severe type of Coronavirus known as severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). The infection has no immediate treatment and vaccine, and it has according to World Health Organization (WHO, 2020) become a worldwide pandemic causing significant morbidity and mortality. There are 1,603,428 confirmed cases, 356,440 recoveries from the illness and 95,714 deaths worldwide as of April 9, 2020. The most likely ecological reservoirs for SARS-CoV-2 are bats, but it is believed that the virus jumped the species barrier to humans from another intermediate animal host. This intermediate animal host could be a domestic food animal, a wild animal, or a domesticated wild animal which has not yet been identified. During previous outbreaks due to other coronavirus (Middle-East Respiratory

Syndrome (MERS) and Severe Acute Respiratory Syndrome (SARS)), human-to-human transmission occurred through droplets, contact and fomites, suggesting that the transmission mode of the COVID-19 can be similar. According to Anand, Ziebuhr, Wadhvani, Mesters, & Hilgenfeld (2003), prevention is, so far, the best practice in order to reduce the impact of COVID-19 considering the lack of effective treatment. The basic principles to reduce the general risk of transmission of acute respiratory infections include the following:

- Listen for instructions from your local government about staying home.
- Avoiding close contact with people suffering from acute respiratory infections.
- Frequent hand-washing, especially after direct contact with ill people or their environment.
- Avoiding unprotected contact with farm or wild animals.
- People with symptoms of acute respiratory infection should practice cough etiquette (maintain distance, cover coughs and sneezes with disposable tissues or clothing, and wash hands) and also use face masks.
- Within healthcare facilities, enhance standard infection prevention and control practices in hospitals, especially in emergency departments.

Prevalence of Covid-19 in Nigeria

According to NCDC, On February 27, 2020, an Italian citizen became the index case for COVID-19 in Nigeria and as at April 9, 2020, there were 288 laboratory-confirmed cases of COVID-19 in Nigeria with 51 discharges and 7 deaths (Nigeria Centre for Disease Control, NCDC, 2020). To prevent further spread of the virus, civil societies and government agencies embarked on enlightenment campaigns for good hygiene and social distancing. Temperature screening was conducted at airports and those returning from countries with numerous confirmed cases of COVID-19 were implored to self-isolate. The NCDC in association with State governments also began tracing and tracking of possible victims and their contacts. On March 18, 2020, the Lagos State government suspended all gatherings above fifty people for four weeks and ordered all lower and middle level public officers to stay-at-home (Ewodage, 2020).

Similarly, the Federal government, on March 30, 2020 introduced various containment strategies such as closing of the national borders and airspace, schools, worship centers and other public places, canceling of mass gathering events and placing the Federal Capital Territory, Lagos and Ogun states on lock down for an initial period of fourteen days (Radio Nigeria, 2020). Covid-19 testing laboratories were set up in Lagos, Abuja and Irrua in Edo State while State governments opened isolation centers and imposed dawn to dusk curfews in their territories.

At early stages of a pandemic, precautionary measures are needed to protect against possible danger and curtail the disease spread. In line with this therefore, the Nigerian government (just like other governments around the world) introduced various containment strategies which have interfered with individuals' daily lives and have led to severe economic loss and social disruption. People were coerced to stay at home, businesses and offices were closed, exempting healthcare facilities/workers and —essential commercial establishments. For Nigerians making a living in the informal economy, their livelihood is now threatened by the lockdown since much of their activities and businesses involve face-to-face contact.

Concept of Agribusiness

The word agribusiness was first used On 17 October 1955 in a speech John H. Davis gave. In that speech Davis indicated that agribusiness referred to “the sum of all farming operations, plus the manufacture and distribution of farm commodities. In brief, agribusiness refers to the sum-total of all operations involved in the production and distribution of food and fiber” (Davis, 1956). These early definitions were based on farm production and distribution. As changes in agriculture and related businesses occurred (Schmitz, Moss, Schmitz, Furtan, & Schmitz, (2010); Pisani 1984), the definition gradually was expanded to include inputs to farms as well as activities to move farm products to markets. For example, agribusiness was defined to include “all those business and management activities performed by firms that provide inputs to the farm sector, produce farm products, and/or process, transport, finance, handle or market farm products” (Downey & Erickson, 1987). Later, that definition was further broadened to include the manufacture and distribution of farm supplies to the production agriculturist and the storage, processing, marketing, transporting, and distributing of agricultural materials and consumer products that were produced by production agriculturalists” (Ricketts & Ricketts, 2009).

More recently the definition was expanded to move beyond the farm. More than food and fiber would be encompassed (Agribusiness came to refer to agriculturally related businesses including warehouses, wholesalers, processors, retailers and more (Chait, 2014). This led to another definition with a broader set of activities that focused on markets and included natural resources: “Agribusiness is a dynamic and systemic endeavor that serves consumers globally and locally through innovation and management of multiple value chains that deliver valued goods and services derived from the sustainable orchestration of food, fiber, and natural resources.” More specifically it involves four “F’s” -- food, fiber, forest (products), and (bio) fuel. Food is the central component including meat, poultry, fruit, vegetables, grains, dairy, and fish. A set of peripheral components includes the fiber industry, forestry, and biofuels. However, there are two other important components – water and waste. Water and waste are universal components of agribusiness. Water is essential for virtually all agribusiness activities, and waste refers to the collection and disposal of material left over or discarded throughout agribusiness processes.

Effect of COVID-19 on Agribusiness

According to the Food and Agriculture Organization (FAO), there are currently 820 million people around the world suffering from chronic hunger in which 113 million are coping with acute severe hunger that poses an immediate threat to their lives or livelihood. Two third of the people in this category lives in eight countries of the world in which Nigeria is included. Similarly, about 70% of Nigeria population derives their livelihood from agriculture, majority of whom are smallholders cultivating less than two hectares of land. The measures to combat the spread of COVID-19 might hinder this group from having easy access to both their land and markets to sell their products or buy seeds and other essential inputs, or struggle due to higher food prices or limited purchasing power. Aside the producers (farmers), food supply chain also includes agro-input dealers, transporters, and agro-processors among others. FAO further emphasized that as COVID-19 spreads and measures to contain it become stricter, the food system as a whole will be tested and strained in the coming weeks and months. As a result, we know that border closures, quarantines, and market, supply chain and trade disruptions could restrict people’s access to sufficient/diverse and nutritious sources of food, especially in areas of

the country hit hard by the virus or already affected by high levels of food insecurity. We are already seeing, however, challenges in terms of the logistics involving the movement of food (not being able to move food from point A to point B), and the pandemic's impact on livestock sector due to reduced access to animal feed and slaughterhouses' diminished capacity (due to logistical constraints and labor shortages). Blockages to transport routes are particularly obstructive for fresh food supply chains and may also result in increased levels of food loss and waste. Transport restrictions and quarantine measures are likely to impede farmers' access to markets, curbing their productive capacities and hindering them from selling their produce. Shortages of labor could disrupt production and processing of food, notably for labor-intensive crops. Spikes in prices are expected in high value commodities, especially meat in the very short term and perishable commodities.

According to Akinwale (2020), the more these restrictions persist, the more the risk of shortage for agribusiness is likely to materialize at any level of the food, feed and livestock chain, thus challenging the Nigerian population access to regular supplies of food. As trucking capacity and driver availability tightens because of COVID-19, transportation capacity may not be adequate to provide just-in-time deliveries to animal feeding operations, food processing and manufacturing plants, distribution facilities, export facilities and retail outlets. With the closure of borders in the state, COVID-19 has the potential to severely disrupt critical food supply chains, including between rural and urban areas. Movement or import/ export restrictions may result in challenges to transport key food items and access processing units and markets, affecting both producers and consumers. This can lead to reduced farmers' incomes and instability of food prices deviating from geographical and seasonal patterns, thus creating uncertainty for both producers and consumers. Making such significant changes in the way food is delivered is bound to lead to some shortages and hiccups, making that big of a switch is going to be some work for those in transportation and food industries. Unless measures are taken fast to protect the most vulnerable, keep global food supply chains alive and mitigate the pandemic's impacts on agribusinesses across the food system, we will be faced with a looming food crisis. The European Food Safety Authority (EFSA) announced that there is currently no evidence of food being a source or a transmission route of COVID-19.

Mitigation Strategies against COVID-19 Impacts on Agribusinesses

With the increasing spread of COVID-19 in the globe, what is clear is that it will have, and is already having, significant negative effects on people along the food supply chain – from producers to processors, marketers, transporters and consumers.

Since the start of the COVID-19 outbreak, the European Union Commission has launched a number of initiatives to help countries fight the virus and to mitigate the impact of the pandemic crisis. In pursuing this line of action, measures to mitigate the impact of the virus on agribusinesses was also introduced:

Figure 1 – Initial EU measures introduced to support the agribusiness industry and secure the uninterrupted flow of food supplies

Free movement of goods	Green lanes' for border checks for vehicles carrying any type of goods	EU-level guidelines. Further measures may build on best practices present at national level
Free movement of labor	Agribusiness employees and seasonal workers enabled to reach their workplace and continue their activities	EU-level guidelines. National best practices could be extended to all Member States
Support for farmers	Deadline for farmers' applications for EU subsidies extended from 15 May to 15 June 2020	Several Member States have already decided to take advantage of the extension
Support for agribusinesses	State aid measures will benefit farmers and food processing and marketing Companies	Commission has already approved a number of Member States' aid schemes

Source: Rachele, Rossi (2020)

Here are some measures required to keep the agricultural sector and supply chains working smoothly Mahendra (2020):

- The government should correctly issue lockdown guidelines that exempt farm operations and supply chains. But implementation problems leading to labor shortages and rising prices should be rectified. Keeping supply chains functioning well is crucial to agribusinesses.
- Farm populations must be protected from the coronavirus to the extent possible by testing and practicing social distancing.
- Farmers must have continued access to markets. This can be a mix of private markets and government procurement. Small poultry and dairy farmers need more targeted help, as their pandemic-related input supply and market-access problems are urgent.
- Farmers and agricultural workers should be included in the government's assistance package and any social protection programs addressing the crisis.
- The government should promote agribusinesses by avoiding export bans and import restrictions of agro-based products.

Methodology

The research design used for this study was an Ex-post facto. The population of the study consisted of all farmers (such as manufacturers of agricultural products, retailers and distributors of agro-based products) in Nigeria. Simple random sampling technique was used to select 45 respondents which constituted the sample size. In order to select sample, 15 farmers were

randomly selected from each 3 categories of farmers under 3 local governments, giving a total of 45 farmers. The instrument used for data collection was an interview schedule titled “THREATS OF COVID-19 PANDEMIC TO AGRIBUSINESS QUESTIONNAIRE” (TCPAUAQ). The reason for using the interview schedule was because of restricted movement in the state and the respondents were called and interviewed over the phone. The contacts of the respondents were made available by the various trade unions of small scale and medium enterprises. The instrument so developed was made to pass through face and content validation by experts. Instrument reliability was tested using Cronbach reliability test at 0.86 coefficient. The data obtained was analyzed using the descriptive statistics for the research questions and simple regression for hypothesis. The result tested for significance at 0.05 alpha level.

Results and Discussion

Results

Research Question 1

What is the extent of COVID-19 in Nigeria?

Table 1: Percentage analysis of the extent of COVID-19 Pandemic in Nigeria.

Extent of Covid-19 Pandemic	Freq	Percentage (%)
Very High Extent	22	48.89**
High Extent	13	28.89
Low extent	7	15.56
Very Low Extent	3	6.67*
TOTAL	45	100%

SOURCE: Field survey

The above table 1 present the percentage analysis of the extent of COVID-19 Pandemic in Nigeria. From the result, it was observed that the highest percentage 22(48.89) of the respondent affirmed very high extent of COVID-19 Pandemic in Nigeria while the least percentage 3(6.67%) of respondents affirmed that the extent of COVID-19 Pandemic in Nigeria is very low.

Research Question 2

What is the nature of threats of COVID -19 on agribusinesses?

Table 2: Percentage analysis of the nature of threats of COVID -19 on agribusinesses.

Nature of threats of COVID -19	Freq	Percentage (%)
Restriction of people’s access to sufficient/ diverse and nutritious sources of food	4	8.89*
Diminished capacity due to reduction of access to animal feed and slaughterhouses’	7	15.56
Logistical constraints and labor shortages	5	11.11
Blockages to transport routes obstructing fresh food supply chains and causing food loss and waste	12	26.67**

Disrupt production and processing of food, notably for labor-intensive crops	6	13.33
Spikes in prices of high value commodities and others	11	24.44
TOTAL	45	100%

SOURCE: Field survey

The above table 2 represents the percentage analysis of the nature of threats of COVID -19 on agribusinesses. From the result, it was observed that blockages to transport routes obstructing fresh food supply chains and causing food loss and waste 12(26.67%) had the highest percentage while restriction of people’s access to sufficient/ diverse and nutritious sources of food 4(8.89%) had the least percentage of the nature of threats of COVID -19 on agribusinesses.

Research Question 3

What are the mitigating strategies against COVID-19 impacts on agribusinesses?

Table 3: Percentage analysis of the mitigation strategies against COVID-19 impacts on agribusinesses.

Strategies	Freq	Percentage (%)
Free movement of goods	11	24.44
Free movement of labor	8	17.78*
Support for farmers	12	26.67
Support for agribusinesses	14	31.11**
TOTAL	45	100%

SOURCE: Field survey

The above table 3 represent the percentage analysis of the mitigation strategies against COVID-19 impacts on agribusinesses. From the result, it was observed that the support for farmers 14(31.11%) had the highest percentage as affirmed by the respondents while Free movement of labor 8(17.78%) had the least percentage of mitigation strategies against COVID-19 impacts on agribusinesses.

Hypothesis Testing

Hypothesis: There is no significant effect of COVID-19 on the operation of agribusinesses in Nigeria.

Table 4: Simple regression analysis of effect of COVID-19 on the operation of agribusinesses in Nigeria.

Model	R	R-Square	Adjusted R Square	Std. error of the Estimate	R Square Change
1	0.78a	0.61	0.60	1.29	0.61

*Significant at 0.05 level; df= 43; N= 45; critical R-value = 0.312

The table shows that the calculated R-value 0.78 was greater than the critical R-value of 0.312 at 0.5 alpha level with 43 degree of freedom. The R-Square value of .61 predicts 61% of the significant effect of COVID-19 on the operation of agribusinesses in Nigeria. This rate of percentage is moderately positive and therefore means that there is no significant effect of COVID-19 on the operation of agribusinesses in Nigeria. It was also deemed necessary to find out the extent of the variance of each case of independent variable (operation of agribusinesses.) as responded by each respondent (see table 5).

TABLE 5: Analysis of variance of the effect of COVID-19 on the operation of agribusinesses in Nigeria.

Model	Sum of Squares	Df	Mean Square	F	Sig.
Regression	112.89	1	112.89	67.51	.000b
Residual	71.91	43	1.67		
Total	184.80	44			

a. Dependent Variable: Operation of Agribusinesses

b. Predictors: (Constant), COVID-19

The above table presents the calculated F-value as (67.51) and the P-value as (000). Being that the P-value (000) is below the probability level of 0.05, the result therefore means that there is no significant effect of COVID-19 on the operation of agribusinesses in Nigeria.

Discussion of the findings

The result of the data analysis in table 4 and 5 was significant due to the fact that the calculated R-value .78 and F-67.51 were greater than the critical R-value of .61 at 0.05 alpha level with 43 degree of freedom. The result implies that there is significant effect of COVID-19 on the operation of agribusinesses in Nigeria. The result therefore is in agreement with the research findings of Akinwale (2020), who asserted that in urban areas, the more these restrictions persist, the more the risk of shortage for agribusiness is likely to materialize at any level of the food, feed and livestock chain, thus challenging the Nigerian population access to regular supplies of food. As trucking capacity and driver availability tightens because of COVID-19, transportation capacity may not be adequate to provide just-in-time deliveries to animal feeding operations, food processing and manufacturing plants, distribution facilities, export facilities and retail outlets. With the closure of borders in the state, COVID-19 has the potential to severely disrupt critical food supply chains, including between rural and urban areas. The significance of the result caused the null hypotheses to be rejected while the alternative was accepted.

Conclusion

The lockdown has choked off almost all economic activity in both the rural and urban areas of the country, including agribusinesses, leading to the widespread loss of jobs and incomes for informal workers and the poor. The shutdown has caused untold misery for informal workers, especially agro-based workers, and the poor who lead precarious lives facing hunger and malnutrition. As restrictions tightens because of COVID-19, transportation capacity may not be adequate to provide just-in-time deliveries to animal feeding operations, food processing and

manufacturing plants, distribution facilities, export facilities and retail outlets. Therefore, there is significant effect of covid19 on the operation of agribusinesses in Nigeria.

Recommendations

1. The government should offer universal coverage of food distribution in the next few months since agribusiness workers might be affected by lockdown. Nutrition programs should continue to work as essential services and provide rations and meals to recipients at home. Eggs can be added to improve nutrition for children and women.
2. Agribusinesses workers need cash income support. The government should provide financial support sufficient for their operation and survival during the lockdown period.
3. Road access should be granted to agribusiness migrant workers, who continues to ensure food availability in the State.
4. As lockdown measures have increased, demand has risen for home delivery of groceries and E-commerce. This trend should be encouraged and promoted.

REFERENCES

- Akerstrom S., Tan Y. J., and Mirazimi A (2006). *Amino acids 15–28 in the ecto domain of SARS coronavirus 3a protein induces neutralizing antibodies*. FEBS Lett. 580:3799–3803.
- Akinwale, J. (2020): *Impacts of Covid-19 on Small Farmers, the Poor*. Department of agricultural extension and communication technology, Federal University of Technology, Akure, Ondo State.
- Anand, K., Ziebuhr J., Wadhvani P., Mesters J. R., and Hilgenfeld R. (2003). *Coronavirus main proteinase (3CLpro) structure\>: basis for design of anti-SARS drugs*. Science 300:1763–1767.
- Chait, J. (2014). *Agribusiness. About money*. Available at <http://organic.about.com/od/organicdefinitions/g/AgribusinessDefinition-Of-Agribusiness.htm>.
- Davis, J. H. (1955). *Business responsibility and the market for farm products*. Address to Boston Conference on Distribution, 17 October 1955, JDP, NAL.
- Davis, J. H. (1956). From agriculture to agribusiness. *Harvard Business Review*, 34, 107–115.
- Del Rio, C., Malani P.N. (2020) *COVID-19—new insights on a rapidly changing epidemic*. *JAMA*. Published online February 28, 2020. doi:10.1001/jama.2020.3072ArticlePubMedGoogle Scholar
- Downey, D. W., & Erickson, S. P. (1987). *Agribusiness Management*. New York, NY: McGraw-Hill, Inc. Available at: <http://organic.about.com/od/organicdefinitions/g/>
- Ewodage, R. (2020). *COVID-19: How We Plan to Implement Social Distancing in Lagos Markets, Transport System– Sanwo-Olu*. Available online at <https://www.channelstv.com/2020/03/22/covid-19>
- Food and Agricultural Organization (FAO, 2020). *COVID-19 pandemic – impact on food and agriculture*.
- Lu, R.; Zhao, X.; Li, J.; Niu, P.; Yang, B.; Wu, H.; Wang, W.; Song, H.; Huang, B. and Zhu, N. (2019) *Genomic characterization and epidemiology of 2019 novel coronavirus: Implications for virus origins and receptor binding*. *Lancet* 2020, 395, 565–574.
- Mahendra S. D. (2020). *COVID-19 impacts on agriculture, food security, and livelihoods in India*. Indira Gandhi Institute of Development Research in Mumbai.
- Nigeria Centre for Disease Control (NCDC) (2020). *COVID-19 case update*. Available online at <https://twitter.com/NCDCgov/>
- Pisani, D. J. (1984). *From the family farm to agribusiness*. Berkeley, CA: University of California Press.
- Ricketts, C., & Ricketts, K. (2009). *Agribusiness: fundamentals and applications*. Clifton Park, NY: Delmar Cengage Learning.

Rossi, R. (2020). *COVID-19 – Novel coronavirus outbreak in Europe and the EU response, EPRS, European Parliament, 2020*. Background document on the impact of COVID-19 pandemics on the agricultural sector. Copa-Cogeca, March 2020.

Schmitz, A., Moss, C. B., Schmitz, T. G., Furtan, H. W., & Schmitz, H. C. (2010). *Agricultural Policy, Agribusiness, and Rent-Seeking Behaviour*. Toronto: University of Toronto Press, Inc.

World Health Organization (2020) *Director-General's Opening Remarks at the Media Briefing on COVID-19—11 March 2020*. Available online: <https://www.who.int/dg/speeches/detail/who-director-general-s-openingremarks-at-the-media-briefing-on-covid-19---11-march-2020>

World Health Organization (WHO) (2003). *Consensus document on the epidemiology of severe acute respiratory syndrome (SARS)*. Geneva: WHO; 2003. Available from: http://www.who.int/csr/resources/publications/CDS_CSR_ARO_2004_2.pdf