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COVID-19 PANDEMIC RESTRICTION'S EFFECT ON NIGERIA'S FOOD SECURITY: A CASE STUDY OF KWARA STATE

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Abstract

The study examined the impact of COVID-19 regulations on food security in Kwara state, Nigeria, through a survey of 200 rural farmers using a structured questionnaire. Analyzing the data through descriptive statistics, factor analysis, and robust OLS statistics, the study revealed that movement restrictions (-0.32), low farmer income (-0.53), insecurity issues (-0.09), herdsmen farmland invasion (-0.21), and government palliatives (-0.10) all negatively and significantly affected food production during the pandemic. Consequently, food security in the area was adversely affected. The study suggests that addressing issues of insecurity, herdsmen farmland invasion, and ensuring effective delivery of relief to farmers, including facilitating their access to soft loans, should be prioritized by the government.

Keywords: COVID-19 Pandemic, Restriction, Food Security and security issues

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1.0 INTRODUCTION

1.1 Background of the Study

An intuitive, rather loose, definition of an epidemic is a sudden, sharp increase in the incidence of a communicable disease, which afflicts a large number of people in a relatively short period of time and like many modern-day viral Pandemic (e.g., MERS, SARS). SARS-CoV-2 emerged from the folds of the food system and of which the dominant narrative puts its earliest appearance in the wet "animal" market of the Chinese city of Wuhan. Similarly, there are indications that SARS-CoV-2, which is responsible for the COVID-19 pandemic did not only originate from the food system, but it also penetrated it and exposed its systemic weaknesses (Zurayk, 2020). According to Nigeria Centre for Disease Control (NCDC, 2020), COVID-19 is zoonotic and the symptoms compatible with COVID-19 are fever, cough and difficulty in breathing and patient's classification is based on a combination of clinical, epidemiological and laboratory findings.

However, given that African countries seem to have relatively low infection rates, (Rosales and Mercado, 2020) the most politically, socially, and economically practical strategy is to stay ahead of the virus by implementing containment measures that localize their response to COVID-19 in a way that will stop the virus from spreading further (Iroulo & Boateng 2020). Consequently, the enforcement of social distancing policy such as restriction of movement of people resulted in the economic downturn in Nigeria which was triggered by the decline in oil price at the international market.

In addition, the disruptions caused by this pandemic are now threatening the food security of billions of people in the world most especially in Nigeria where majority of the populations are daily income earners. Indeed, hunger could double due to food supply disruptions caused by the pandemic, especially in developing nations such as Nigeria as these pressures on food security caused by the pandemic will not affect all countries or all citizens equally. Therefore, identifying the different stresses on food security systematically, will track the pandemic's pressures on food system. Hence, every policymaker in African nations needs one foundational component herein: an emergency mindset besides the self-evident purpose of containment should be to restore

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economic life as quickly as possible because global food supply chains could be subjected to disturbances and these emergency responses in African nations should be considered only the first phases in a much-needed, urgent, long-term strategy (Iroulo & Boateng, 2020).

Nigeria is food insecure and the numbers of hungry Nigerians keep rising as a result of lockdown order due to Covid-19 pandemic coupled with other factors affecting food production, post harvest losses, herdsmen and farmer's crises, insecurity and increasing population (Ufearoh, 2020). Therefore, all this pose a great threat to food security in most developing nations and in the view of the numerous threats posed by this pandemic epidemic as discussed above in relation to food security, this research tends to examine the impact of COVID-19 pandemic on food security in Kwara State, Nigeria. The main objective of this study is to examine the effect of COVID-19 pandemic on food security in Nigeria using Kwara State as a case study. The specific objectives are, to - describe the socio-economic characteristics of the respondents in the study area; and determine the effect of COVID-19 on food security of the respondents during the lockdown.

This research has been carried out to provide information for policy makers including government at various levels of the economy, researchers and farmers through extension agents, who are in need of knowledge on possibilities of food insecurity due to COVID-19 pandemic so as to proffer possible solutions and to contribute to existing knowledge on communicable diseases outbreak and food security.

2.0 LITRATURE REVIEW

2.1 Conceptual Overview

The key concepts: economic impacts of COVID-19 pandemic, proliferation of food insecurity due to COVID-19 Pandemic and the empirical theory will be discussed below with the aim of showing their interrelationship to the subject matter

2.2 The Economic Impact of COVID-19 Pandemic

The economic impacts of pandemic are broad; some of them are quantifiable, but many are not. The relationship between the costs inflicted on individual households and those on the society in

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aggregate can vary considerably across Pandemic, as that can be between the direct and indirect costs and that between the long- and short-term effects (Lewis, 2001). Demographic factors played a decisive role in determining the general level of economic activity during medieval times, whereas modern Pandemic occur in a world with instant information, and so can affect business confidence even when the attendant death toll is small and far away. The historical context also matters. Other key influences are the nature of the disease, the duration of the epidemic, and the socioeconomic groups affected. The extraordinary measures that are accompanying the pandemic, especially the lockdown, results in a complete loss of income for the daily Income earners, peasant farmers, etc.

2.3 Proliferation of Food Insecurity Due to COVID-19 Pandemic

The Food and Agriculture Organization (FAO, 2020a) states that COVID-2019 is affecting agriculture in two significant aspects: the supply and demand for food. These two aspects are directly related to food security; thus food security is also at risk.

2.3.1 Food supply Chain

This is a network that connects an agricultural system (the farm) with the consumer's table, including processes such as manufacturing, packaging, distribution, and storage (Chen et al., 2020). Initially, the announcements of social distancing, physical distancing, social isolation and lock down policy introduced by government at different levels (federal and state) following the recommendations of World Health Organization (WHO) and Nigeria Centre for Disease Control (NCDC) made people go to the supply centers and generate a shortage of some products, despite this, the food supply has stabilized because it is one of the systems that must be maintained to ensure food security. One of FAO's roles is to promote and ensure that food value chains are not interrupted and continue to operate (FAO, 2020b). Thus, despite the restrictions that government has imposed on the mobility of labor in agricultural systems, although with some problems, the supply of basic necessities of life is normally assured. The situation is different when it comes to goods that are imported or exported; due to the closure of borders, international trade was interrupted, although after having defined security protocols to avoid the spread of the virus, trade stabilized and this may be temporary because it depends on what countries are doing to

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stop the spread of the virus. Hence, part of the food supply system, are the social programs that some countries have, in which they feed millions of families and children with limited economic resources. This supply system is being served in different ways:

a. Delivery of food rations of basic necessities in the country.

b. Economic allocation equivalent to the cost of food rations of basic necessity. Interruptions to food transfers are minimal, so the food supply remains stable, (Zhang, 2020).

Although it depends on the country and the measures that each one has adopted, globally the prices are not stable again; therefore, spikes in the prices of basic necessities are expected as been seen already in most developing nations, although it is more likely to occur for high-value products, especially meat and perishables. One of the indices that measure the variation of the price worldwide is the FAO Food Price Index (FFPI), a measure of the monthly variation of the international prices of a basket of food products. According to the FAO (2020c), the FFPI of February 2020 had an average of 180.5 points, that is, 1.9 points (1.0%) less than in January, constituting the first month on- month decrease after four months' consecutive increases.

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2.3.2 Food demand

Demand implies the willingness and ability of consumers to pay money for a particular good or service, during any particular period (Gottheil, 2013). The demand for food has increased even though there seem to be reduction in people's spending capacity, the situation could worsen if the pandemic continues for a long time, due to reduced income and job losses (FAO, 2020b). Since China represents an important market in world trade and where the COVID-19 disease started, her experience shows an increase in online demand in the food and beverage sector, due to quarantine policies (FAO, 2020a). In situations like these, where a virus spreads on contact, contactless delivery services become preferred by consumers.

2.3.3 Food security

Food security implies that everyone has unrestricted access to food that allows them to satisfy their basic needs (Rosales and Mercado, 2020). Not taking quick action implies an imminent

food crisis, with a greater effect on the most vulnerable population. Measures should focus on keeping global food supply chains active and mitigating the impacts of the pandemic across the food system. Social programs act as an umbrella that minimizes the effect of short-term crises.

The first vulnerable groups are people who experience chronic hunger and do not consume enough caloric energy to live a normal life, which currently numbers about 820 million people (FAO, 2020a). This group of people cannot afford any possible interruption of their livelihoods or access to food that a situation with COVID-19 could bring. In countries where such people live, the consequence in the spread of the virus could be serious with health systems with limited capacity. The second vulnerable groups are small farmers, they constitute larger percentage of population in the developing nations and their contribution towards the economic growth of the nation cannot be over emphasize**,** in this time of epidemic small scale farmers may be prevented from working on their land and accessing markets to sell their products or buy seeds and other essential inputs.

The third vulnerable groups are children from low-income families, who are mainly nourished by food provided by social programs; the suspension of these programs due to the pandemic may leave these group of people without food so, make nutrition to be at risk, hence, as a consequence the existence of children with limited capacity to cope with diseases (FAO, 2020d). Thus, each country must direct its actions to maintain social food programs, taking the necessary precautions to avoid transmission of the virus.

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2.3 Theoretical Underpinning

The theoretical framework adopted for the analysis of this study is drawn from the Theory of systemic approach in relation to food system as complex systems and livelihood approach.

2.3.1 The Systemic Approach: Food Systems as Complex Systems

In a general term, food system can be regarded as a system that made up of all the interacting social and ecological components that affect the food security of a given group of people. The food system involves all the phases from production to the end user of the commodity (food) produced, through distribution and processing (Alinovi, Mane and Romano 2009). This definition is general and conceptually very broad because it entails many dimensions' ranging

from economic, social, institutional, technological and cultural. The implication of this is that the stability of a jointly determined system depends less on the stability of its individual components but on its ability to maintain self-organization that is flexible in the face of stress and shocks. This ultimately means moving from a static, deterministic analysis towards a dynamic, stochastic analysis for the analysis of food systems and food security (Alinovi, 2009).

2.3.2 Livelihood Approaches

The Rise and fall of Livelihood Approaches: The sustainable livelihoods concept provided a rich new schema for the researchers. At the moment, livelihoods approaches are most useful as an analytical or heuristic tool (Clark & Carney, 2008). They provide a way to order information and understand not only the nature of poverty but also the links between different aspects of people's livelihoods. A livelihood is sustainable when it can cope with and recover from stress and shocks, maintain and enhance its capabilities and assets, and provide sustainable livelihood and this approaches have proved to be valuable in the following specific areas (Clark and Carney, 2008):

- understanding the dynamics of the trajectory out of social protection to the production and promotion of more viable livelihoods, even for individuals with very few assets;
- analyzing complex trends such as climate change and conflict situations i.e. situations where a key objective is to strengthen people's overall resilience as the future becomes more uncertain and these could be linked to practical action;
- providing a framework for understanding food crises and how and why it affects different groups in different ways.

Finally, livelihood approaches can help pinpoint the key differences between different socio-economic groups as well as being used to rack changes over time and it will prove fundamental for resilience analysis

2.4 The Empirical Studies

Siche (2020) examined what is the impact of COVID-19 disease on agriculture? The result revealed that there is sufficient evidence to affirm that the pandemic caused by the COVID-19

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disease has an important effect on agriculture and the food supply chain, mainly affecting food demand and consequently food security, with a great impact on the most vulnerable populations.

Kost (2020) investigate the geospatial hotspots need point-of-care strategies to stop highly infectious outbreaks: Ebola and corona virus with the objectives to stop outbreaks, accelerate detection, facilitate emergency response for Pandemic, mobilize public health practitioners, enhance community resilience, and improve crisis standards of care. The investigation revealed that point of care testing (POCT) can interrupt spirals of dysfunction and delay by enhancing disease detection, decision making, contagion containment, and safe spacing, thereby softening outbreak surges and diminishing risk before human, economic, and cultural losses mount.

Priyadarshini (2020) conducted a Survey on some of the global effects of the COVID-19 pandemic. The survey revealed that global effect of the COVID-19 pandemic are identified and certain trends related to the same over the approximate time period of January 2020- March 2020 have been observed. The impacts of the COVID-19 outbreak on the global Gross Domestic Product (GDP), the travel and tourism industry and high-tech product shipments have been analyzed.

Boukhatem (2020) investigate the novel corona virus Disease 2019 (COVID-19) outbreak in Algeria: A new challenge for prevention. The investigation shows that it is fundamental to explore the explanations for people's poor compliance with recommendations and rules and to take exact measures in order to improve them.

Khan, Naushad, Fahad, Faisal and Muhammad (2020), examined the Covid-2019 and world economy. The result shows that Unity in the world is necessary for controlling of Corona virus because if one country control but the other is not, then, it is impossible to control the whole world. So, unity in the world is required for control of corona virus.

Burkle (2020) studied the declining public health protections within autocratic regimes: impact on global public health security, infectious disease outbreaks, Pandemic, and pandemics. The study revealed that treaties remain the most successful means the world has in preventing, preparing for, and controlling Pandemic in an increasingly globalized world.

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Ozili (2020) examined the Covid-19 pandemic and economic crisis - the Nigerian experience and structural causes. It showed that the spillover of Covid-19 pandemic into Nigeria coupled with declining oil price, which were external shocks, caused the economic crisis in Nigeria in 2020 and structural problems at the time prolonged the economic crisis.

Ozili (2020) examined the COVID-19 in Africa - socioeconomic impact, policy response and opportunities. The result shows that it is possible that, once the pandemic is over, most African countries will enter into an unavoidable recession because most African countries benefit significantly from the global supply chain and oil dependent African countries.

Guetiya and Clarke (2020) studied how prepared is Africa to face COVID-19? The study revealed that the fear associated with COVID-19 may also lead to some of the long-standing messages about simple measures to reduce the spread, such as hand washing, finally becoming absorbed and more universally adopted by health workers and the public.

Abdullahi, Emeribe, Mustapha, Fasogbon, Ofor, Opeyemi, and Nwofe (2020) exploring the genetics, ecology of SARS-CoV-2 and climatic factors as possible control strategies against COVID-19. The investigation shows that it is necessary for scientists to delve into fabrication, production and standardization of SARS-CoV-2 rapid diagnostic tests strips and enzyme immunoassay kits (antigen-based ELISA), as adjunctive to the currently available protocols (especially in developing countries).

Evans (2020) studied the Socio-economic impacts of novel corona virus: The policy solutions. The study showed that the economic implications are thus detrimental not only to public health systems but to trade and travel, food and agriculture industries, various market types and retail chains, among others.

Iroulo and Boateng (2020) investigated why African States must localize corona virus response. The investigation shows that even if COVID-19 ends today, many will still have to contend with the problems of inadequate health infrastructure, stunted economic growth, limited social protection for the vulnerable, a small manufacturing sector, and in some cases the abuse of political and human rights.

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WFP and UNICEF. (2020) studied mitigating the effects of the COVID-19 pandemic on food and nutrition of school children. The study showed that in countries with home grown school feeding programmes, the livelihoods of smallholder farmers and suppliers are at risked when such programmes are disrupted.

Bizoza and Sibomana (2020) examined the indicative socio-economic impacts of the novel corona virus (Covid-19) outbreak in Eastern Africa: Case of Rwanda. Results indicate that despite promising stepwise policy measures taken by the government of Rwanda and how the population is positively responding to these measures, these sub-sectors will be negatively affected by the COVID-19 though at different levels. The external merchandise trade and SMEs are expected to be more affected than the agricultural sector.

Kelly-Cirino, Nkengasong, Kettler, Tongio, Gay-Andrieu, Escadafal and Boehme (2019) examined the importance of diagnostics in epidemic and pandemic preparedness. The result shows that identifying overlaps in diagnostic development needs across different priority pathogens would allow timelier and cost-effective use of resources than a pathogen by pathogen approach; target product profiles for diagnostics should be refined accordingly.

Abbasi, Ghoochani, Ghanian and Kitterlin (2016) studied the assessment of households' food insecurity through the use of USDA Questionnaire with the aim to assess the food security situation over period of 12 months among urban households in Karaj and its suburbs, and specifically to investigate the link between household food security and key influencing variables, namely household income level and residence history. Also based on other studies, the relationships between age, education and gender of the heads of household and household food insecurity levels were also explored. This study confirms that unemployment, low income, and lack of education may expose families to the risk of food insecurity, thus intensifying poverty-related problems.

Smallman (2015) examined whom do you trust? Doubt and conspiracy theories in the 2009 influenza pandemic. The result revealed that every pandemic undermines the bonds of trust that unite people with their national governments and health authorities; globally, people in both wealthy and less-developed countries lacked trust in what they depicted as transnational elites,

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who might make decisions about the bodies and health of citizens in poorer nations based on the financial interests of wealthy nations.

Otte, Hinrichs, Rushton, Roland-Holst and Zilberman (2008) studied the impacts of avian influenza virus on animal production in developing countries. The paper ends by outlining directions of future research that combine epidemiology and economics to provide a framework for disease control decision making.

2.4.2 Summary and gap Identified

Previous literatures have attempted to provide answers to effects of Covid-19 at different level of the economy but there is still none of this researches give a robust estimation of Covid-19 effect on food security, so, the rationale for this study emanated from the fact that there are few body of literature that investigates the linkages between effects of covid-19 on agriculture in relation to food security in developing countries, yet, far less is known about this relationship in developing countries such as Nigeria and Africa in general. However, most of the studies reviewed in this research are cross-country studies of which only few pinpoints the effects of covid-19 on agriculture as most developing country may be food insecure post covid-19 due to the outbreak of covid-19 pandemic and its related activities. Therefore, to fill the gaps this study tends to investigates the effects of COVID-19 pandemic restriction on food security in Nigeria using a case of Kwara State.

3.0 METHODOLOGY

3.1 Introduction

This chapter presents the methods that were used to conduct the study. It specifically dealt with the research design, study area, sample and sampling technique, model specification, measurement of variable, the research instruments, data collection procedures and data analysis techniques.

3.2 Research Design

This study used survey research design, and also adopted descriptive and inferential method to obtain information concerning the current status of the phenomena to describe "what exists" with

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respect to variables or conditions in a situation (Key, 1997 cited in Mohamed & Muturi, 2017). The study aimed at describing the socio-economic characteristics of the respondents as well as examination of the effect of COVID-19 on income generation, as well as to determine the factors affecting the income generation of the respondents during and after COVID-19 pandemic lockdown.

3.3 Study Area

For this study, farm level data were collected from 200 rural farmers in Kwara State, Nigeria popularly known as "state of harmony". Kwara State is one of the 36 states of Nigeria, a state located in the North-Central geopolitical zone of Nigeria, commonly referred to as the Middle Belt. The State has 16 Local Government Areas, and its headquarters is Ilorin. With coordination of 8°30′N 5°00′E, the State has abundant land area estimated to be 36,825 km^2 (14,218 sq mi). As of 2006, the population of Kwarans was 2.37 million based on the Nigeria 2006 Census. The state is made up of 1.69% of the Nation's total population having relied upon immigration for population growth and socioeconomic development. The State is predominantly rural with an estimated 75 percent of the population engaged in rain-fed subsistence agriculture and farm families are mainly rural. Farming is the major occupation of Kwara State indigenes and the State has numerous mineral resources such as tourmaline, tantalite, and many mineral deposits in the northern part; Cocoa and Kolanut in the Southern parts Oke - Ero, Ekiti and Isin LGA.

3.4 Validity and Reliability of Research Instruments

In validating the primary research instruments, Face validity was used: Face validity simply means that the validity is taken at face value (Cronbach, 1971 & Nesterov, 2005). As a check on face validity, test/survey items (questionnaires) were sent to experts on the subject matter to gather useful suggestions for modification. The instrument was accurately scrutinized and validated for its face content by the experts who are from various fields of agriculture and rural development finance. To test for the reliability, the researcher used a Cronbach's Alpha test to measure the internal consistency and how closely related a set of items are as a group in the questionnaire administered.

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3.5 Sample and Sampling Technique

In this study, due to the proximity of Ilorin to the researchers' base and because many farmers in the area participates in off-farm activities, purposive and multi-stage random Sampling Technique was used to select Ilorin the State capital of Kwara State; households of the correspondent were randomly selected among communities in Ilorin town using an appropriate sampling fraction in order to make the sampling design to be self-weighting thereby avoiding sampling bias. 200 farm households were randomly selected from rural communities for the study.

3.6 Methods of Data Collection

The study used primary data and it was collected directly from the respondents through the use of well-structured questionnaires. The researcher physically administered the questionnaires to the respondents' resident to make sure that the respondents answer the questions at their own convenient time and it was thoroughly explained to the respondents so as to fully understand the questions with the aim of making it easy for them to answer. The study used open and close-ended format types of questionnaires to obtain information from the respondents. The closed-ended format provided respondents with options to choose from, while the open-ended format allowed respondents to provide their own answers.

3.7 OLS Regression Model Specification

A model used by Peng, Lee, & Ingersoll, (2002) was adapted to suit the objectives of the research. The model can be expressed as stated thus:

$$Y = \beta_0 + \beta_1 GP + \beta_2 HFI + \beta_2 IEG + \beta_4 IP + \beta_5 LFI + \beta_6 AMF + \beta_7 MR + \beta_8 FP + \beta_9 COM + \beta_{10} NFL + \beta_{11} SAF + \mu i$$

Y = (Food Security)

β_0 = Constant Variable

Explanatory variables included in the model are:

GP = Government Palliatives

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HFI = Herdsmen Farmland Invasion

IEG = Inflated Essential Goods

IP = Insecurity Problem

LFI= Low Farmer Income

AMF = Access to Medical Facilities

MR = Movement Restrictions

FP = Farmland Preparation

COM = Closure of Open Market

NFL = Non-availability of Farm Labour

SAF = Scarcity of Agricultural Funds

μ_i = Error Term

3.8 Model Estimation Technique

The cost of factor affecting the income generation and food production was used for the measurement of food insecurity among the respondents while the Robust OLS model was adopted for the analysis of the determinants of food insecurity in this study. The test for the null hypothesis was conducted using factor analysis, Wald statistics tests for joint significance of parameters and linear restriction of parameters**.**

3.8.1 Robust Ordinary Least Squares Regression

The regression parameters of the study's objectives were estimated using the ordinary least squares (OLS) method. Because the dependent variables in this model are continuous variables, this is the best option. OLS is deemed the best linear unbiased (BLU) estimator among all linear unbiased estimators due to the continuous nature of the dependent variables. To account for the possibility of heteroscedasticity, the estimations are done with robust standard error estimates.

Therefore, the study employed MM-estimation which is a combination of S-estimation and M-estimation. The procedure starts by performing S-estimation, and then uses the estimates

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obtained from S-estimation as the starting point for M-estimation. Since MM-estimation is a combination of the other two methods, it addresses outliers in both the dependent and independent variables (Abonazel & Rabie, 2019; Koller & Stahel, 2017; Sepasi, Roose & Matsuura, 2015).

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RESULTS AND DISCUSSION

4.1 Descriptive Analysis of Respondents Bio data

The results of descriptive analysis are presented here in order to show the description of each of the variables, particularly, those pertaining to the demographic information of the respondents of this study.

Table 4.1:

Demographic Distribution of Respondents

	Frequency	Percent	Valid Percent	Cumulative Percent
Sex of the Respondent				
MALE	108	54.0	54.0	54.0
FEMALE	92	46.0	46.0	100.0
Total	**200**	**100.0**	**100.0**	
Age of the Respondent				
18 - 30	40	20.0	20.0	20.0
31 - 40	76	38.0	38.0	58.0
41 - 50	60	30.0	30.0	88.0
51 - 60	24	12.0	12.0	100.0
Total	**200**	**100.0**	**100.0**	
Marital Status of the Respondent				
Single	36	18.0	18.0	18.0
Married	144	72.0	72.0	90.0
Divorced	16	8.0	8.0	98.0
Widow	4	2.0	2.0	100.0
Total	**200**	**100.0**	**100.0**	
Household Size of the Respondent				
1 -3	16	8.0	8.0	8.0
4 – 6	48	24.0	24.0	32.0
7 – 9	64	32.0	32.0	64.0
10>	72	36.0	36.0	100.0
Total	**200**	**100.0**	**100.0**	
Educational Status of the Respondent				
No Formal Education	24	12.0	12.0	12.0
Quranic Education	8	4.0	4.0	16.0
Adult Education	4	2.0	2.0	18.0
Primary Education	12	6.0	6.0	24.0
Secondary Education	36	18.0	18.0	42.0
Tertiary Education	116	58.0	58.0	100.0
Total	**200**	**100.0**	**100.0**	

Source: Field survey, 2023

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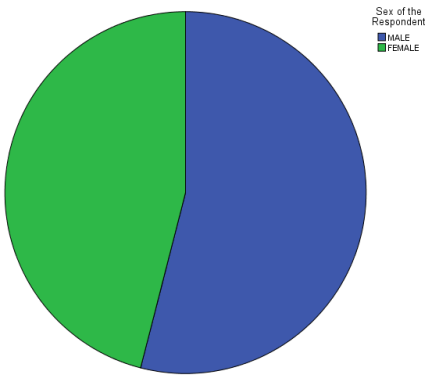
Entries on Table 4.1 below showed that majority (54%) of the respondents are male while (46%) of the respondents are female.

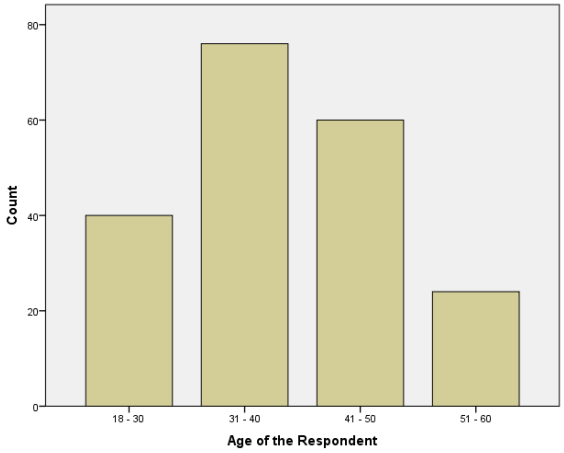
Figure 4.1: Sex of the Respondent



Source: Author's Field Computations, 2023.

The proportion of respondents' age 18 – 30 years is (20%), 31 – 40 years of age is (38%) while that of 41 – 50 years is (30%) and 51 – 60 years is (12%). This evidently depicts that the survey targeted household heads either male or female because they have sufficient information to give valid responses about their respective households on which elaborate food security analysis can be based.

Figure 4.2: Age of the Respondent



Source: Author's Field Computations, 2023.

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The result in table 4.1 above also shows that (18%) of the respondents are single, (72%) of the respondents are married, (8%) of the respondents are divorced and (2%) of the respondents are widow.

Evidently from table 4.1 above, majority of the respondents (36%) have household size within the range of 10 and above persons. Minority followed by the bracket 1 – 3 persons which accounted for (8%) of the respondents, while a household size of 4 – 6 persons accounted for (24%) of the respondents and 7 – 9 persons' class interval of the household accounted for (32%) of the respondents.

The result from the table 4.1 above also shows that (12%) of the respondents do not have formal education, (4%) of the respondents attended Qur'anic education, (2%) of the respondents attended adult education, (6%) of the respondents completed primary education, while (18%) of the respondents completed secondary education and majority (58%) of the respondents completed tertiary education.

Figure 4.3: Distribution of the respondents according to their Educational Status

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4.2. Preliminary Analyses

The results of the preliminary analysis undertaken in this study are presented in this section. These include a reliability test using Cronbach's alpha as a measure of the survey instrument's internal consistency, as well as a principle components analysis prior to OLS estimation of the main regression analysis. These were used to meet the goals of this study project. The food security issues during covid-19 pandemic lockdown in Kwara State, Nigeria, is the dependent variable in this study. The ordinary least squares (OLS) regression was utilized for the continuous dependant variable in the regression results reported in this section. To mitigate for any heteroscedasticity, our regression model used robust estimates of standard errors.

4.2.1 Reliability of Research Instruments

The Cronbach's Alpha measure of internal consistency reliability was used to assess the reliability of this study research instrument. Cronbach's alpha is a measure of internal

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consistency, or how closely a group of things are related to one another. It is regarded as a scale dependability indicator.

The reliability was assessed using the guidelines proposed by George and Mallery (2003), Kline (2000), and DeVellis (2012). These guidelines suggest that internal consistency is excellent when Cronbach's alpha is 0.9 and above, good when Cronbach's alpha is 0.8 and less than 0.9, acceptable when Cronbach's alpha is 0.7 and less than 0.8, questionable when Cronbach's alpha is 0.6 and less than 0.7, poor when Cronbach's alpha is 0.5 and less than 0.6, and unacceptable when Cronbach's alpha is less than 0.5.

Table 4.2: Cronbach's Alpha Reliability Test for the Study

S/N	SECTION	NUMBER OF ITEMS	CRONBACH'S ALPHA	INTERNAL CONSISTENCY
1.	Food Security Issues	8	0.790	Acceptable
2.	Effects on Income Generation	19	0.737	Acceptable

Source: Author's Field Computations, 2023.

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4.2.2 Principal Components Analysis

The questions in the questionnaire under each construct were reduced to variables using principal components analysis. The results, which include the total variance explained and rotated component matrix, are shown here.

Table 4.3: Total Variance Explained Result for Factors Affecting the Income Generation and Food Production

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.933	20.698	20.698	3.933	20.698	20.698	2.485	13.079	13.079
2	2.482	13.063	33.760	2.482	13.063	33.760	2.400	12.633	25.712
3	1.816	9.559	43.319	1.816	9.559	43.319	1.824	9.599	35.311
4	1.592	8.377	51.697	1.592	8.377	51.697	1.751	9.218	44.529
5	1.475	7.765	59.462	1.475	7.765	59.462	1.712	9.010	53.539
6	1.248	6.566	66.028	1.248	6.566	66.028	1.701	8.953	62.492
7	1.124	5.918	71.946	1.124	5.918	71.946	1.438	7.567	70.059
8	1.000	5.264	77.210	1.000	5.264	77.210	1.359	7.151	77.210
9	.829	4.365	81.575						
10	.690	3.631	85.206						
11	.556	2.928	88.134						
12	.513	2.703	90.837						
13	.398	2.095	92.932						
14	.377	1.984	94.917						
15	.306	1.608	96.524						
16	.227	1.193	97.717						
17	.190	.998	98.715						
18	.156	.820	99.536						
19	.088	.464	100.000						

Extraction Method: Principal Component Analysis.

Source: Author's Field Computations, 2023.

Since these are the components with eigenvalues greater than one, the principal components analysis for factors affecting income generation and food production maintained eight (8) components. The eight retained components account for over 77 percent of the total variance for

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factors affecting income generation and food production during the covid-19 pandemic lockdown, according to the cumulative variance explained.

Table 4.4: Component Matrix Result for Factors Affecting the Income Generation and Food Production

Component Matrix[a]

	Component							
	1	2	3	4	5	6	7	8
Movement restriction	.544	-.109	.180	-.021	.115	-.478	-.230	-.465
Non-availability of farm labour	.501	.546	-.173	.082	-.063	.201	.306	.015
Scarcity of agricultural fund	.487	.488	-.307	-.380	-.018	.059	.110	.143
Non-availability of farm input	.741	.170	-.363	-.091	-.055	.085	.082	-.170
Closure of open market	.508	.592	-.051	.145	-.028	.031	-.407	.116
Access to medical facilities	.446	.209	-.001	.155	.000	.124	-.591	.043
Mental state of the farmers	.044	-.218	.290	.346	.385	.573	.032	-.232
Health status of the farmers	.092	.269	-.199	.656	.180	.181	.180	-.323
Personal financial level	.088	.076	.134	.376	.576	-.556	.047	.025
Fear of contracting the pandemic by farmers	.270	.261	.097	-.271	.694	.040	.360	.164
Poor sensitization on the effect of Covid-19 to the farmers	.575	-.336	.095	-.294	-.215	-.084	.181	-.466
Limited access to government palliative	.074	.103	.682	.319	-.395	.188	.157	.084
Unavailability of community health services during the lockdown	.501	-.248	.492	-.437	.220	.131	.037	.097
Limited access to extension information service during lockdown	.663	-.476	.105	.006	.048	.255	-.110	.104
Limited access to farm related peer-group information	.503	.179	.572	.050	-.033	-.090	-.130	.226
High cost of labour during lockdown	.401	.323	.148	.247	-.329	-.306	.283	.049
Problem of insecurity during lockdown	.573	-.485	-.182	.203	-.256	-.017	.222	.041
Invading of farm by herdsmen	.330	-.552	-.186	.351	-.020	-.210	.156	.469
Poor market network	.418	-.478	-.479	.117	.178	.093	-.193	.116

Extraction Method: Principal Component Analysis.

a. 8 components extracted.

Source: Author's Field Computations, 2023.

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The representation of the eight (8) retained components of all the items of factors affecting income generation and food production during the covid-19 pandemic lockdown is shown in the result of the rotated matrix conducted for factors affecting income generation and food production during the covid-19 pandemic lockdown. Values less than 0.3 were excluded from the study since they account for low variance in such a component and make the table simpler to read. Component 1 can be stated to reflect Movement limitation as a result of the fact that the majority of the items with the highest loads under this component address Movement restriction. Because the majority of the items with the largest loads under this component are things that address non-availability of agricultural labor, it may be claimed that Component 2 represents non-availability of farm labor. Because the majority of the items with the highest loads under this component are items that address scarcity of agricultural fund, it can be claimed that Component 3 represents scarcity of agricultural fund. Component 4 can also be stated to reflect the closing of the open market because the majority of the items with the largest loads under this component deal with the closure of the open market. Similarly, component 5 might be thought of as representing government palliative care, as the majority of the products with the largest loads fall under this heading. Component 6 can also be stated to represent herders' farmland invasion because the majority of the items with the highest loads under this component deal with herdsmen farmland invasion. Furthermore, component 7 can be thought of as representing access to medical facilities, as the majority of the products with the highest loads under this component are related to medical facilities. More specifically, component 8 can be stated to represent the insecurity concern because the majority of the products with the largest loads fall under this component.

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Table 4.5: Total Variance Explained Result for Food Security Issues during Covid-19 pandemic lockdown

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.269	40.859	40.859	3.269	40.859	40.859	2.404	30.048	30.048
2	1.243	15.540	56.399	1.243	15.540	56.399	2.108	26.351	56.399
3	.869	10.864	67.263						
4	.806	10.078	77.341						
5	.726	9.077	86.418						
6	.491	6.141	92.559						
7	.366	4.574	97.133						
8+	.22++9	2.867	100.000						

Extraction Method: Principal Component Analysis.

Source: Author's Field Computations, 2023.

Because these are the components with eigenvalues larger than 1, the principal components analysis undertaken for food security difficulties during the covid-19 pandemic lockdown retained two (2) components. The cumulative variance explained for the two retained components is 56.399 percent, showing that the components retained together account for almost 56 percent of the whole variance for food security difficulties during the Covid-19 pandemic lockdown.

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Table 4.6: Component Matrix Result for Food Security Issues during Covid-19 pandemic lockdown

Component Matrix[a]

	Component	
	1	2
I worry my food will run out…	.408	.470
I eat the same thing for several…	.584	.483
I rely on a limited number of…	.683	.430
I eat less than I think I should…	.761	.021
I cut the size of my meals and…	.728	-.124
I am often hungry but I do not eat…	.643	-.044
I cannot give my child(ren)/house…	.607	-.443
My child(ren) are not eating eno…	.635	-.625

Extraction Method: Principal Component Analysis.

a. 2 components extracted.

Source: Author's Field Computations, 2023.

The representation of the two retained components of all the items of food security concerns during Covid-19 pandemic lockdown is shown in the result of the rotational matrix conducted for food security issues during Covid-19 pandemic lockdown. Values less than 0.3 were excluded from the study since they account for low variance in such a component and make the table simpler to read. Component 1 can be stated to reflect low income as a result of the fact that most of the items with the highest loads under this component are related to low income. Because the majority of the items with the largest weights under this component are things that concern inflated essential goods, it may be claimed that Component 2 represents inflated essential goods.

4.3 Presentation of Regression Model

4.3.1 Robust OLS Regression Result for Effect of COVID-19 on Food Security

The effect of the COVID-19 pandemic on food security in Nigeria is examined using a robust OLS regression model. The scores derived from the principal components analysis (PCA) undertaken to reduce the items under the construct are the continuous dependent variable in this model.

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When the test was run with the Breusch-Pagan/Cook-Weisberg heteroskedasticity test, an initial result was generated using OLS estimation, but it had a heteroskedasticity problem. The OLS estimation of the model with robust estimates of standard errors to adjust for the heteroskedasticity problem is shown in Table 4.7.

Table 4.7: OLS Regression Result for Effect of COVID-19 on Food Security

Variable	Coefficient	Std. Error	z-Statistic	Prob.
FARMLAND_PREPARATION	0.108638	0.065105	1.668661	0.0952
CLOSURE_OF_OPEN_MARKET	-0.002727	0.063211	-0.043140	0.9656
GOVERNMENT_PALLIATIVE	-0.101537	0.046731	-2.789801	0.0035
HERDSMEN_FARMLAND_INVASI	-0.208550	0.060116	-3.469121	0.0005
INFLATED_ESSENTIAL_GOODS	-0.305139	0.072731	-4.195466	0.0000
INSECURITY_PROBLEM	-0.092547	0.031618	-2.501941	0.0031
LOW_INCOME	-0.529872	0.064991	-8.153032	0.0000
MEDICAL_FACILITIES_ACCES	-0.113213	0.057179	-1.979988	0.0477
MOVEMENT_RESTRICTION	-0.317414	0.057442	-5.525792	0.0000
NON_AVAILABILITY_OF_FARM	-0.114560	0.064527	-1.775392	0.0758
SCARCITY_OF_AGRIC_FUND	-0.102432	0.063359	-1.616689	0.1059
C	-0.040064	0.055752	-0.718610	0.4724

Robust Statistics

R-squared	0.339675	Adjusted R-squared	0.301039
Rw-squared	0.508921	Adjust Rw-squared	0.508921
Akaike info criterion	204.1245	Schwarz criterion	247.3374
Deviance	92.34770	Scale	0.708909
Rn-squared statistic	141.5112	Prob(Rn-squared stat.)	0.000000

Source: Author's Field Computations, 2023.

The result on Table 4.7 shows that the negative coefficient of government palliatives (-0.101537) indicates that a 1% increase in government palliatives during the Covid-19 lockdown will result in a -0.101537 percent decrease in food security. The negative coefficient of herdsmen farmland invasion (-0.208550) indicates that a 1% reduction in herdsmen farmland invasion during the Covid-19 lockdown will result in a 0.208550 percent increase in food security. Furthermore, the

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negative coefficient of inflated essential goods (-0.305139) indicates that a 3% decrease in inflated essential goods during the COVID-19 lockdown will result in a -0.305139 percent decrease in food security. Likewise, the negative coefficient of insecurity problem (-0.092547) indicates that a percentage decrease in insecurity during the Covid-19 lockdown will result in a -0.092547 percent increase in food security. Additionally, the negative coefficient of farmer low income (-0.529872) indicates that a percentage decrease in farmer low income during the Covid-19 lockdown will result in a -0.529872 percent decrease in food security. Also, because of the negative coefficient of access to medical facilities (-0.113213), an increase in access to medical facilities during the Covid-19 lockdown will result in a -0.113213 percent decrease in food security. Finally, because of the negative coefficient of movement restrictions (-0.317414), a percentage reduction in movement restrictions during the Covid-19 lockdown will result in a -0.317414 percent decrease in food security.

Therefore, the tabulated result on Table 4.7 demonstrates that government palliatives, herdsmen farmland invasion, inflated essential goods, insecurity problem, low farmer income, access to medical facilities, and movement restrictions have significant coefficients. This claim is supported by their individual p-values, which are smaller than the 0.05 significance level used in the study. Farmland preparation, closure of open market, the unavailability of farm labour, and the scarcity of agricultural funds, on the other hand, are not significant because their separate p-values are bigger than the 0.05 significance level.

The diagnostic result on Table 4.7 shows that R-squared has a value of 0.339675, which indicates that 33.97% percent of variations in the food security are explained by the factors captured in the model. This shows about 66.03% change in the dependent variable is caused by other variables not found in the model but measured by the error term. In addition, the Rn-squared statistic 141.5112 statistic and accompanying p-value of 0.00 imply a strong rejection of the null hypothesis that all non-intercept coefficients are equal to zero. Thus, it is conceivable to conclude that the entire model is significant and well-fitting based on this outcome. Lastly, the output shows the value of the deviance, information criteria, and the estimated scale. These measures may be of use when comparing models.

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Table 4.8: Results of Variance Inflation Factor

Coefficients[a]		
Model	Collinearity Statistics	
	Tolerance	VIF
(Constant)		
MR	.007	1.338
NFL	.011	2.022
SAF	.005	1.687
COM	.010	2.110
AMF	.100	1.364
GP	.100	1.115
IP	.011	2.125
HFI	.009	1.843
IEG	.011	1.588
FP	.022	1.695
LFI	.021	1.385
a. Dependent Variable: Food Security		

Source: Author's Field Computations, 2023.

The result of the variance inflation factor was used to see if the OLS result for food security had a problem with multicollinearity. The VIFs are extremely low, as evidenced by the results. VIF values below 4 are generally considered to indicate that there is no severe multicollinearity (Asteriou & Hall, 2016). This demonstrates that none of the explanatory variables are a linear combination of the others.

4.3.2 Summary of Test of Hypotheses

The robust OLS regression model results for the hypothesis testing of the effect of covid-19 pandemic restriction on food security in Nigeria were summarized in Table 4.9 using a case study of Kwara State. Ho_1 stated that "*there is no significant effect of COVID-19 on food security*". The null hypothesis Ho_1 was shown to be false, while the alternative hypothesis was found to be true.

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Tables 4.9: Summary of Test of Hypothesis on the Effect of covid-19 Pandemic Restriction on Food Security in Nigeria using a case Study of Kwara State

Var	Hypothesis	Result/Sign Obtained	Decision/Support for Hypothesis
H_{01}	there is no significant effect of COVID-19 on food security	Significant (-ve)	Reject
H_0	there is a significant effect of COVID-19 on food security	Significant (+ve)	Accept

Source: Researcher's Design, (2023).

4.4 Discussion of Findings

The regression models in Table 4.7 evaluate the impact of COVID-19 restrictions on food security in Nigeria, leading to the rejection of the hypothesis that suggests no significant effect of COVID-19 on food security in Kwara State. The study finds that government palliatives, herdsmen farmland invasion, inflated essential goods, insecurity, low farmer income, limited access to medical facilities, and movement restrictions have negative coefficients. This indicates that during the COVID-19 lockdown, these factors adversely affected food production.

Discussing the findings, the study reveals that government palliatives had a negative effect on food security, suggesting that the intended objective of boosting food security through palliative distribution during the pandemic was not achieved. The results contradict the livelihood approaches theory, which emphasizes sustainable livelihoods that can cope with stress and shocks. This finding aligns with previous studies by Priyadarshini (2020), Amare et al. (2021), Balana et al. (2020), and Ozili (2020).

Additionally, the study uncovers that herdsmen farmland invasion, inflated essential goods, and insecurity significantly negatively affected food security in Kwara State. This implies that these issues contributed to the decreased food production during the COVID-19 movement restriction, contrary to the systemic approaches theory. The stability of the system is suggested to depend on maintaining self-organization in the face of stress and shocks. However, the findings indicate that the security of farmers and the affordability of essential agricultural inputs are crucial for

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increasing production, consistent with Amare et al. (2021), Priyadarshini (2020), Balana et al. (2020), and Ozili (2020).

Furthermore, the study notes that limited access to medical facilities and movement restrictions also have a significant negative effect on food security in Kwara State. This suggests that the inability of farmers to easily access medical facilities and move around without restrictions contributed to low food production during the pandemic, supporting the livelihood approaches theory. This finding aligns with Balana et al. (2020), Ozili (2020), and Amare et al. (2021).

Finally, variables such as farmland preparation, closure of open markets, unavailability of farm labor, and scarcity of agricultural funds do not show a significant effect on food security in Kwara State according to the study.

5.1 Conclusion

This study focused on examining covid-19 pandemic restriction's effect on Nigeria's food security, using Kwara State as a case study. Beyond pinpointing the food security challenges prevalent during the outbreak, the investigation recognized that factors influencing family food accessibility are often specific to the local context. By concentrating on Kwara State, the study aimed to shed light on the impact of the COVID-19 pandemic on food security in Nigeria, with a focus on describing the socioeconomic characteristics of respondents in the area and assessing how COVID-19 affected their food security during the lockdown.

The study's findings revealed that government palliatives, herdsmen farmland invasion, inflated essential goods, insecurity problems, low farmer income, restricted access to medical facilities, and movement restrictions significantly influenced food security in Kwara State during the COVID-19 pandemic restrictions. Notably, the study identified a negative relationship between income generation and food security, suggesting that government-imposed lockdowns were contributing to increased food insecurity. This aligns with recent findings from a grey literature review, indicating that lockdowns and mobility restrictions during the pandemic had substantial impacts on food security, primarily through income losses and reduced purchasing power, particularly affecting the most vulnerable households.

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In conclusion, the study observed that lockdown measures disproportionately disrupted non-farm business activities, leading to significant income loss and an uptick in food insecurity for households relying on these activities. However, the impact of lockdown measures on wage-related activities was comparatively smaller. This observation is consistent with the systemic approach, considering food systems as complex entities, and supports the livelihood approach theory, which posits that sustainability is achievable when livelihoods can effectively cope with life-threatening challenges like the effects of the COVID-19 pandemic on food security.

Overall, the study's implications highlight the importance of addressing social safety nets in both rural and urban regions, emphasizing the ongoing discourse in the region. These findings provide valuable insights for governments and international donor organizations, aiding in refining targeting strategies to identify the most disadvantaged sub-populations. Additionally, they offer guidance for the formulation of immediate and medium-term social protection measures.

5.2 Recommendations

Based on the findings of this study about the effects of a covid-19 pandemic restriction on food security in Nigeria, using Kwara State as a case study, the following were recommended;

- To alleviate the effects of the pandemic on smallholders, legislative measures to improve agricultural supply chains, including input distribution systems and agricultural produce marketing, are needed.

- That government should look into the issues of insecurity, herdsmen farmland invasion and ensure that palliative to farmers are effectively distributed as well as enabling them to have easy access to soft loan.

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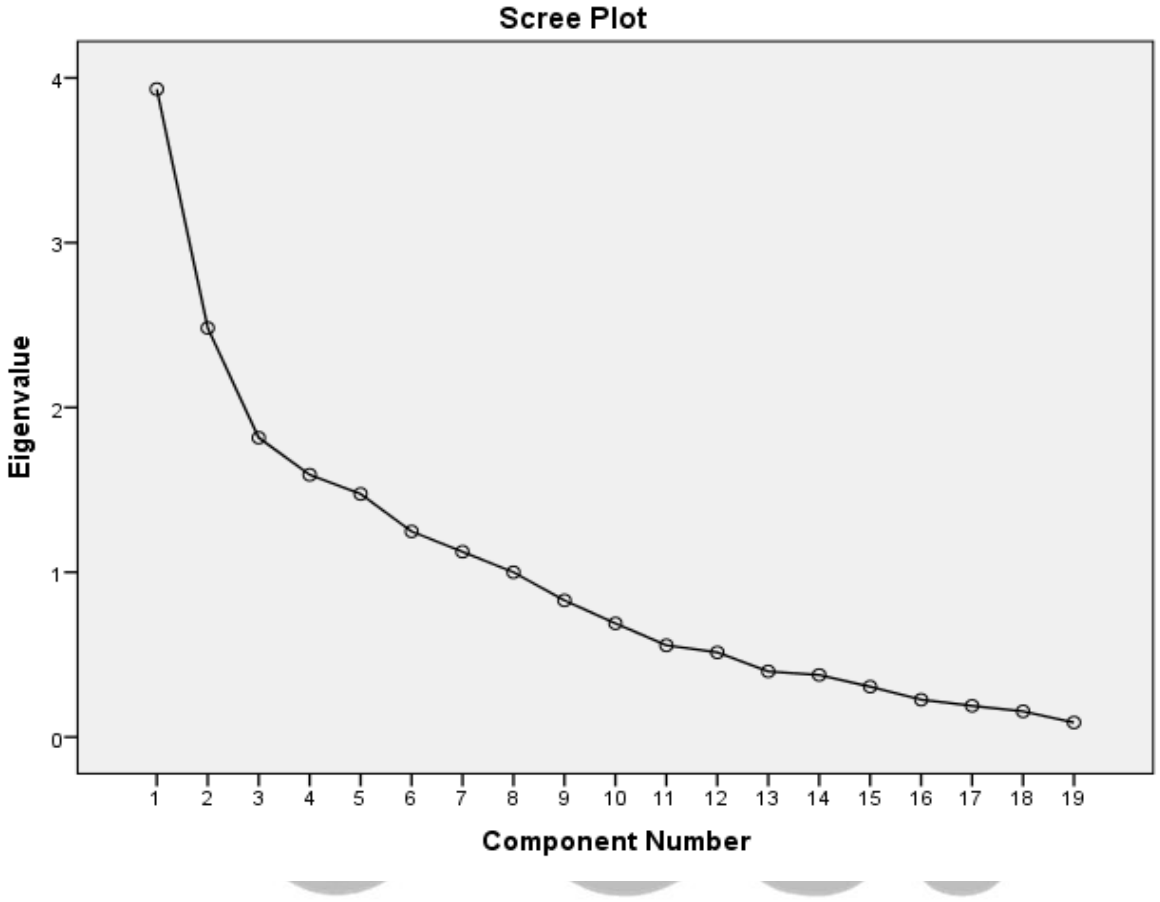
Appendix



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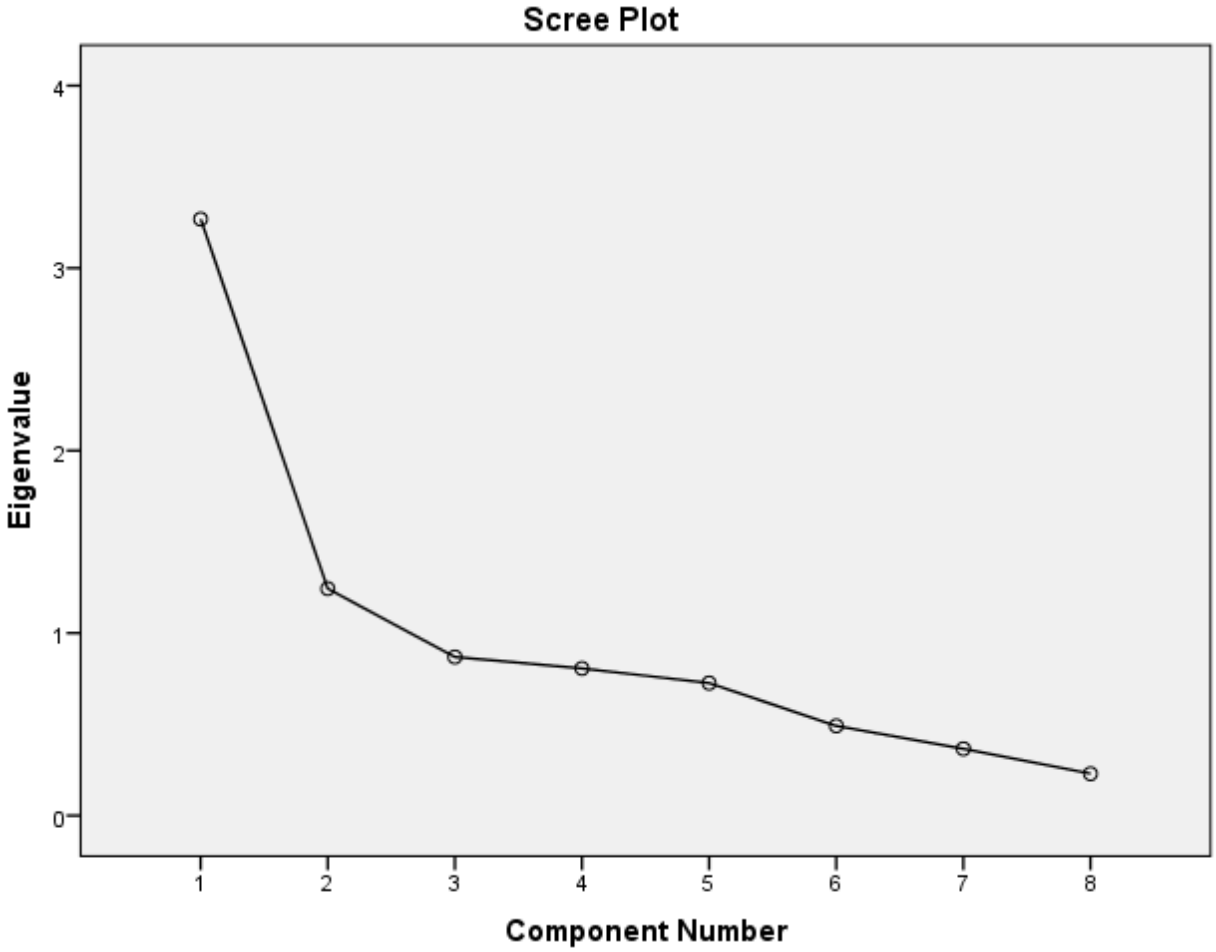

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Variable	Coefficient	Std. Error	z-Statistic	Prob.
FARMLAND_PREPARATION	0.108638	0.065105	1.668661	0.0952
CLOSURE_OF_OPEN_MARKET	-0.002727	0.063211	-0.043140	0.9656
GOVERNMENT_PALLIATIVE	-0.101537	0.046731	-2.789801	0.0035
HERDSMEN_FARMLAND_INVASI	-0.208550	0.060116	-3.469121	0.0005
INFLATED_ESSENTIAL_GOODS	-0.305139	0.072731	-4.195466	0.0000
INSECURITY_PROBLEM	-0.092547	0.031618	-2.501941	0.0031
LOW_INCOME	-0.529872	0.064991	-8.153032	0.0000
MEDICAL_FACILITIES_ACCES	-0.113213	0.057179	-1.979988	0.0477
MOVEMENT_RESTRICTION	-0.317414	0.057442	-5.525792	0.0000
NON_AVAILABILITY_OF_FARM	-0.114560	0.064527	-1.775392	0.0758
SCARCITY_OF_AGRIC_FUND	-0.102432	0.063359	-1.616689	0.1059
C	-0.040064	0.055752	-0.718610	0.4724

Robust Statistics

R-squared	0.339675	Adjusted R-squared	0.301039
Rw-squared	0.508921	Adjust Rw-squared	0.508921
Akaike info criterion	204.1245	Schwarz criterion	247.3374
Deviance	92.34770	Scale	0.708909
Rn-squared statistic	141.5112	Prob(Rn-squared stat.)	0.000000

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