CZECH UNIVERSITY OF LIFE SCIENCES PRAGUE

Faculty of Economics and Management

IMPACT OF COVID-19 ON THE NIGERIA ECONOMY: CASE STUDY OF OGUN STATE AGRICULTURAL SECTOR (SOUTH WEST)

(December 2019 to June 2021)

MASTER'S THESIS

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CZECH UNIVERSITY OF LIFE SCIENCES PRAGUE

Faculty of Economics and Management

DIPLOMA THESIS ASSIGNMENT

B.Sc. Adedeji Israel Adeboye, BSc

Economics and Management
Economics and Management

Thesis title

Imapct of Covid 19 to the Economy of Nigeria

Objectives of thesis

Examination of the impact of COVID-19 on economic growth in Nigeria: Opinions, attitudes and to ascertain the individual perception of the effect of the COVID-19 pandemic on economic growth in Nigeria.
To examine the impact of the COVID-19 pandemic on the Nigerian economy with the aim of proposing some policy recommendations for reducing the negative impacts discovered.

Methodology

The information in this M.Sc. thesis will be collected from relevant and published scientific articles, periodicals, and papers in English and will be analyzed and compared with the official data of the UN and government organizations.

The used internet databases will be Web of Science, Science Direct, Google Scholar…etc. Also, relevant private information from Nigeria related to the topic will be useful.

The M.Sc. thesis will be relying on previously collected data and information same as on the own experience of the author from the region.

This thesis, therefore, will provide a snapshot of COVID 19 and its impact on the global economy and highlights the impact and challenges of COVID 19 on the Nigerian economy. Finally, the thesis will provide some strategies to curb the impact of COVID 19 in Nigeria as well as offer some economic recommendations.

The proposed extent of the thesis

40-60 pages

Keywords

COVID-19, Economy, Pandemic, Nigeria

Recommended information sources

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Declaration

I declare that I have worked on my master's thesis titled ‘Impact of Covid-19 on the Nigeria Economy: Case Study of Ogun State Agricultural Sector (South West)’ independently, all texts in this thesis are original, and all the sources have been quoted and acknowledged by means of complete references and according to Citation rules of the FEM.

In Prague date

Adeboye Adedeji Isreal

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Impact of COVID-19 on the Nigerian Economy: A Case Study of Ogun State Agricultural Sector (South West)

Abstract

Globally, agriculture provides living to one billion people and more and COVID-19 outbreak poses a grave consequences on global food security and supply chain as a result of some health safety measures. This study specific examined the impact of COVID-19 on Agric-food production; prices of Agricultural produce and farmers' livelihood in Ogun state. The study surveyed 400 farmers and farm attendants across the 20 LGAs in Ogun State. The study employed both ordinary least square and binary logistic regression technique and found that Covid-19 pandemic had a negative and significant impact on farmer's income, government support to the agriculture sector in terms of equipment and finances, and domestic credit to agriculture sector both had a positive and significant relationship with farmer's income. The study concluded that contemporary farmers in Ogun state were well-learned married men with at least 6 to 10 years farming experience with average monthly income of 100,000 to 200,000 naira. Farmer's income declined and consumption was reduced. Government support and domestic credit are one of the major sources to increases farmer's income and welfare; farmers' experience determines prices of agriculture output and covid-19 reduces farmer's welfare.

Keywords: Agriculture, Covid-19, pricing, Livelihood, Farmer,

Abstraktní
Zemědělství celosvětově poskytuje obživu jedné miliardě lidí a více a vypuknutí COVID-19 má vážné důsledky pro globální potravinovou bezpečnost a dodavatelský řetězec v důsledku některých opatření v oblasti zdravotní bezpečnosti. Tato studie konkrétně zkoumala dopad COVID-19 na zemědělskou produkci potravin; ceny zemědělských produktů a živobytí farmářů ve státě Ogun. Studie zkoumala 400 farmářů a farmářů ve 20 LGA ve státě Ogun. Studie využívala jak běžnou techniku nejmenších čtverců, tak binární logistickou regresní techniku a zjistila, že pandemie Covid-19 měla negativní a významný dopad na příjmy farmářů, vládní podporu zemědělskému sektoru, pokud jde o vybavení a finance, a domácí úvěry zemědělskému sektoru. pozitivní a významný vztah k příjmu zemědělce. Studie dospěla k závěru, že současní farmáři ve státě Ogun byli dobře vzdělaní ženatí muži s minimálně 6 až 10 lety farmářských zkušeností s průměrným měsíčním příjmem 100 000 až 200 000 nair. Příjem farmářů se snížil a spotřeba se snížila. Vládní podpora a domácí úvěry jsou jedním z hlavních zdrojů ke zvýšení příjmů a blahobytu zemědělců; zkušenosti farmářů určují ceny zemědělské produkce a covid-19 snižuje blahobyt farmářů.

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List of abbreviations

ACDC	Africa Center for Disease Control
COVID-19	Coronavirus disease
DCAS	Domestic Credit to Agricultural Sector
ERGP	Economic Recovery and Growth Plan
FAO	Food and Agricultural Organization of the United Nations
FMARD	Federal Ministry of Agriculture and Rural Development
GDP	Gross Domestic Product
IFPI	International Food Policy Institute
ILO	International Labour Organisation
LGA	Local Government Areas
NAS	National Agrifood Systems
NAICS	North American Industry Classification System
NBARDM	National Bank for Agriculture and Rural Development Mumbai
NBS	National Bureau of Statistics
NCDC	Nigeria Centre for Disease Control
NPC	National Population Commision
SPSS	Statistical Package for Social Sciences
UNDP	United Nations Development Programme

1. Introduction and Literature Review

Chapter 1: Background of the Study

Globally, agriculture provides living to one billion people and more, it serves as the backbone of many low-income countries accounting for 60.4 percent of employment (ILOSTAT, 2019) and 49 percent where its employment share in Africa out of which women accounted for 41.9 per cent of the agricultural workforce in the developing world (ILO Sectoral Brief, 2020). The Coronavirus disease (COVID-19) pandemic and its resurging variants ravaged the entire human space posing a grave risk to lives and livelihoods, and caused havoc across many spheres including the educational, health, economic, and agricultural sectors.

The COVID-19 outbreak spread across 218 countries with more than 86 million cases and 2 million deaths (ACDC, 2019), aside deaths other risk associated with the pandemic are diseases, health problems, stress and trauma for rural people (Abrams & Szefler, 2020; Hossain et al., 2020; McDonald et al., 2020; Poudel & Subedi, 2020; Singh et al., 2020). A total of 2,830,462 3,021,769 COVID-19 cases and 72,121 deaths representing 3.3% and 3.6% respectively of the global total was recorded in Africa (ACDC, 2019). Governments in an attempt to break COVID-19 the transmission chain implemented some health safety procedures (social distancing, hand hygiene, border closure, internal movement limitations/restrictionsvari, and lockdown)). However, the aftermath of these procedures is a reduced economic power, labour supply to meet the rising demand for agricultural product, this resulted to food losses in the agricultural value chain. The global food security was affected by the break out of COVID-19, the pandemic could push about 100 million people into extreme poverty (World Bank, 2021).

Nigeria's population is the highest in Africa with a population of 207 million people (Worldometer, 2020). The agriculture sector is a major job opportunity, source of income, food production and supply to rural dwellers (Oyetoro & Abdulraheem, 2020) and plays a vital role in the country's economic diversification plan by ensuring food security; promoting industrialization; providing jobs, stimulating strong resilience to external vulnerabilities and fostering shared prosperity (PWC, 2021).Growth in the agricultural sector has been steady between 2019 and 2021 with an average of 2.6% and accounting for 22% of Nigeria's GDP (PWC, 2021). The sector is

the largest employer of labour providing more than one-third (36.4%) of the labour force (ILO, 2021, and World Bank, 2020a) and contributes about 24% to the Gross Domestic Product (GDP) (NBS, 2020). About 76% of total consumptions flows from Local farm supplies in Nigeria (Amankwah *et al.,* 2021).

Agriculture sector comprises crop production, fishing, livestock and forestry with crop production contributing 87.6% of the total sectors output while 8.1%, 3.2% and 1.1% were share of livestock, fishing and forestry in the total sectoral yield respectively (PWC, 2021). Agriculture is the core of the federal Economic Recovery and Growth Plan (ERGP), it has an agenda of self-sufficiency for tomato in 2017, rice in 2018, and wheat between 2019/2020. Total rice production stood at 2.3 million MT with demand being 6.3 million MT.

Nigeria's poultry industry has approximately 180 million birds, out of which about 80million, 60 million, and 40 million chickens were raised in extensive, semi-intensive and intensive respectively. Meat and eggs annual production stood at 300Mt and 650Mt respectively. This positioned Nigeria has the largest annual egg production and second largest chicken population in Africa (Akure, Vantsawa, Balogun, Omodona, Emeghara, and Olafemi, 2021). Small poultry holders accounts for 65-77% (UNDP, 2006; Sonaiya, 2007; and Herrero, 2021), and women are the primary keepers (Yakubu, Bamidele Hassan, Ajayi, Ogundu, Alabi, Sonaiya, & Adebambo, 2020; and Alabi, Ajayi, Bamidele, Yakubu, Ogundu, Sonaiya, Ojo, Hassan, & Adebambo, 2020).

Agricultural food production in Nigeria is determined by several factors such as differing farming season across regions in Nigeria. The planting season for most crops is usually ushered by the raining season (which lies between the month of May and October). And this was the period of the first COVID-19 wave. Often, farmers are not land owners, as a result, the preservation of natural resources is their secondary objective (Adams, 2019). The desertification and water depletion problem in the northern makes nomadic herdsmen move to the south in search for a graze-able filed, this often result in violent conflicts of farmer-herders due to the destruction of farmland crops and death of cattle. Inadequate infrastructure to preserve and store agricultural product along the value chain leads to post-harvest loses and food wastages. COVID-19 outbreak

poses addition devastating impact as farmers' disposable income declined as a result of discontinuity. This further raised the problem of food insecurity (UNDP, 2020),

Though, the agric-food sector showed more resilience to the pandemic compared to other sectors, food systems are failing, and the COVID-19 pandemic worsened the severe food security situation in Nigeria (FAO, 2021b). This study aim to examine the effects of the COVID-19 pandemic on the agricultural production in Nigeria, using Ogun State Nigeria as a study reference. Hence, except an immediate action is proffered, the impacts of the rising global food emergency could prove uncurbed in the long –term. As a result, there are an increasing quest for knowledge by various governments, economists, and institutions to find mediating responses to climate change.

In Nigeria, most Agric-food production is seasonal especially crop farming, this is because climate influences the types of crops that are grown and the forms of agriculture that are practiced (Adams, 2019). Nigeria's agricultural sector is vital in the meeting domestic demand yet less export oriented. Nigeria's agricultural export fell from ₦302.2 billion to ₦269.8 billion between 2018 and 2019, however, import rose from ₦851.6 billion to ₦959.5 billion (12.7%). This explains bulk of food production flowing from importation Cassava production in Nigeria is the world's largest and also in Africa the largest producers of rice. However, Nigeria's export earnings from cassava is very low with Thailand and Vietnam dominating the global export market while rice consumption demand is complemented with import (PWC, 2021).

Despites government effort to protect and promote domestic agricultural farm produce and the vast opportunities that could enhance total agricultural output, issues of concern are resource shortages such as seedlings, fertilizers, low mechanise farming etc., inadequate storage facility, poor distribution system, weak agricultural research and extension services, and lack of finance though, the Bank of Industry (BOI) through loans has been contributing towards the growth of agricultural sector, it impact is less felt in terms of the overall agric-food production.

The recent challenge is the COVID-19 pandemic. COVID-19 has disrupted agricultural activities across different production systems (Bamidele & Amole, 2021) and posed significant hardships and economic losses to households (Evans, 2021; and Middendorf, Faye, Middendorf, Stewart, Jha, & Prasad, 2021). The outbreak of Covid-19 further exacerbate the challenges of

Nigeria's food security. The food distribution and supply chain was disrupted (FAO, 2020) and an escalating rising cost of food items in Nigeria has since been recorded.

The federal government pronouncement of a lockdown led to panic-buying, food stockpiling, and a hike in food prices (such as bread, yam, fruits, fish, cereals, fats and oil, and sugar) in April 2020, and an increasing price volatility, destabilizing international markets (Oyekanmi, 2020; PWC, 2020; FAO, 2021a; and IFPI, 2020). High labour demand are associated peak periods of agricultural activity (Microsoft News, 2021), with COVID-19 demand for a shift in duties (FAO, 2021), agricultural production was affected (Microsoft News, 2021). The livelihoods of farm workers that are engaged in export-oriented, labour-intensive agricultural production in developing countries were greatly affected (ILO Sectoral Brief, 2020). Perishable food items were adversely affected by the restrictions on movement and interactions, the perishable food items were hindered as a result there was an increase in food wastage (FAO, 2021).

The sector has several untapped potentials for growth and development with an estimated total land area of 84 million hectares and 40% under cultivation (FMARD, 2012). Nevertheless, agriculture in Nigeria remains underdeveloped. The reliance on primitive methods will hinder the sustenance of the rising demand for food production in the prevailing pandemic and with the growing population. The literature is replete with studies that analyse the impact of agricultural sector of the Nigerian economy, recent trend is to examine the significant impact of COVID-19 pandemic on Agric-food production. Based on the problems identify the following research questions are set out for investigation.

i. What is the impact of COVID-19 on Agric-food production in Ogun State?
ii. To what extent does COVID-19 affect the prices of Agricultural produce in Ogun state?
iii. What is the impact of COVID-19 on livelihood of producers of agriculture commodities in Ogun state?

The significance of agricultural resources in bringing about economic growth and sustainable development of a nation cannot be underrated. The intention for undertaking this study is to contribute to the debate on the impact of the COVID-19 on agricultural output in Nigeria. To achieve this; the study will identify the possible implications of COVID-19 on agricultural backwardness and how to increase agricultural output both for consumption and for exportation,

which ultimately will lead to a favourable balance of payment (BOP) for the nation. Assessing the impact of the COVID-19 pandemic on the agriculture sector gives sufficient information on the disruption of the Nigerian population's food supply chain.. Along this line, this study will give insights into Agric-food production, Agricultural Inputs; Prices of Agricultural Inputs; and market challenges in agriculture as a result of the pandemic.

In addition, this study will contribute to the already existing body of knowledge regarding this area of study for future research especially the study of how COVID-19 relates to agricultural output and how to mitigate the future impact of pandemic in Nigeria. The agricultural sector provides the basic ingredients humankind needs. Besides agric-food production, the sector supplies raw materials necessary for industrialization (E.g., the agro-based industry), the consequence of which can slow national growth (Byerlee, Janvry & Sadoulet, 2009). The findings of the study are vital to policymakers as it points out the role of COVID-19 pandemic on agricultural food production. Policymakers may adapt the possible solutions to these causes as a reference point to other variants of COVID-19 pandemic which will further benefit the agricultural sectors.

This study analyses the impact of COVID-19 on agricultural food production in Ogun state, Nigeria. The study employs a cross-sectional data collection method using a questionnaire will be deployed to 400 targeted Farm owners and the managers that have information on the agric-food production across the ten local government areas of Ogun State, the questionnaire will be deployed through the google form due to geographical constraint.

Ogun State lies between the Longitude 3°15'30.11"E and Latitude 6°54'35.4"N with a population of about 4,054,272 (NPC, 2006). Most of the crops grown in Ogun State include cassava, rice, maize, melon, cotton, cocoyam, cocoa, yam, cowpea, etc. Livestock production is supplementary. Besides the land mass of arable farmland in Ogun state makes a relevant agric-food production base. Also, agric-food production advancement requires the growth of infrastructures like roads, storage units, transportation railways, market yards, postal services, and most importantly access to international borders for exportation. Ogun state shares close proximity to other African countries in terms of land borders and access to cargo shipment through water ways makes it suitable for the study.

This study is limited as it does not consider the transmission mechanism of COVID-19 on agric-food production and does not examine the impact of variations or market disruptions of food supply on small and larger scale farms neither does it seek to examine issues on the adaptation of the agricultural production to future variants of Covid-19. Therefore a future research on the impact of COVID-19 on long-term food supply chain and insecurity may be investigated.

Chapter 2: Literature Review

This chapter focuses on the review of literature that is related to the study. Specifically, the chapter is divided into three parts and these are conceptual, theoretical, and empirical reviews of literature.

2.1 Conceptual Issues

Agriculture is one of the most vital human activities and the main sources of income and productive sector. Agriculture sectors is a sector that drives economic growth of most developing nations, however, growing climate concern is as a result of the shock it has on agricultural inputs or outputs. Nigeria's' agricultural sector growth has not been smooth, the Department of Agriculture which was established in 1912 was inactive between 1912 and 1921 due to the First World War. Export boom was recorded between 1945 and 1954 because countries recovery process depended primarily on agricultural products for industrialization.

Subchapter 1: **Theories of Agricultural Output**

The Ricardian Model: Ricardo (1951) introduced the Ricardian theory. The theory claimed that land representing nature is the key restriction to an economy's capital accumulation. Technical advances cannot overcome the diminishing returns in agriculture owing to the restrictions of nature. Ricardo opined that the produce of the earth all that is derived from its surface by the united application of labour, machinery, and capital, is divided among three classes of the community; namely, the propriety of the land, the owner of the stock or capital necessary for its cultivation, and the labourers by whose industry it is cultivated. Production is a product of land, labour, and physical stock. The supply of population induced by capital stock improves food demand which further engender land cultivation. This price increase stimulates an increase in wages. However, Ricardo considers technological improvements to be temporary and the wages to rise in the long

run. Hence, when capital accumulation advances with the increasing population, the rising share of wages occasioned by the increasing corn price eventually amounts to just the products made by the labourers.

The Conservation Model of Agricultural Development: The conservation model of agricultural development originated from developments in crop and livestock husbandry linked with the English agricultural revolution, as well as conceptions of soil exhaustion.empha. The conservation model suggested by the early German chemists and soil scientists stressed the development of a series of increasingly complicated land and labor-intensive agricultural systems, organic manure generation and usage, and labor-intensive capital formation in the form of physical structures to more effectively exploit land and water resources. Agricultural development was capable in many areas of the world of a sustained Over comparatively long periods of time, agricultural production has grown at a pace of roughly 1.0 percent each year. This pace is incompatible with present rates of increase in agricultural production demand, which in emerging nations typically range from 3-5 percent.

The influence of urbanization on industry Location variations in agricultural development were mostly attributed to changes in environmental parameters in the conservation model. It stands in stark contrast to models that interpret spatial disparities in economic development levels and rates exclusively in terms of urban-industrial development levels and rates.. The urban industrial impact model was formulated (by Von Thunen) to explain geographic variations in the intensity of the farming system and the productivity of labour in an industrialized society. Later, this model was broadened to explain why the factor and product markets connecting the agricultural and non-agricultural sectors in places with rapid urban-industrial development performed well. Although the approach has been extensively tried in developing countries, it has garnered little attention in the developing world.

The Diffusion Model: The model rests on the empirical observation of substantial differences in land and labour productivity among farmers and regions. The route to agricultural development is through more effective dissemination ohf technical knowledge and a narrowing of the productivity differences among farmers and regions. Even in pre-modern societies, the spread of better husbandry practices was a major source of productivity development. Prior to the

establishment of contemporary agricultural research, a large portion of a system's work was spent to crop exploration and development. Nations with well-developed agricultural research systems makes significant effort to the test and refine farmers' innovations, as well as the testing and adaptation of exotic crop varieties and animal species.

The model emphasized the relationship between diffusion rates and the personality, characteristics, and educational accomplishments of farm operators. Since the emergence of agriculture economics as a separate sub-discipline linking the agricultural sciences and economics in the late nineteenth century, the diffusion model has served as the Much of the farm management and production economics research and extension is based on this philosophical framework. The

place at a period when experiment-station research was only contributing a small amount to the increase in agricultural productivity The research of rural sociologists on the diffusion process made a further contribution to the effective transmission of known technology. As technical assistance and community development programs based explicitly or implicitly on the diffusion model failed to generate either rapid modernization of traditional farms or rapid growth in agricultural output, the diffusion model's limitations as a foundation for the design of agricultural development policies became increasingly apparent..

The High Payoff Input Model emerged in the 1960s as a result of the inadequacy of policies based on conservation, urban-industrial effect, and diffusion models. An investment targeted to make modern agriculture a profitable source of economic growth is the key to changing a traditional agricultural industry into a productive source of economic growth, high-payoff Farmers in developing countries have access to a variety of inputs. Peasants were regarded as rational and effective resource allocators in previous agricultural systems. They remained impoverished because there were few technical and economic opportunities in most poor countries to which they could respond.

The enthusiasm with which the high payoff The profusion of studies indicating high rates of return on public investment in agricultural research has contributed to the acceptance of the input model and its translation into economic doctrine. It was also attributable to the success of attempts to generate new tropical grain types with great productivity. In Mexico, new high-yielding wheat varieties were created in the 1950s, while in the Philippines, new high-yielding rice varieties were

developed in the 1960s. These cultivars responded well to industrial inputs like fertilizer and other chemicals, as well as better soil and water management. However, the high returns associated with the adoption of novel kinds, as well as the related technical inputs and management approaches, has resulted in their widespread adoption. Farmers in various Asian, African, and Latin American countries are taking notice of the new cultivars.

Subchapter 2: Empirical Review

On the measures against the impact of Covid-19 pandemic on agriculture food, the study by Bochtis et al., (2020) evaluated the impact of covid-19 on US agricultural labour force. The study identified risks associated with agriculture sector as well as measures to protect workers. In addition, control measures that can increase the resilience of agriculture sector and protect farmers were proposed. Pulighe and Lupia (2020) recommended expanding farming operations, ensuring farming in urban regions to improve the resiliency of food systems delivering fresh products to urban areas, and developing numerous measures of urban and natural resource management. After a pandemic, Bhavani and Gopinath (2020); Lal (2020a); Sukhwani et al., (2020) suggest that food supply will be unable to meet local demand. In most cases, novel farming strategies to improve the resilience of food supply systems are still necessary. Though novel farming practices will not be able to guarantee complete food supply security, they will help to shape more resilient food supply systems in the future (Gunther, 2020). The impact of lockdown imposed in India owing to COVID-19 was assessed by NBRDM, (2020). The study posit that covid-19 is significant to the overall production levels in the agricultural and allied sector with a decline of 47% of the sample districts. 19% of the districts reported an increase in the overall level of production in the sector, 34% of the districts showed In the agricultural and allied sector, there has been no change in production levels. Lack of labor and machinery, the need for social separation, and limits on free movement of men and machines are some of the reasons for the decline in agricultural operations. All subsectors have seen a drop in production, with poultry reporting the biggest drop at 19.6 percent, followed by fisheries at 13.6 percent. Crop production has been the least affected, with a 2.7 percent drop. The impact on Crop sector lower harvesting of major rabi crops viz. wheat, mustard, gram, etc. Availability agri-inputs declined in 58% of the sample districts, 38% districts reported no change agri-inputs availability while, 4% districts reported an increase in the availability of Agri-inputs. Prices of agri-inputs revealed that 300 sample districts (54%) indicated

an increase, whereas 236 districts (42%) reported no impact of COVID-19 on agri input prices, and 24 (4%) districts reported a decrease in aggregate agri-input prices. and 24 (4%) districts reported a decline in the overall price levels of Agri-inputs.

Within the Nigerian context, Bamidele and Amole, (2021) evaluated the impact of COVID-19 on 525 smallholder poultry farmers across 5 Nigerian states using structured questionnaires which focused on income, production systems, markets, and food security. The result found that the average monthly income prior to and during COVID-19 declined from ₦22,565 to ₦15,617 respectively. As a result of COVID-19, the number of farmers living below the international poverty line of USD 1.90 per day increased by 28.4%. Farmer's gender, location, household size, and monthly income significantly impacted reliance on chickens for food and income and the COVID-19 pandemic had a significant effect on farmers' livelihoods and food security in Nigeria.

Akure *et al*., (2021) examined the impact of this COVID-19 on the poultry sectors in Faegea local government area of Kano state, Nigeria. The study employed multi-stage sampling technique to select 200 poultry farmers. The study showed that some broiler farms in Kano, Nigeria were closed during COVID-19 as a result of labour shortage, inability to pay workers and high cost of feed. The constraints to broiler production were ranked in the order of significance, expensive feed ranked first most serious constraint followed by the cost of production, labour shortage ranked third; movement restriction ranked fourth; non-payment of salary ranked fifth.

Because of the aforementioned, it is clear that previous studies on the impact of COVID-19 pandemic on agric-food production are yet to be exhausted and inconclusive, as controversies still exist on each strand of the literature. Most recent researches on COVID-19 pandemic and agriculture production in Nigeria carried out a literature review on the likely impact of COVID-19 pandemic on agric-food production with no empirical backings, and the few studies that considered and documented that COVID-19 had an impact on agric-food production do that with a limited scope on crop yields while it ignored other categories of agricultural sector.

2. Aims of the Thesis

Central to answering the above questions, the study will assess the impact of COVID-19 on agricultural production in Ogun State, Nigeria. The specific objectives are to assess the:

i. Impact of COVID-19 on Agric-food production in Ogun State
ii. Effect of COVID-19 on prices of Agricultural produce in Ogun state
iii. Impact of COVID-19 on farmers' livelihood in Ogun state

Based on the research objectives, the following hypotheses will be tested:

i. H_{01}: COVID -19 pandemic does not have an impact on Agric-food production in Ogun state
   H_{11}: COVID -19 pandemic have an impact on Agric-food production in Ogun state
ii. H_{02}: COVID -19 pandemic has no effect on the Agricultural produce in Ogun state.
   H_{12}: COVID -19 pandemic have an effect on Agricultural produce in Ogun state.
iii. $H_{03:}$ There is no significant influence of COVID-19 on farmers' livelihood in Ogun state.
   $H_{13:}$ There is a significant influence of COVID-19 on farmers' livelihood in Ogun state.

3. Methods

This chapter discusses the methodology adopted for this study. The chapter contains the methodology, area of the study, research design, study population, sampling technique and sampling size, sources of data, data analysis technique, validity, and reliability of research instrument.

3.1 Research Design

The importance of research design is to guide the researcher in the process of collecting, analyzing, and interpreting observation thereby allows the researcher to draw inferences concerning causal relations under investigation. In this study, a non-experimental research design is employed because the study does not involve any form of control and experimental group.

3.2 Study Population

This study will be conducted amongst over the local government areas of Ogun state. The study covers all registered farmers in each of the local government areas and information on the agric-food production will be elicited. Ogun State lies between the Longitude 3°15'30.11"E and Latitude 6°54'35.4"N with a population of about 4,054,272 (NPC, 2006). Most of the crops grown in Ogun State include cassava, rice, maize, melon, cotton, cocoyam, cocoa, yam, cowpea, etc. Livestock production is supplementary. Besides the land mass of arable farmland in Ogun state makes a relevant agric-food production base. Also, agric-food production advancement requires the growth of infrastructures like roads, storage units, transportation railways, market yards, postal services, and most importantly access to international borders for exportation. Ogun state shares close proximity to other African countries in terms of land borders and access to cargo shipment through water ways makes it suitable for the study.

3.3 Sampling Procedure

The study will adopt the following sampling procedure as highlighted below elaborating the sample size, sampling elements, sampling unit, sampling frame, and sampling techniques.

3.3.1 Sample Size

A sample is a sub-set of a population. The study will conduct a survey of a sample size of 400 farmers in Ogun State, Nigeria; this is considered adequate to account for the characteristics of the entire population. The unit of observation is all farm owners and farm managers of the selected farms. Categorically, agriculture in Ogun state convers crop farming, poultry, fishery and agriculture and extension services. The sample will be drawn through purposive sampling method from 10 out of the 20 Local Government Areas (LGA) in Ogun state. According to Abrams, (2010), the convenience sampling approach ensures respondents' availability and accessibility.

3.3.2 Sampling Elements

Sampling involves a process of selecting a group of people or items from a defined population. The study is designed to elicit information on how COVID-19 influences the agricultural sector in Ogun state, Nigeria. In this study, the sample comprises two tiers of respondents which include farm owners and farm managers from each of the ten (19) selected local government area in Ogun state, Nigeria, this is because the implication of COVID-19 outbreak is directly felt by the farmers. By targeting these categories of farmers, questions relating to how Agric-food production; Availability of Agricultural Inputs; Prices of Agricultural Inputs; Marketing of agriculture produce of farmers in Ogun state during and post-COVID-19 outbreak can best be addressed by them only.

3.3.3 Sampling Technique

The purposive sampling technique will be employed in selecting the respondents within each of the local government in Ogun state, Nigeria; this is to ensure that all identified categories in the sampling frame were surveyed. Due to the sensitive nature of the required information, information will only be sought from farm owners and farm managers.

This study adopted the Survey Research Method which involves the use of structured questionnaire designed to obtain data from respondents on their perception of COVID-19 and Agric-food production; Availability of Agricultural Inputs; Prices of Agricultural Inputs; Marketing of agriculture produce of farmers in Ogun state. This method is the most appropriate because salient information cannot be easily obtained from existing information in the records of the enterprise, and constructing questions tailored directly to address the research questions is

germane to the achievement of the objectives raised in Chapter One. Similarly, Deennis and Shepherd, (2011); Ahmed et al, (2012); and Akingbola et al, (2017) had employed the survey method and proven relevant to this study. This study will adopt the quantitative research method to empirically investigate the impact of COVID-19 on Agric-food production; Availability of Agricultural Inputs; Prices of Agricultural Inputs; Marketing of agriculture produce of farmers in Ogun state.

3.5 Sources of Data and Measurement

Primary data is data that is used for a specific purpose for which it was gathered. This study employed the primary source of data collection on the 400 selected farm owners and farm managers using a structured questionnaire. In this study, data on the perceived implication of COVID-19 and Agric-food production; Availability of Agricultural Inputs; Prices of Agricultural Inputs; Marketing of agriculture produce of farmers in Ogun state will be obtained by administering questionnaire to respondents with the aid of field assistants and colleagues. Where geographical and time constraints existed, the questionnaire will be administered using Google form link.

The data were measured quantitatively and categorically. The categorical data are: Covid-19 (Covid-19 has an impact = 1, otherwise = 0), Sex (Male = 1, otherwise = 0), rainfall (rain = 1, otherwise = 0), temperature (Relative temperature =1, otherwise=0), government support (Farmer received covid-19 financial support = 1, otherwise = 0)**,** and prices of agricultural produce (Relative temperature =1, otherwise=0). The quantitative data are: monthly earnings (₦), owners' age (in completed year), age of business (in completed year), and farm size.

3.5 Data Collection Instruments

This study obtained information obtained through survey

3.5.1 Questionnaires

In this study, the main research instrument is a structured questionnaire, which will be administered to respondents from each of the selected local government area. The questionnaire is designed elicit all relevant information that addresses the problem of the study. The questionnaire

consists of 35 pre-defined choice questions which will be administered through drop and pick method. The questionnaire contains three question types, few open-ended questions; close-ended multiple-choice questions that gives the respondent a choice from a range of answers based on the 5- point Likert-style rating scale; and choice questions that require the respondents to either agree or disagree with the statements made within the range, this ensure that the choice of answers directly addressed research problems (Questionnaire is shown in Appendix I). On the scale 1, is the lowest score and 5 is the highest. The designing of the questionnaire uses input from literature survey and modulated with the inputs from peers.

The questionnaire contained questions to analyse the impact of COVID-19 on aspects such as agricultural production, prices of inputs and outputs, availability of agricultural input, and marketing of agricultural produce. The questionnaire was designed to assess whether the imposition of lockdown to COVID-19 pandemic had impacted the various activities in the agriculture sector adversely, favourably or had no impact.

This method of data collection ensures the originality of opinions and perceptions of respondents under study. The questionnaire is appropriate based on the level of originality, confidentiality, and non-biases on the responses of the respondents. The closed-ended questionnaire is constructed on a five (5) point Liker-type scale for responses to specific items as follows; Very High (coded 5); High (coded 4); Moderate (coded 3); Low (coded 2); and Very Low (coded 1) provided structured responses that facilitated quantitative analysis, testing of hypothesis, and drawing of conclusion.

3.5.2 Administration of the Questionnaires

Prior to the administration of the questionnaire, the essence of the study, the importance of the respondents' participation, who is responsible for the survey, and a statement guaranteeing confidentiality will be explained to the respondents through a personalized covering letter attached to each questionnaire. In addition, the cover letter expresses thanks to the respondents at the end. Given that distance is a constraint to the study, an online survey is an option available to solicit responses from the field. The questionnaire is prepared using goggle form and *online link* will shared with the registered farmers association of each local government seeking their responses through a structured questionnaire.

3.5.3 Piloting and Evaluation of Questionnaires

The complexity surrounding the design of the questionnaire makes it practically impossible even for experts to get it done rightly at the first attempt. Hence, the questionnaires will be pre-tested through pilot test on a small sample of selected respondents that could independently fill the questionnaire. Responses gathered will be analysed and adopted to improve the questionnaire. The essence of the pilot test is to filter questions, improve the question order and layout. Respondents in the pilot program will be given two weeks to fill the questionnaires before collection is made. Concerted efforts will be made to ensure better responses and retrieval of questionnaires from the respondents, this is done through phone calls and repeated visits.

3.6 Method of Data analysis and Evaluation

3.6.1 Model Specification

This study adopts the Ricardian Model. The Ricardian model assumes that each farmer wishes to maximize income (output) subject to the exogenous conditions of their farm. Specifically, the farmer chooses the crop and inputs for each unit of land that maximizes output. As with all empirical investigations, it's possible that the model's functional form could be improved or that the regressions contain significant missing variables. It is assumed that farmers modify their inputs, outputs, and farming operations to maximize the benefits of the farm's location, particularly the climate. The Ricardian model is a static comparison model. It reflects all of the climate-related changes that farmers and ecosystems have made. It is a gauge of climate change's long-term implications. Because it is not a dynamic analysis, it does not account for the costs of transitioning from one climate to another.

This study takes a lead from Akomolafe et al., (2018), and, the study believed the position of the Ricardian model that each farmer wishes to maximize income (output) subject to the exogenous conditions of their farm. Specifically, the farmer chooses the crop and inputs for each unit of land that maximizes output. By modifying the model of Akomolafe et al., (2018), a functional form is expressed as follows:

$$Agrico_t = (TEMP, \mathrm{RAINF}, \mathrm{COR}, DCAS, CPI) \ldots\ldots \quad 3.1$$

This study has three independent objectives, consequently, each of the objective is expressed with an econometric model. For Objective one, *'Impact of COVID-19 on Agric-food production in Ogun State'*. The econometric model is presented in equation 3.2 is specified as:

$$Agrico = \alpha_0 + \alpha_1 \text{TEMP} + \alpha_2 RAINF + \alpha_3 Covid + \alpha_4 DCAS + \alpha_5 Sfam + \alpha_6 \text{Sgovt} + \varepsilon \ldots\ldots\ldots \quad 3.2$$

For Objective two, *'Effect of COVID-19 on prices of Agricultural produce in Ogun state'*. The econometric model is presented in equation 3.3 is specified as:

$$Pagrico = \beta_0 + \beta_1 Agrico + \beta_2 Covid + \beta_3 \text{Sgovt} + \beta_4 Sfam + \beta_5 Dcas + u \ldots\ldots \quad 3.3$$

For Objective three, *'Impact of COVID-19 on livelihood of producers of agriculture commodities in Ogun state'*. The econometric model is presented in equation 3.4 is specified as:

$$Fami = \sigma_0 + \sigma_1 Agrico + \sigma_2 Covid + \sigma_3 \text{Expr} + \sigma_4 Sfam + \sigma_5 Dcas + v \ldots\ldots\ldots\ldots\ldots\ldots 3.4$$

Where,

$Agrico$ is the total Agricultural sector output during and post Covid-19 period.

$Fami$ represent farmer's Income which is a proxy for Farmer's livelihood.

$Agsec$ is a *vector of component of* Agric-food output determinants.

Temp is temperature during and post Covid-19 period.

Rainf is rainfall during and post Covid-19 period.

Covid = components Covid-19 pandemic.

Sgovt is Covid-19 support in terms of finance and agricultural inputs

$Sfam$ = Size of the farm.

Expr = farmers' experience which is proxy for the age of the business.

$Dcas$ = Domestic Credit to Agricultural Sector (proxy for capital investment in the agricultural sector).

ε_t, u_t, v_t are the error term for each of model 3.1, 3.2, and 3.3 respectively.

α_0; β_0; and σ_0 are the constant for each of model 3.1, 3.2, and 3.3 respectively.

A priori expectation

For equation 3.2: α_1 and $\alpha_2$can either be <0 or >0 ; α_4 >0; α_5 >0; α_6>0.

For equation 3.3: β_1 >0; β_2 <0; β_3>0; β_4 >0, and β_5 >0.

For equation 3.4: σ_1 >0; σ_2 <0; σ_3>0; σ_4>0; and σ_5>0.

3.6 Estimation Techniques

Data collected will be analysed. Firstly, coding of data will be done for all primary data, and then the following analysis will apply with the aid of statistical software such as Statistical Package for Social Sciences (SPSS). Descriptive statistics involving simple tables, charts, frequencies, and percentage distributions, as well as mean, standard deviation and variances were used to analyze data that was collected. The regression models for predicting independent variables (Zikmund, 2003).

For Objective One, *'Impact of COVID-19 on Agric-food production in Ogun State'*, and Objective three, *'Impact of COVID-19 on livelihood of producers of agriculture commodities in Ogun state'*. The ordinary least square technique is be employed to ascertain the influence of Covid-19 on agric-food output and farmer's livelihood.

For Objective two, *'Effect of COVID-19 on prices of Agricultural produce in Ogun state'*.

3.7 Validity and reliability

3.7.1 Validity

Content validity was evaluated to examine the content of the questionnaires to determine whether they cover a representative sample of the domains to be measured. Kothari (2004) argues that determination of content validity is primarily judgemental and intuitive. To establish the validity of the research instrument, the researcher sought the opinion of scholars and experts in strategy implementation. All this was geared towards modification of the instrument ensuring that it measured what it ought to measure.

3.7.2 Reliability

Orodho (2004) describes reliability as the ability of a study to replicate its findings on repeated procedures. He also suggests that reliability should be established through a pilot study that must be conducted to at least 10% of the sample and whose participation in the actual data collection should not be encouraged. The researcher preferred this method because it gauged whether the instruments would elicit the same responses in both instances. The validity and reliability of the questionnaire was tested by measuring the internal consistency of the predictor variables using Cronbach's Alpha coefficient. Nunnally and Bernstein (1994), who posit that a coefficient greater than or equal to 0.7 is regarded as acceptable and an indication of construct reliability.

4. Results

4.1 Analysis of Demographic Status

Table 4.1: Demographic Status of Respondents

Category		Frequency	Percent
What role do you play in your establishment?	Employee	90	22.6
	Farmer	309	77.4
Do you have employees?	No	8	2.0
	Yes	391	98.0
What is your sex?	Female	2	0.5
	Male	397	99.5
Are you married?	No	10	2.5
	Yes	389	97.5
Which age group indicates your age?	20 to 29 years of age	393	98.5
	30 to 39 years of age	5	1.3
	40 to 49 years of age	1	0.3
What is your highest level of education?	HND/BSc	391	98.0
	PGD/MSc	7	1.8
	PhD	1	0.3
Do you farm full time? If NO, please indicate your off-farm employment status?	No	95	23.8
	Yes	304	76.2
For how long have you been farming?	Full time	392	98.2
	Part time	7	1.8
Type of agri-business of Description of farm	11 to 15 Years	2	0.6
	6 to 10 Years	391	98.0
	Below 5 Years	6	1.5
For how long have you been farming	Aquaculture	105	26.3
	Crop farming	203	50.9
	Direct Market	2	0.5
	Equipment Dealer/Sales	26	6.5
	Livestock	63	15.8
What is your monthly household income?	50,000 - 100,00	126	31.6
	100,000-200,000	210	52.6
	More than 200,000	63	15.8

Source: Author's Computation, 2022

The Table 4.1 shows the demographic distribution of the respondents by age, sex and education level, and age of Business. A total of 400 questionnaires was administered and 399 were returned. Of all the 399 respondents, 309 were farm owners/ farmers representing 77.4% of the entire target audience while 90 respondents fall in the category of employees. The result of the

description of the respondents by sex is interesting as 397 respondents were male and only 2 female respondents were examined. Since 99.5% of the total respondents were male, it therefore implies that most contemporary farmers in Ogun state are male. Similarly, out of the 399 respondents, 389 respondents (98.5%) were married while only 10 respondents were unmarried.

With regards to the age of the respondents, 393 which represents 98.5% of the respondents were between the age of 20 to 29 years, 5 which represent 1.3% were between the age of 30 to 39 years, with just 1 respondent (0.3%) been between the age of 40 to 49 years. Intuitively, most of the farmer or farm owners in Ogun State are middle-aged, and this explains their innovative prowess to embrace modern technology in agriculture. The level of education level of the respondents shows that 98.0%, that is, 391 respondent were holders of HND/BSc, 7 respondents which represent 1.8% holds a PGD/MSc degree, while only 1 respondent (0.%) hold a PhD degree. Thus indicates that majority of farmers and farm owners that were surveyed are well-learned.

In terms of the length of existence of the farm, 2 respondents have had their farm running between 11 to 15 years, 391 respondents which represents 98.0% claimed that their farm has been existing for as long as years 6 to 10 years while, 6 farmers which represent 1.5% of the respondents claimed that their farm has been running between below 5 years. This shows that most of the farms are young and this corroborates were established between 6 to 10 years. Crop farming is the highest agriculture that is conducted in Ogun State, it has over 50.9% of the respondents (203), and this is followed by Aquaculture which is the second highest category of agriculture that is carried out in Ogun State with 26.3% of the total survey, that is, 105 respondents. Livestock farmers were relatively high when compared to other category with 63 respondents representing 15.8%. The study revealed that most of the farmers earn between 100,000 to 200,000 naira monthly with 201 respondents and 126 farmers earning between 50,000 to 100,000. Only 6 farmers earn an average monthly income of over 200,000 naira.

4.2 Summary of Responses

4.2.1 Responses of the Impacts of COVID-19 on Agricultural Production

Table 4.2: Impacts of COVID-19 on Agricultural Production

Category		Frequency	Percent
Changes in the supply of agricultural product due to COVID-19 impacts	Increase	115	28.8
	Rapidly decreased	47	11.8
	Slightly decreased	237	59.4
Farmers' abilities to carry out agricultural activities affected due to COVID-19 impacts	Maybe	69	17.3
	No	45	11.3
	Yes	285	71.4
Farmer's abilities to carry out the preparation of next planting season affected due to COVID-19 impacts	Maybe	41	10.3
	No	59	14.8
	Yes	299	74.9
Changes in the cultivation area due to COVID-19 impacts	Area has decreased	301	75.4
	Area has increased	46	11.5
	No changes	52	13.0
Changes in Agri-output due to COVID-19 impacts?	Area has decreased	352	88.2
	Area has increased	22	5.5
	No changes	25	6.3
Aggregate production of agriculture and allied sector	Decreased	254	63.7
	Increased	91	22.8
	Remained the same	54	13.5
Availability of agri-inputs	Decreased	237	59.4
	Increased	90	22.6
	Remained the same	72	18.0
At the wake of COVID-19 outbreak, agricultural activities were affected due to	Harvesting	35	8.8
	Land preparation	31	7.8
	Marketing	270	67.7
	Sowing	32	8.0
	Weeding	31	7.8
The main reasons for the disruptions to their agricultural activities due to COVID-19 outbreak is	Expensive farm inputs	68	17.0
	Movement restrictions	232	58.1
	Unavailability of Traders	99	24.8
Which of the list of options best describes your existing farm/business situation	Cash Flow Issues	91	22.8
	Disrupted Markets	87	21.8
	Lack of Labour	29	7.3

	Lack of Supplies	22	5.5
	Low Customer Sales	41	10.3
	Transportation Challenges	129	32.3

Source: Author's Computation, 2022

Table 4.2 presents the responses of the impacts of COVID-19 on agricultural production. The table revealed that a slight decreased was recorded as changes in the supply of agricultural product due to COVID-19 impacts, this is supported by 237 responses which represents 59.4% of the respondents. Similarly, 285 (71.4%) respondents submit that farmers' abilities to carry out agricultural activities was affected by COVID-19 impacts, which means that agricultural activities were affected by Covid-19. 299 respondents which represents 74.9% claimed that as a farmer, their ability to out preparation for next planting season was affected due to COVID-19 impacts. Same goes for changes in the cultivation area due to COVID-19 impacts, 301 farmers said that the farm area decreased as a result of Covid-19.

In term of Changes in Agri-output due to COVID-19 impacts and Aggregate production of agriculture and allied sector, 237 and 352 farmers claimed that there was a decreased in output. At the wake of COVID-19 outbreak, 270 respondents claimed that marketing of agric produces was the first to be affected by covid-19, this represents 67.7% of the entire surveyed farmers. This was followed by harvesting where 35 respondents submitted that harvesting was the second most hit agricultural activities by Covid-19. An interesting part is that most of the disruptions in agricultural activities attributed to COVID-19 outbreak was as a result of restrictions in movement. 232 respondents revealed that their inability to move freely affected agricultural activities.

4.2.2 Responses on the Impacts of COVID-19 on Agricultural Output Pricing and Farmers' Livelihoods

Table 4.3: The Impacts of COVID-19 on Farmers' Livelihoods

Category		Frequency	Percent
Average Price of Agri-inputs	Decreased	51	12.8
	Increased	305	76.4
	Remained the same	43	10.8
Are there changes in the prices of agricultural produce due to COVID-19 impacts?	No changes	44	11.0
	Prices have decreased	23	5.8
	Prices have increased	332	83.2
How do you expect livelihoods will be impacted as a result of disruptions from COVID-19?	Little to no impact	35	8.8
	Moderate impact	86	21.6
	Moderate to severe impact	60	15.0
	Severe impacts	163	40.9
	Some impact	55	13.8
Which statement best reflects food situation in your household due to COVID-19?	Less preferred foods	80	20.1
	No difficulties eating enough food	218	54.6
	Skipped meals or ate less than usual	101	25.3
What is the effected of COVID-19 on household incomes?	Increased	86	21.6
	Sharply decreased	131	32.8
	Slightly decreased	182	45.6
Is there a change in Consumers' shopping behaviour compared to pre-Covid-19?	Agree	234	58.6
	Disagree	22	5.5
	Neutral	41	10.3
	Strongly agree	99	24.8
	Strongly disagree	3	.8
How can you describe the change in consumers' shopping behaviour?	Cheaper produce are preferred	82	20.6
	Larger quantities than usual	38	9.5
	Smaller quantities than usual	279	69.9

Source: Author's Computation, 2022

The table above shows responses of farmers as to how Covid-19 affected agric-food prices and famers' livelihood. Out of the 399 responses, 305 farmers claimed that average prices of Agri-inputs increased during Covid-19 pandemic. This accounted for 76.4% of the surveyed farmers. In terms of the effect of Covid-19 on the price of agricultural produce, 332 farmers which represents

83.2% of the surveyed sample opined that prices of agricultural produce increased significantly due to COVID-19 impacts. Farmers were asked about how COVID-19 may affect their livelihoods, their responses shows that 163 farmers envisage a severe impact while 60 and 86 respondents were of the opinion that covid-19 had a moderate to severe and moderate impact on their livelihood.

In addition, the study revealed that as a result of covid-19 outbreak, consumers now find it difficult to eat enough meals as compared to the pre-Covid era. 218 respondent which represents 54.6% signified that consuming adequate meals has become a thing of the past due to Covid-19 pandemic while 101 (25.3%) claimed that they now skip meals or ate less than usual. In terms of farmer's income, 182 farmers agreed that their incomes had decreased slightly while 131 respondents representing 45.6% believed that there was a sharp decreased in their incomes. When asked if an expected shopping behaviour is envisaged, 99 respondents strongly agreed that consumers' shopping behaviour had changed compared to pre-Covid-19. 279 of the respondents said that as a result of Covid-19, consumers' now buys items in smaller quantities than usual while, 82 respondents representing 20.6% prefers to buy cheaper products.

4.3 Empirical Analysis

Table 4.4: Objective 1- *Impact of COVID-19 on Agric-food production in Ogun State'*

Variable	Coefficient	Std. Error	t-Statistic	Prob.
(Constant)	10.31	2.049	5.03	0.000
Temp	-0.74	1.035	-0.717	0.474
Rainf	0.11	1.132	0.097	0.923
Covid	0.21	0.053	3.948	0.000
Sgovt	1.697	0.300	5.647	0.000
Sfam	1.35	0.000	1.647	0.100
Dcas	-0.01	0.003	-2.665	0.008
R-squared:	0.698	F-statistic	8.158	
Adjusted R-squared:	0.568	Prob(F-statistic)	0.0000	

Source: Researchers' Compilation, 2022

The table above presents the estimation output of the Ordinary Least Square (OLS) regression model. The average value of Agric-food production (Agrico) in Ogun State when all explanatory variables are held constant is 10.31. The study revealed that rainfall and farm size has positive but insignificant impact on Agric-food production. The R^2 figure for this regression model

is 69.8% (as contained in the lower section of the regression table). This means that the explanatory variables (temperature; covid-19 pandemic; government support; and domestic credit to agriculture sector) explain 69.8% of the variations in Agric-food production (Agrico). The F-statistic shows the overall strength of the model. The F-stat is greater than 8.158 (and hence has a p-value of 0.0000), the model has an overall strong predictive power.

4.3.2 The impact on Covid-19 on Prices of Agricultural Products

4.3.1 Classification Accuracy

Table 4.5a and 4.5b shows the classification table. Using the obtained Y function observations which are classified as follows and a prior probability of 0.50. A model is a good model if it has a minimal chance of misclassification. The Fisher linear discriminant analysis was employed in the binary classification.

Table 4.5a: Classification Accuracy

Observed		*Predicted*		***Accuracy %***
		Pagrico		
		.00	1.00	
Pagrico	.00	0	139	0.0
	1.00	0	316	100.0
Total				69.5

The cut value is .500
Source: Author's Computation using SPSS, 2022.

Table 4.5a evaluates the null model that has only the constant in the equation. The binary logistic regression estimates the probability of price of agriculture output (Pagrico), 100.0% were correctly classified and 0.0% were incorrectly classified. The overall correct percentage was 69.5%, which reflects the model's overall explanatory strength.

Table 4.5b: Classification Accuracy without constant

Observed		*Predicted*		***Accuracy %***
		Pagrico		
		.00	1.00	
Pagrico	.00	73	66	52.5
	1.00	10	306	96.8
Total				83.3

The cut value is .500
Source: Author's Computation using SPSS, 2022.

Table 4.5b evaluates the null model that has only the constant in the equation. The full model table 4.5b where the predictors are included, the binary logistic regression estimates the probability 96.8% of price of agriculture output were correctly classified and 52.5% were incorrectly classified. The overall correct percentage was 83.3%, which reflects the model's overall explanatory strength. Therefore, the model provides 83.3% accurate classification.

Table 4.5c: Model summary of Full Model

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	396.715[a]	.302	.426

Table 4.5d: Omnibus Tests of Model Coefficients

Step	Chi-square	Df	Sig.
1	163.342	8	<0.000

Source: Author's Computation using SPSS, 2022

The Logistic regression (LR) statistic ($\boldsymbol{\Lambda}$) is obtained by dividing the maximum of likelihood function under H_0 by the maximum of likelihood function under H_0 or H_1. $\boldsymbol{q}$ regression parameters are set to 0 in the null hypothesis, and if the null hypothesis is true, the $-\mathbf{2log}(\boldsymbol{\Lambda})$ statistic has an approximate $\boldsymbol{\chi q2}$ distribution for a large sample. The decision rule is that the null hypothesis is rejected if $-\mathbf{2lo}(\boldsymbol{\Lambda})>\boldsymbol{\chi q},\mathbf{1}-a\mathbf{2}$ or p-value < a. Table 4.5b provides the – 2loglikelihood and pseudo R2 values for the full model. The – 2loglikelihood (396.715[a]) shows that the model with the explanatory variables significantly provides a better fit than the null model, because there is significant decrease in -2loglikelihood. Hence, all explanatory variables were kept in the model. Cox & Snell R-Square indicating that 30.2% of the variation in the independent variable is explained by the logistic model. Nagelkerke R Square is indicating a moderately strong relationship of 42.6% between the predictors and the prediction.

The R^2 values tells us approximately how much variation in the outcome is explained by the model while Nagelkerke's R^2 suggests that the predictor explain roughly 42.6% of the variation in price of agriculture output. The value of the Omnibus Tests of Model Coefficients goodness of fit statistic for the full model was Chi-square = 163.3 and the corresponding p-value from the chi-square distribution with 8 degree of freedom is 0.000 which means that it is statistically significant and therefore our model is good.

Table 4.5e: Binary Logistic model

Variable	□̂	S.E.	Wald	p-value	Exp(β)
Agrico	.005	.015	.122	.726	1.005
Fami	.000	.000	.380	.537	1.000
Rainf	3.763	.383	96.403	.000	43.084
Covid	.020	.019	1.139	.286	1.020
Sgovt	.222	.091	5.903	.015	1.248
Sfam	.000	.000	.256	.613	1.000
Expr	.066	.037	3.119	.077	1.068
Dcas	-.001	.001	2.334	.127	.999
Constant	-3.750	.822	20.823	.000	.024

a. Variable(s) entered on step 1: Agrico, Fami, Rainf, Covid, Sgovt, Sfam, Expr, Dcas.
Source: Author's Computation using SPSS, 2022**.**

Table 4.5e presents the contribution of each predictor in the full model and the variables with P values less than 0.05 are deemed to contribute significantly to the predictive ability of the model (Wright, 1995). The table provides coefficients and their standard errors (S.E.), Wald test values, p values, odd ratios, and 95% confidence intervals for odds ratios. The Wald test is used to test the set of hypotheses (H0: $Q\boldsymbol{r} = \mathbf{0}$ vs H1: $Q\boldsymbol{r} \neq \mathbf{0}$) for individual regression slope coefficients. It is obtained by dividing the slope coefficients by their standard error. If the null hypothesis is true, the Wald value has an approximate standard normal distribution for a large sample, and the null hypothesis is rejected if the Wald value is greater than the critical standard normal value or the p-value is less than the significance level.

In general, computing the probabilities of each case falling into a specific category, the study revealed that Agriculture output (Agrico) with p = 0.726; farmer's income (Fami) with p = 0.537; Covid-19 (Covid) with p = 0.286; size of the farm (sfam) with p = 0.613; and domestic credit to agriculture sector (Dcas) with p = 0.127 were all insignificant. These variables have no probability of influencing the price of agriculture output (Pagrico) significantly. As a result, the variables are reported only and not interpreted. And the logit is:

Pagrico = -3.750 + 0.005 Agrico + 0.000 Fami - 3.763 Rainf + 0.020 Covid + 0.222 Sgovt - 0.000 Sfam + 0. .066 Expr - 0.001 Dcas

Table 4.6: Objective 3- *'Impact of COVID-19 on farmers' livelihood in Ogun state'.*

Variable	Coefficient	Std. Error	t-Statistic	Prob.
(Constant)	362.46	4842.609	0.075	0.940
Temp	-187.77	1761.824	-0.107	0.915
Rainf	1029.41	1928.775	0.534	0.594
Covid	-253.76	110.442	-2.298	0.022
Sgovt	14548.84	1108.331	13.127	0.000
Sfam	-0.016	.015	-1.093	0.275
Dcas	851.17	199.534	4.266	0.000
Expr	202.01	201.063	1.005	0.316
Pagrico	67.51	13.526	4.991	0.000
R-squared:	0.811	F-statistic	212.097	
Adjusted R-squared:	0.708	Prob(F-statistic)	0.0000	

Source: Researchers' Compilation, 2022

The table above presents the estimation output of the Ordinary Least Square (OLS) regression model. The average value of farmer's income (Fami) in Ogun State when all other variables are held constant is 362.46. The R^2 figure for this regression model is 81.1% (as contained in the lower section of the regression table). This means that the explanatory variables (rainfall, temperature; covid-19 pandemic; government support; experience, price of agriculture produce and domestic credit to agriculture sector) explain 69.8% of the variations in farmer's income. The F-statistic shows the overall strength of the model. Since the F-stat is well greater than 212.097 (and hence has a p-value of 0.0000), it means that the null hypothesis that the regression coefficients are all zero is rejected. That is, the model has an overall strong predictive power.

5. Discussion

Hypothesis One: Impact of COVID-19 on Agric-food production in Ogun State'

To begin with, temperature (Temp) has a coefficient of -0.74. The negative sign of this coefficient indicates that temperature has a negative relationship with Agric-food production. It therefore means that an increase in temperature by one Celsius will reduce Agric-food production in Ogun State by 10.31, holding other factors that affects Agric-food production constant. The fact that its p-value is 0.000 means that temperature is significant at the 5% level. Thus, implies that temperature stimulates Agric-food production in Ogun State.

From the table, the covid-19 pandemic (Covid) has a coefficient of -0.21, this indicates that covid-19 pandemic has a negative relationship with Agric-food production. As a result of this, a persistent increase in covid-19 variant will bring about a reduction in Agric-food production by 0.21, holding other influencing factors constant. The fact that its p-value is 0.0000 means that covid-19 pandemic is statistically significant with Agric-food production at the 1% level of significance. Government support (Sgovt) to the agriculture sector in terms of equipment and finances has a positive and significant relationship with Agric-food production with a coefficient of 1.697. This shows that a unit increase in government support (Sgovt) towards will raise Agric-food production by 1.67. The fact that its p-value is 0.000, this implies that government support significant at the 1% level. Lastly, the domestic credit to agriculture sector (Dcas) has a negative and positive relationship with Agric-food production with a coefficient of -0.01. This means that a unit increase in domestic credit to agriculture sector will reduce Agric-food production by 0.01.

Hypothesis Two: The impact on Covid-19 on Prices of Agricultural Products

The result revealed a negative relationship existed between rainfall and prices of agriculture output, having a coefficient of -3.763, this means that higher rainfall reduces the possibility of increasing prices of agriculture output. The probability of rainfall is p value = .000, as a result, there is high probability that rainfall will affect the price of agriculture output (Pagrico) at 1 percent level of significance. Therefore, as the volume of rainfall increases, the less possibility for the prices of agriculture output to increases. The odds ratio for rainfall is 43.084 times with confidence 95%.

The result also found that a negative relationship existed between government support and prices of agriculture output, having a coefficient of -0.222. Intuitively, government support to the agriculture sector in terms of equipment and finances has less possibility to influence prices of agriculture output to increase. Government support (Sgovt) to the agriculture sector in terms of equipment and finances is significant to prices of agriculture output with a p value of 0.015, this implies that government support significantly affect the probability of reducing the prices of agriculture output at 1 percent level of significance. This is because access to capital stimulate farmers to employ modern equipment and increase output which further reduces prices of agriculture output due to higher supply. The odds ratio for is 1.248 with confidence of 95%.

Lastly, farmers' experience (Expr) has a coefficient of 0.066 is positive and implies that farmers' experience exerts a positive impact on prices of agriculture output; hence, the more yers of farming experiences that a farmer possesses, the likelihood that prices of agriculture output will be increases. This is because, a robust experiences, the farmer knows the up and down town in the market and can leverages on this experiences to manipulate or influence prices in the market either by hoarding or information asymmetry. Farmers' experience is significant to prices of agriculture output with a p value of 0.077, this implies that Farmers' experience significantly affect the probability of increasing prices of agriculture output at 10 percent level of significance. The odds ratio for Farmers' experience 1.068 times with confidence 90%.

Hypothesis Three: Impact of COVID-19 on farmers' livelihood in Ogun state.

The study found that temperature, rainfall, farm size, and farmers experience had an insignificant impact on Agric-food production. Covid-19 pandemic (Covid) has a negative and significant impact on farmer's income with coefficient of -253.76, this indicates that covid-19 pandemic has a negative impact on farmer's income, hence, a persistent increase in covid-19 variant will reduce farmer's income significantly. The fact that its p-value is 0.022 means that covid-19 pandemic is statistically significant with farmer's income at the 5% level of significance.

Government support (Sgovt) to the agriculture sector in terms of equipment and finances has a positive and significant relationship with farmer's income with a coefficient of 14548.84. This shows that a unit increase in government support raises farmer's income. The fact that its p-value is 0.000, this implies that government support significant at the 1% level. Lastly, the

domestic credit to agriculture sector (Dcas) has a positive and significant impact on farmer's income having a coefficient of 851.17. This means that a unit increase in domestic credit to agriculture sector will reduce farmer's income. The result further revealed that price of agriculture output (Pagrico) exert a positive and significant impact on farmer's income with a coefficient of 67.51. The positive sign indicates that a unit increase in price of agriculture output raises farmers' income in Ogun State. Thus, price of agriculture output is farmer's income improving.

6. Conclusions

Sequel to the findings above, this study concluded that most contemporary farmers in Ogun state were well-learned married men with at least 6 to 10 years farming experience with average monthly income of 100,000 to 200,000 naira. The dimension of impact that covid-19 had a slight decreased and recorded a decrease in supply of agricultural inputs, agricultural activities and agricultural product, and farmers' abilities to carry out agricultural activities were limited as a result of movement restrictions and marketing challenges. In terms of farmer's livelihood, the study concluded farmers experienced a sharp decreased in their incomes which lead to changes in their consumption behaviour as a result, consuming enough quality of meal was difficult and most times farmers adjusted by skipping meals.

Temperature, Covid-19 pandemic, and domestic credit had a negative and significant impact on Agric-food production while government support exerted a positive and significant relationship. The study concluded that temperature reduce Agricultural sectors ability to provide more food production in Ogun State and that persistent outbreak of newer variants of covid-19 pandemic reduce Agric-food production. Furthermore, government support can raise Agric-food production while domestic credit to agriculture sector will reduce Agric-food production

The result revealed a negative relationship existed between rainfall and prices of agriculture output, having a coefficient of -3.763, this means that higher rainfall reduces the possibility of increasing prices of agriculture output. The probability of rainfall is p value = .000, as a result, there is high probability that rainfall will affect the price of agriculture output (Pagrico) at 1 percent level of significance. Therefore, as the volume of rainfall increases, the less possibility for the prices of agriculture output to increases. The odds ratio for rainfall is 43.084 times with confidence 95%.

A negative relationship existed between government support and prices of agriculture output, government support influence prices of agriculture output to increase. Farmers' experience (Expr) had positive and implies that farmers' experience exerts a positive impact on prices of agriculture output. Hence, the study concluded that farmers' experience is a vital variable that determines prices of agriculture output

The concluded that temperature, rainfall, farm size, and farmers experience had no insignificant impact on Agric-food production. However, Covid-19 pandemic (Covid) has a negative and significant impact on farmer's income, thus, covid-19 is welfare reducing. In another hand, government support to the agriculture sector in terms of equipment and finances, and domestic credit to agriculture sector both had a positive and significant relationship with farmer's income. Hence, government support and domestic credit are one of the major sources to increases farmer's income and welfare.

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Appendices

Appendix 1: Questionnaire

Appendix 2: Regression 1: Impact of COVID-19 on Agric-food production in Ogun State'

Appendix 3: Regression 2- 'Effect of COVID-19 on prices of Agricultural produce in Ogun State'.

Appendix 4: Regression 3- 'Impact of COVID-19 on livelihood of producers of agriculture commodities in Ogun state'.

Appendix 1: Questionnaire

Czech University of Life Sciences Prague
Faculty of Economics and Management
Department of Sustainable Technologies

Topic: Impact of COVID-19 on the Nigeria Economy: Case Study of Ogun State Agricultural Sector (South west)
Dear Sir/Ma,

I am a Postgraduate student in the above-named Department, and as a prerequisite for the award of Masters' Degree in Economics. I am conducting a study on the 'Impact of COVID-19 on Agricultural Production in Nigeria: A case study of Farmers in Ogun State'.

This survey questionnaire is strictly for academic research purposes. I shall be grateful if you could take time off your busy schedule to respond frankly to the questions below. Information provide in this questionnaire will be held very confidential.

I thank you in advance for your cooperation.

Yours faithfully,

Adeboye Adedeji Isreal

Researcher

QUESTIONNAIRE

SECTION I: Background Information

Directions: Please place a mark in/check the box next to the answer of your choice or write in the space provided.

1. SECTION I: DEMOGRAPHICS

1.1	What role do you play in your establishment?	Farmer or Agribusiness Owner/Partner [ ] Employee [ ]
1.2	Do you have employees?	Yes [ ] No [ ]
1.3	What is your sex?	Male [ ] Female [ ]
1.4	Are you married?	Yes [ ] No [ ]
1.5	Which age group indicates your age?	20 to 29 years of age [ ] 30 to 39 years of age [ ] 40 to 49 years of age [ ] 50 to 59 years of age [ ] 60 to 69 years of age [ ] 70 + years of age [ ]
1.6	What is your highest level of education?	SSCE [ ] OND/NCE [ ] HND/BSc [ ] PGD/MSc [ ] PhD [ ] Others [ ]
1.7	What is your monthly household income?	Less than ₦50,000 [ ] ₦50,000 - ₦100,000 [ ] ₦100,000 - ₦200,000 [ ] More than ₦200,000 [ ]
1.8	Do you farm full time?	Yes [ ] No [ ]
1.9	If NO, please indicate your off-farm employment status?	Full time [ ] Part time [ ]
1.10	For how long have you been farming? Below 5 Years [ ] 6– 10 Years [ ] 11 – 15 Years [ ] Above 15 Years [ ]	
1.11	Type of agri-business of Description of farm	Livestock [ ] Aquaculture [ ] Crop farming [ ] Direct Market [ ] Equipment Dealer/Sales [ ] Forestry/Timber [ ]

SECTION II

Directions: Please state the extent to which you agree or disagree with the following statements by ticking the space in front of each question on your views on the following.

In this section, questions are raised to find out the respondents' view about the impact of COVID-19 on Agricultural Output in Ogun State, Nigeria.

2. THE IMPACTS OF COVID-19 ON AGRICULTURAL PRODUCTION

2.1	Has there been any changes in the supply of agricultural product by COVID-19 impacts?	Increase [ ] Slightly decreased [ ] Rapidly decreased [ ] No change [ ]
2.2	Were farmers' abilities to carry out agricultural activities affected due to COVID-19 impacts?	Yes [ ] No [ ] Maybe [ ]
2.3	Will farmer's abilities to carry out the preparation of next planting season affected by COVID-19 impacts?	Yes [ ] No [ ] Maybe [ ]
2.4	Has there been any changes in the cultivation area due to COVID-19 impacts?	Area has increased [ ] Area has decreased [ ] No changes [ ]

2.5	Has there been changes in Agri-output due to COVID-19 impacts?	Agri-output has increased [ ] No changes [ ] Agri-output has decreased [ ]
2.6	Whether the aggregate production of agriculture and allied sector?	Increased [ ] Decreased [ ] Remained the same [ ]
2.7	Has the availability of agri-inputs?	Increased [ ] Decreased [ ] Remained the same [ ]
2.8	Which of the list of options best describes your existing farm/business situation due to disruption from the COVID-19 crisis?	Disrupted Markets [ ] Low Customer Sales [ ] Cash Flow Issues [ ] Transportation/Shipping Challenges [ ] Lack of Supplies [ ] Lack of Labour [ ]
2.9	At the wake of COVID-19 outbreak, what agricultural activities were affected?	Land preparation [ ] Sowing [ ] Weeding [ ] Harvesting [ ] Marketing [ ]
2.10	What were the main reasons for the disruptions to their agricultural activities?	Unavailability of Middlemen/Traders [ ] Inaccessible or expensive farm inputs [ ] Movement restrictions [ ] Transport limitations [ ] Reduced demand for farm produces [ ] Lack of labour forces [ ]

SECTION III

In this section, questions are raised to find out the respondents' view about the impact of COVID-19 on Agricultural Produce Pricing, Farmers livelihood in Ogun State, Nigeria.

3. THE IMPACTS OF COVID-19 ON OF AGRICULTURAL OUTPUT PRICING AND FARMERS' LIVELIHOODS

3.1	Average Price of Agri-inputs Increased [ ] Decreased [ ] Remained the same [ ]	
3.2	Whether procurement of Agri-input has been impacted? No Impact [ ] Impacted Adversely [ ] Impacted Favourably [ ]	
3.3	Are there changes in the prices of agricultural produce due to COVID-19 impacts?	Prices have increased [ ] No changes [ ] Prices have decreased [ ]
3.4	What were the main reasons why consumers could not access the markets?	Markets were closed [ ] Transport limitations [ ] Movement restrictions [ ] Security concerns [ ] Members of household are self-quarantining [ ]
3.5	How do you expect livelihoods will be impacted as a result of disruptions from COVID-19?	Little to no impact [ ] Some impact [ ] Moderate impact [ ] Severe impacts [ ] Moderate to severe impact [ ]
3.6	Which statement best reflects food situation in your household due to COVID-19?	No difficulties eating enough food [ ] Less preferred foods [ ]

		Skipped meals or ate less than usual [ ]
3.7	What is the effected of COVID-19 on household incomes?	Sharply decreased [ ] Slightly decreased [ ] Increased [ ] No change [ ] Maintain income levels [ ]
3.8	Is there a change in Consumers' shopping behaviour compared to pre-Covid-19?	Strongly Agree [ ] Agree [ ] Neutral [ ] Disagree [ ] Strongly disagree [ ]
3.9	How can you describe the change in consumers' shopping behaviour?	Larger quantities than usual [ ] Smaller quantities than usual [ ] Cheaper produce are preferred [ ] Going to other markets [ ]

Replying address
dejiolaolu4jesus@yahoo.co.uk
Adeboye Adedeji Isreal
Department of Sustainable Technologies

APPENDIX 1: Result of Descriptive Analysis

```
FREQUENCIES VARIABLES=Role Employees Sex Relationship Age Education i ii iii iv v vi vii viii ix
x xi xii xiii xiv xv xvi xvii xviii xix xx xxi
  /STATISTICS=STDDEV MEAN MEDIAN
  /BARCHART FREQ
  /ORDER=ANALYSIS.
```

Frequencies

Notes

Output Created		08-MAR-2022 20:11:27
Comments		
Input	Active Dataset	DataSet0
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	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	399
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics are based on all cases with valid data.
Syntax		FREQUENCIES VARIABLES=Role Employees Sex Relationship Age Education i ii iii iv v vi vii viii ix x xi xii xiii xiv xv xvi xvii xviii xix xx xxi /STATISTICS=STDDEV MEAN MEDIAN /BARCHART FREQ /ORDER=ANALYSIS.
Resources	Processor Time	00:00:05.91
	Elapsed Time	00:00:05.50

[DataSet0]

Statistics

		Role	Employees	Sex	Relationship	Age	Education	i
N	Valid	399	399	399	399	399	399	399
	Missing	0	0	0	0	0	0	0

Statistics

		ii	iii	iv	v	vi	vii	viii
N	Valid	399	399	399	399	399	399	399
	Missing	0	0	0	0	0	0	0

Statistics

		ix	x	xi	xii	xiii	xiv	xv
N	Valid	399	399	399	399	399	399	399
	Missing	0	0	0	0	0	0	0

Statistics

		xvi	xvii	xviii	xix	xx	xxi
N	Valid	399	399	399	399	399	399
	Missing	0	0	0	0	0	0

Frequency Table

Role

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Employee	90	22.6	22.6	22.6
	Farmer	309	77.4	77.4	100.0
	Total	399	100.0	100.0	

Employees

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	8	2.0	2.0	2.0
	Yes	391	98.0	98.0	100.0
	Total	399	100.0	100.0	

Sex

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Female	2	.5	.5	.5
	Male	397	99.5	99.5	100.0
	Total	399	100.0	100.0	

Relationship

	Frequency	Percent	Valid Percent	Cumulative Percent

Valid	No	10	2.5	2.5	2.5
	Yes	389	97.5	97.5	100.0
	Total	399	100.0	100.0	

Age

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	20 to 29 years of age	393	98.5	98.5	98.5
	30 to 39 years of age	5	1.3	1.3	99.7
	40 to 49 years of age	1	.3	.3	100.0
	Total	399	100.0	100.0	

Education

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	HND/BSc	391	98.0	98.0	98.0
	PGD/MSc	7	1.8	1.8	99.7
	PhD	1	.3	.3	100.0
	Total	399	100.0	100.0	

i

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	95	23.8	23.8	23.8
	Yes	304	76.2	76.2	100.0
	Total	399	100.0	100.0	

ii

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Full time	392	98.2	98.2	98.2
	Part time	7	1.8	1.8	100.0
	Total	399	100.0	100.0	

iii

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	11 to 15 Years	1	.3	.3	.3
	11 to15 Years	1	.3	.3	.5
	6 to 10 Years	391	98.0	98.0	98.5
	Below 5 Years	6	1.5	1.5	100.0
	Total	399	100.0	100.0	

iv

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Aquaculture	105	26.3	26.3	26.3
	Crop farming	203	50.9	50.9	77.2
	Direct Market	2	.5	.5	77.7
	Equipment Dealer/Sales	26	6.5	6.5	84.2
	Livestock	63	15.8	15.8	100.0
	Total	399	100.0	100.0	

v

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		2	.5	.5	.5
	Increase	113	28.3	28.3	28.8
	Rapidly decreased	47	11.8	11.8	40.6
	Slightly decreased	237	59.4	59.4	100.0
	Total	399	100.0	100.0	

vi

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Maybe	69	17.3	17.3	17.3
	No	45	11.3	11.3	28.6
	Yes	285	71.4	71.4	100.0
	Total	399	100.0	100.0	

vii

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Maybe	41	10.3	10.3	10.3
	No	59	14.8	14.8	25.1
	Yes	299	74.9	74.9	100.0
	Total	399	100.0	100.0	

viii

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Area has decreased	301	75.4	75.4	75.4
	Area has increased	46	11.5	11.5	87.0
	No changes	52	13.0	13.0	100.0
	Total	399	100.0	100.0	

ix

	Frequency	Percent	Valid Percent	Cumulative Percent

		205	51.4	51.4	51.4
	Area has decreased	147	36.8	36.8	88.2
Valid	Area has increased	22	5.5	5.5	93.7
	No changes	25	6.3	6.3	100.0
	Total	399	100.0	100.0	

x

		Frequency	Percent	Valid Percent	Cumulative Percent
	Decreased	254	63.7	63.7	63.7
	Increased	91	22.8	22.8	86.5
Valid	Remained the same	54	13.5	13.5	100.0
	Total	399	100.0	100.0	

xi

		Frequency	Percent	Valid Percent	Cumulative Percent
	Decreased	237	59.4	59.4	59.4
	Increased	90	22.6	22.6	82.0
Valid	Remained the same	72	18.0	18.0	100.0
	Total	399	100.0	100.0	

xii

		Frequency	Percent	Valid Percent	Cumulative Percent
	Harvesting	35	8.8	8.8	8.8
	Land preparation	31	7.8	7.8	16.5
	Marketing	270	67.7	67.7	84.2
Valid	Sowing	32	8.0	8.0	92.2
	Sowing;Weeding	29	7.3	7.3	99.5
	Weeding	2	.5	.5	100.0
	Total	399	100.0	100.0	

xiii

		Frequency	Percent	Valid Percent	Cumulative Percent
	Inaccessible or expensive farm inputs	68	17.0	17.0	17.0
	Movement restrictions	232	58.1	58.1	75.2
	Unavailability of Middlemen/Traders	70	17.5	17.5	92.7
Valid	Unavailability of Middlemen/Traders;Inaccessible or expensive farm inputs;Movement restrictions	29	7.3	7.3	100.0
	Total	399	100.0	100.0	

xiv

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Cash Flow Issues	91	22.8	22.8	22.8
	Disrupted Markets	87	21.8	21.8	44.6
	Disrupted Markets;Lack of Labour	29	7.3	7.3	51.9
	Lack of Supplies	22	5.5	5.5	57.4
	Low Customer Sales	41	10.3	10.3	67.7
	Transportation/Shipping Challenges	129	32.3	32.3	100.0
	Total	399	100.0	100.0	

xv

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Decreased	51	12.8	12.8	12.8
	Increased	305	76.4	76.4	89.2
	Remained the same	43	10.8	10.8	100.0
	Total	399	100.0	100.0	

xvi

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No changes	44	11.0	11.0	11.0
	Prices have decreased	23	5.8	5.8	16.8
	Prices have increased	332	83.2	83.2	100.0
	Total	399	100.0	100.0	

xvii

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Little to no impact	35	8.8	8.8	8.8
	Moderate impact	86	21.6	21.6	30.3
	Moderate to severe impact	60	15.0	15.0	45.4
	Severe impacts	163	40.9	40.9	86.2
	Some impact	55	13.8	13.8	100.0
	Total	399	100.0	100.0	

xviii

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Less preferred foods	80	20.1	20.1	20.1
	No difficulties eating enough food	218	54.6	54.6	74.7

	Skipped meals or ate less than usual	101	25.3	25.3	100.0
	Total	399	100.0	100.0	

xix

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Increased	86	21.6	21.6	21.6
	Sharply decreased	131	32.8	32.8	54.4
	Slightly decreased	182	45.6	45.6	100.0
	Total	399	100.0	100.0	

xx

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Agree	234	58.6	58.6	58.6
	Disagree	22	5.5	5.5	64.2
	Neutral	41	10.3	10.3	74.4
	Strongly agree	99	24.8	24.8	99.2
	Strongly disagree	3	.8	.8	100.0
	Total	399	100.0	100.0	

xxi

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Cheaper produce are preferred	82	20.6	20.6	20.6
	Larger quantities than usual	38	9.5	9.5	30.1
	Smaller quantities than usual	279	69.9	69.9	100.0
	Total	399	100.0	100.0	

Appendix 2: Regression 1: *Impact of COVID-19 on Agric-food production in Ogun State'*

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	Dcas, Rainf, Sgovt, Temp, Sfam, Covid[b]	.	Enter

a. Dependent Variable: Agrico
b. All requested variables entered.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.714[a]	.698	.586	8.85247	.098	8.158	6	448	.000

a. Predictors: (Constant), Dcas, Rainf, Sgovt, Temp, Sfam, Covid

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	3835.892	6	639.315	8.158	.000[b]
	Residual	35108.078	448	78.366		
	Total	38943.969	454			

a. Dependent Variable: Agrico
b. Predictors: (Constant), Dcas, Rainf, Sgovt, Temp, Sfam, Covid

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	10.306	2.049		5.031	.000
	Temp	-.742	1.035	-.034	-.717	.474
	Rainf	.110	1.132	.005	.097	.923
	Covid	-.207	.053	-.222	3.948	.000
	Sgovt	1.697	.300	.264	5.647	.000
	Sfam	1.348E-005	.000	.086	1.647	.100
	Dcas	-.008	.003	-.141	-2.665	.008

a. Dependent Variable: Agrico

Appendix 3: Regression 2: *'Effect of COVID-19 on prices of Agricultural produce in Ogun state'*.

Case Processing Summary

Unweighted Cases[a]		N	Percent
Selected Cases	Included in Analysis	455	100.0
	Missing Cases	0	.0
	Total	455	100.0
Unselected Cases		0	.0

Total	455	100.0

a. If weight is in effect, see classification table for the total number of cases.

Dependent Variable Encoding

Original Value	Internal Value
.00	0
1.00	1

Classification Table[a,b]

			Predicted		
			Pagrico		Percentage Correct
			.00	1.00	
Step 0	Pagrico	.00	0	139	.0
		1.00	0	316	100.0
	Overall Percentage				69.5

a. Constant is included in the model.
b. The cut value is .500

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 0	Constant	.821	.102	65.112	1	.000	2.273

Variables not in the Equation[a]

			Score	df	Sig.
Step 0	Variables	Agrico	.347	1	.556
		Fami	.980	1	.322
		Rainf	157.662	1	.000
		Covid	.173	1	.678
		Sgovt	1.892	1	.169
		Sfam	.973	1	.324
		Expr	.447	1	.504
		Dcas	.004	1	.953

a. Residual Chi-Squares are not computed because of redundancies.

Omnibus Tests of Model Coefficients

		Chi-square	df	Sig.
Step 1	Step	163.342	8	.000
	Block	163.342	8	.000
	Model	163.342	8	.000

Model Summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	396.715[a]	.302	.426

a. Estimation terminated at iteration number 5 because parameter estimates changed by less than .001.

Classification Table[a]

	Observed		Predicted		
			Pagrico		Percentage Correct
			.00	1.00	
Step 1	Pagrico	.00	73	66	52.5
		1.00	10	306	96.8
	Overall Percentage				83.3

a. The cut value is .500

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	Agrico	.005	.015	.122	1	.726	1.005
	Fami	.000	.000	.380	1	.537	1.000
	Rainf	-3.763	-.383	96.403	1	.000	43.084
	Covid	.020	.019	1.139	1	.286	1.020
	Sgovt	-.222	-.091	5.903	1	.015	1.248
	Sfam	.000	.000	.256	1	.613	1.000
	Expr	.066	.037	3.119	1	.077	1.068
	Dcas	-.001	.001	2.334	1	.127	.999
	Constant	-3.750	.822	20.823	1	.000	.024

a. Variable(s) entered on step 1: Agrico, Fami, Rainf, Covid, Sgovt, Sfam, Expr, Dcas.

Appendix 4: Regression 3 *'Impact of COVID-19 on* farmers' livelihood in Ogun state*'*.

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	Pagrico, Rainf, Agrico, Expr, Temp, Sfam, Covid, Sgovt, Dcas[b]	.	Enter

a. Dependent Variable: Fami
b. All requested variables entered.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.901[a]	.811	.807	15069.57366	.811	212.097	9	445	.000

a. Predictors: (Constant), Pagrico, Rainf, Agrico, Expr, Temp, Sfam, Covid, Sgovt, Dcas

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	433490841601.950	9	48165649066.883	212.097	.000[b]
	Residual	101055962318.952	445	227092050.155		
	Total	534546803920.902	454			

a. Dependent Variable: Fami

b. Predictors: (Constant), Pagrico, Rainf, Agrico, Expr, Temp, Sfam, Covid, Sgovt, Dcas

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	362.463	4842.609		.075	.940
	Temp	-187.766	1761.824	-.002	-.107	.915
	Rainf	1029.406	1928.775	.012	.534	.594
	Covid	-253.762	110.442	-.073	-2.298	.022
	Sgovt	14548.841	1108.331	.620	13.127	.000
	Sfam	-.016	.015	-.028	-1.093	.275
	Dcas	851.170	199.534	.240	4.266	.000
	Agrico	-28.831	78.233	-.008	-.369	.713
	Expr	202.005	201.063	.021	1.005	.316
	Pagrico	67.514	13.526	.345	-4.991	.000

a. Dependent Variable: Fami