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YEDITEPE UNIVERSITY

INSTITUTE OF HEALTH SCIENCES

DEPARTMENT OF PUBLIC HEALTH

**EFFECTS OF CORONAVIRUS (COVID-19) PANDEMIC
ON FOOD SECURITY IN NIGERIA**

MASTERS OF SCIENCE THESIS

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Istanbul-2023

TEZ ONAYI FORMU

Kurum : Yeditepe Üniversitesi Sağlık Bilimleri Enstitüsü

Program : Halk Sağlığı Yüksek Lisans Programı

Tez Başlığı : Effects of coronavirus (Covid-19) pandemic on food security in Nigeria.

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Sınav Tarihi : 27.07.2023

Bu çalışma jürimiz tarafından kapsam ve kalite yönünden Yüksek Lisans Tezi olarak kabul edilmiştir.

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ONAY

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DECLARATION

I hereby declare that this thesis in its entirety is an original work of mine, with the exception of passages where appropriate citations have been made in the text, and that it does not, to the best of my knowledge and belief, contain any previously published or written works by others or materials that have been accepted for the award of any other degree.



Date

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DEDICATION

I dedicate this dissertation to my ever-supportive friends and family. I'm especially appreciative of my wonderful parents, Prof. Hosea Oladeji and Mrs. Olanike Ogunfemi, whose words of inspiration and calls to perseverance still reverberate in my ears. Every step of the journey was accompanied by my brothers Peter, Festus, and Daniel. My close friends and my church brethren for their help and encouragement during the writing process. I will always be grateful for everything they did, especially Yemi for helping me advance my technological knowledge and Olamide for the numerous words of encouragement. My best friend Jesse Iwuala deserves a lot of credit for standing by me throughout the entire master's program. You all are incredible.

ACKNOWLEDGEMENTS

This thesis work turned out to be a true eye opener for me and my devoted supervisor, Assistant Professor Dr. Hale Arik T., who helped me all the time and paid attention every step of the way. She has been genuinely always guiding and mentoring me. Without missing words, I consider it a wonderful honor to be her master's student, and I'm eager to continue our scientific collaboration.

Special gratitude to Dr. Ernest Umakhihe who helped me with official emails of FMARD staff and Mr. Roberts Pelumi, who assisted and lobbied for quick responses to the questionnaires. I appreciate both of you.

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LIST OF ACRONYMS AND ABBREVIATIONS

COVID-19	Coronavirus
FMARD	Federal Ministry of Agriculture and Rural Development
SME	Small and Medium-sized Enterprises
MSME	Micro, Small, and Medium Manufacturing Enterprises
WTO	World Trade Organization
FAO	Food and Agriculture Organization of the United Nations
IFPRI	International Food Policy Research Institute
ABP	Anchor Borrowers' Programme
APP	Agriculture Promotion Policy
OECD	Organization for Economic and Cooperation Development
USDA	United States Department of Agriculture
ITA	International Trade Administration
GAIN	Global Alliance for Improved Nutrition
PwC	PricewaterhouseCoopers International Limited
UNICEF	United Nations International Children's Education Fund
NCDC	National Centre for Disease Control

ABSTRACT

Solomon, D. (2023) Effects of COVID-19 on Food Security in Nigeria. Yeditepe University, Institute of Health Science, Department of Public Health, MSc thesis, Istanbul.

The purpose of this study was to evaluate the difficulties caused by the COVID-19 pandemic and comprehend how they impact food security and policies. A web-based survey was used in this cross-sectional investigation. The staff of the Ministry of Agriculture in Abuja (FMARD), Nigeria were chosen as the study population since they represent a significant part of the population and are well-informed about implemented food policies in the country (n=630). Data were analyzed using Inferential and Descriptive methods. OLS regression analysis was used to estimate COVID-19 effects on Food Security and Food Policy. Most respondents were between ages 26-35 with a mean income of N172,000. For the food security model, the results revealed that Covid-19 had a significant negative impact ($\beta = -0.111$, 95% CI, -0.173 to -0.049, $R^2 = 60.1\%$, F-ratio=5.9, $p < 0.001$), indicating that the pandemic was associated with decreased food security. Of the demographic factors, only age and years of experience ($p < 0.05$) were also significant predictors. In the food policy model, Covid-19 was found to have a significant negative association ($\beta = -0.037$, 95% CI, -0.051 to -0.023, $R^2 = 57.1\%$, F-ratio=18.755, $p < 0.001$) among FMARD members. Only age and level of education ($p < 0.001$) were significant predictors, indicating that older members with higher education levels had a greater influence on food policy decisions. In summary, these findings reveal the negative impact of Covid-19 on food security and policy decisions within this group. It also contributes to a deeper understanding of the complexities surrounding food security and policy, emphasizing the need for targeted interventions and policies to address these challenges.

Keywords: Covid-19, Pandemic, Food security, Food Policy, Agriculture.

ÖZET

Süleyman, D. (2023) COVID-19 Pandemisinin Nijerya'da Gıda Güvenliğine Etkileri. Yeditepe Üniversitesi Sağlık Bilimleri Enstitüsü Halk Sağlığı Bolum Yüksek Lisans Tezi, İstanbul.

Bu çalışmanın amacı, COVID-19 pandemisinin gıda güvenliğini ve politikalarını nasıl etkilediğini saptamak ve yol açtığı zorlukları değerlendirmektir. Bu kesitsel araştırmada web tabanlı bir anket kullanılmıştır. Nijerya, Abuja Tarım Bakanlığı (FMARD) personeli ülkede uygulanan gıda politikaları hakkında bilgi sahibi olmaları (n=630) nedeniyle çalışma popülasyonu olarak seçilmiştir. Veriler, çıkarımsal ve tanımlayıcı yöntemler kullanılarak analiz edildi. COVID-19'un gıda güvenliği ve gıda politikası üzerindeki etkilerini tahmin etmek için OLS regresyon analizi kullanıldı. Ankete katılanların çoğu, ortalama geliri 172.000 N olan 26-35 yaşları arasındaydı. Gıda güvenliği ile yapılan modellerde, Covid-19'un gıda güvenliği üzerine önemli bir olumsuz etkisi olduğu saptandı ($\beta = -0,111$, CI= %95, -0.173 to -0.049, $R^2 = \%60,1$, F oranı=5,9, $p < 0,001$). Demografik faktörlerden yaş ve iş yerindeki deneyim yılı ($p < 0.05$) anlamlı belirleyicilerdi. Gıda politikası modelinde, Covid-19'un FMARD üyeleri arasında anlamlı bir negatif ilişkiye ($\beta = -0,037$, CI= %95, -0.051 to -0.023, $R^2 = \%57,1$, F-oran=18,755, $p < 0,001$) sahip olduğu bulundu. Yaş ve eğitim düzeyi ($p < 0.001$) anlamlı belirleyicilerdi ve bu durum daha yüksek eğitim düzeyine sahip yaşlı üyelerin gıda politikası kararları üzerinde daha büyük bir etkiye sahip olduğunu göstermektedir. Özetle bu bulgular, Covid-19'un gıda güvenliği ve politika kararları üzerindeki olumsuz etkisini ortaya koymakta ve gıda güvenliği ve politikasını çevreleyen sorunların daha iyi anlaşılmasına katkıda bulunmaktadır.

Anahtar Kelimeler: Covid-19, pandemi, gıda güvenliği, gıda politikası, tarım

INTRODUCTION

1.1. Background of the study

The World Health Organization (WHO) reported that the first instances of the 2019-nCoV coronavirus infection have been found in Wuhan, China. This infection, which later spread, started on December 31, 2019, and had several symptoms ranging from lethal to undetectable. (1). Since its inception, different variants of COVID-19 have been identified, of all the variants discovered, the delta and omicron variants were the most common due to the speed and high rate of inception. The incidence rate of COVID-19 has increased exponentially across the globe, causing a huge number of cases and mortality (2). Now, it is one of the main global health problems.

If humanity exists, there is a never-ending possibility of new infectious diseases (3). This fact has been evident from the emergence of the Spanish flu in 1918, Ebola in 1976 AIDS in 1981, and COVID-19, which has become the latest documented pandemic (4). Numerous precautionary steps have been implemented to lessen the impact and spread of COVID-19, but its impacts have already been seen over the entire world.

From the previous pandemics, restrictions, curfews, quarantines, stiff policies, and laws have always been implemented to curb the spread of infections. These implementations, no matter how necessary, always cause a lot of panic and subsequently affect human activities and economic growth (5,6). These consequences have also been felt strongly in the agriculture industry, endangering the supply and security of food. (7).

The United Nations stated that COVID-19 could interfere with food logistics across various governments and provinces while discussing the effect of the pandemic on the food crisis. Additionally, a reduction in international food and farm product logistics (import-export) may make it more difficult to access retail locations and distributors around the country and move essential food goods. This event can lead to a reduction in the income of farmers and fluctuating food prices deviating from place to place (8). Worst-case scenarios might be experienced in certain rural areas where there will be non-availability of this produce. Evidently, those who significantly rely on the market to meet their food needs, such as displaced populations, urban populations, informal workers, and others, will be at a disadvantage. This paper will look at a review of the

literature on this topic, materials and methods, statistical analysis, conclusion, and recommendations in the subsequent chapters.

1.2. Aim and Importance of Research

The COVID-19 virus is a medical and health crisis, but if certain policies are not implemented quickly, its impact on food, nutrition, and its security will be extremely serious. Experiences from previous crises, using the Ebola virus as a yardstick show that these infections gravely affect human activities and economic growth (9); These epidemics cause a shift in the country's norms. Food management, access, and use are seriously threatened (5,6). Food Security, Nutrition, and its policies were significantly affected by epidemics like Ebola, SARS, MERS, and Influenza.

The production and availability of crops and basic food items may be impacted by the COVID-19 pandemic at the rate at which cases are rising if preventive or therapeutic measures are not put in place. The United Nations Food and Agriculture Organization (UNFAO) estimates that there are currently 820 million hungry people in the globe. With Nigeria as a case study, it would be illuminating to observe how the COVID-19 pandemic has altered this worldwide issue of food security. The study's goals are to:

1. To determine the association of COVID-19 pandemic with food security
2. To determine the impact of COVID-19 pandemic on food policy

1.3. Research Hypotheses

H₀: there is no relationship between COVID-19 and food security

H₁: there is a relationship between COVID-19 and food security

Hypothesis Two

H₀: there is no effect of COVID-19 on food policy.

H₁: there is an effect of COVID-19 on food policy.

1.4. Significance of the Study

Students, nutritionists, the Ministry of Agriculture, public health experts, and practitioners will all find the study to be of great importance. This route to research the pandemic effects has not been pursued in Nigeria, hence it will create a fresh and clear understanding of how infectious diseases affect food security, policies, and agriculture. The study will also serve as a reference to another researcher that will embark on the related topic.



LITERATURE REVIEW

2.1. Corona-virus

The viral respiratory illness called COVID-19 is caused by SARS-CoV-2. It is extremely contagious. In the Chinese city of Wuhan's Hubei Province, coronavirus was first discovered. The World Health Organization announced on February 11th, 2020, the official designation for the coronavirus. (10). When it first broke out, it was called Wuhan pneumonia (11). This has been common with past outbreaks in that they were named after the geographical location it was first observed. It soon became known worldwide due to its high rate of transmission.

Although some people with COVID-19 are asymptomatic, many infected persons have symptoms like fever or chills, amongst others (12). These symptoms are most likely to surface within the first 14 days of exposure to the disease although they might cease to exist after a few weeks without treatment in some persons (13). Critical symptoms are more likely to manifest in the elderly and people with major health issues such weaker immune systems, heart or lung disorders, and obesity. These illnesses could range from pneumonia, dyspnea, hypoxia, respiratory failure, shock, failure of several organs to even death.

Since its beginning, COVID-19 has occurred at an alarmingly high rate. In 2020, the Centers for Disease Control (CDC) in the United States estimated that 81% of infected people had mild to moderate symptoms, 14% had severe symptoms, and 5% had critical situations and were consequently admitted to intensive care units. There have also been a lot of medical complications due to COVID-19. They include heart failure, stroke, encephalopathy, candidiasis, aspergillosis, miscarriage, and intrauterine growth restriction in pregnant women (14).

The COVID-19 virus is mainly spread by droplets or aerosols. A cough, sneeze, or speech/talk made by an infected person releases the virus into the atmosphere and anyone who is within 6 feet is at risk of being infected. The virus can linger in the air for a longer period than usual, especially in enclosed spaces. When individuals touch their eyes, noses, or mouths with dirty hands after rubbing them on contaminated surfaces, COVID-19 can be directly transferred. Often, People can

be asymptomatic and still spread the virus. New infections are more contagious in the first couple of weeks (1).

The most effective means of preventing infection or spreading it is to gather vast knowledge about the COVID-19 virus, its causes, and transmission. What's more, people should be proactive by protecting themselves when and others through proper hygiene. Frequent use of any alcohol-based disinfectant is highly encouraged (4). It is important to get vaccinated, avoid crowded/enclosed places, keep a distance from others, wear a mask in public, and stay at home when they need to. If any symptom is experienced, it is imperative to go in for a test. The standard test method for COVID-19 is known as the nucleic acid test. This test is also known as the PCR (Polymerase chain reaction) test. It is carried out using upper respiratory samples like nasopharyngeal swabs, nasal swabs, or sputum. The nucleic acid test acts as a molecular test by detecting viral RNA particles in the specimen collected. The gold standard diagnosis of COVID-19 has been this test (15). Like the previous epidemics, the ripple effects of COVID-19 have been felt in the Agriculture, Oil & Gas, Education, Manufacturing, and Finance sectors (16).

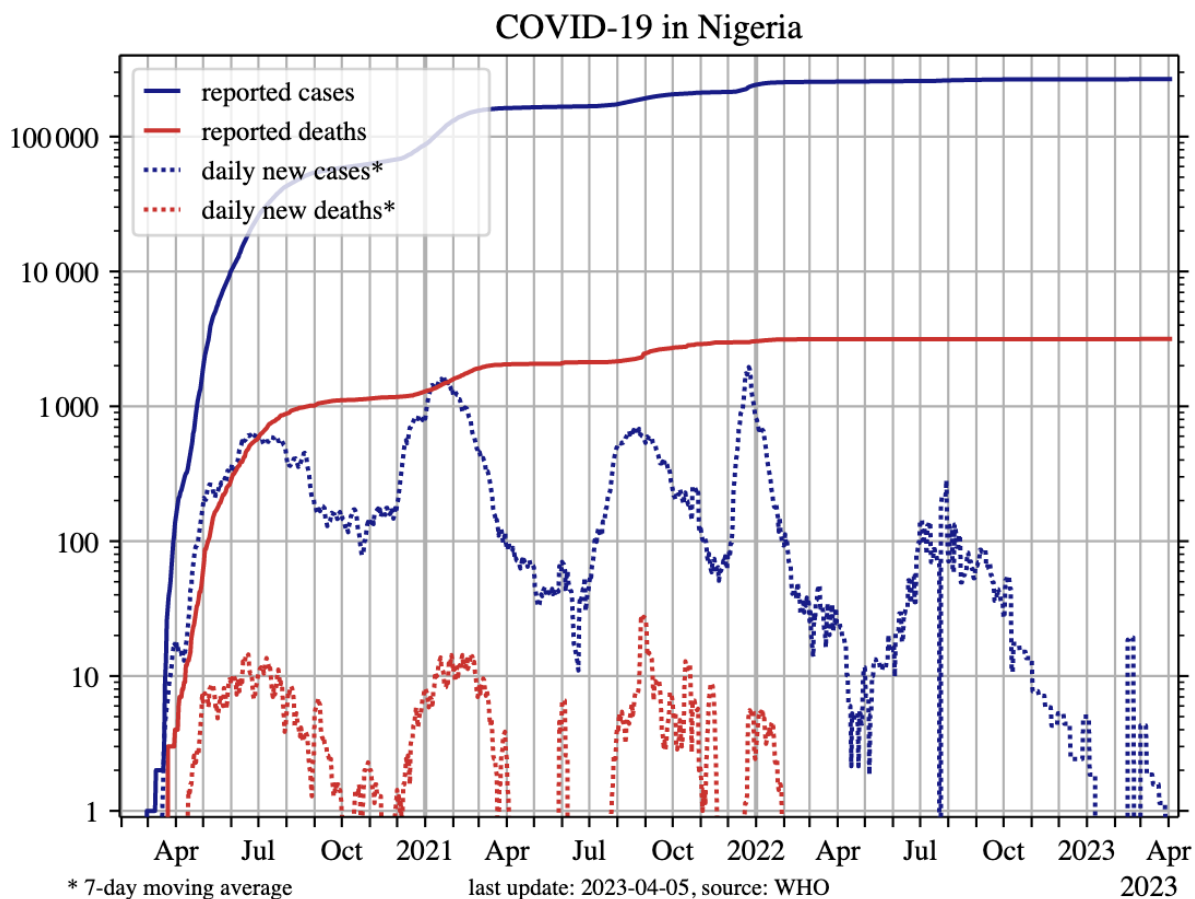
2.1.1. COVID-19 in Nigeria

Nigeria is situated in the Gulf of Guinea and Western Africa. Bordered by Niger, Cameroon, Chad, and Benin, it holds the largest human population in the continent. Nigeria is a developing nation with increasing poverty levels, social and political unrest, huge international debts, and a great dependence on imported goods. Nigeria was in fact the second African nation to record a COVID-19 casualty, with the first being Egypt (17). Owing to its early onset and lack of preparation, significant economic disruptions were experienced.

The first person to test positive for COVID-19 in Nigeria was an Italian Diplomat. This event was reported in Ikoyi, Lagos on February 27, 2020. Subsequently, the second case followed a few weeks later when a citizen who was close to the Italian also tested positive. This issue quickly increased exponentially and by the end of the second quarter of the year, the number of cases confirmed already surpassed 43,000 with the death toll at 879 (15). Three years later, these digits increased to 266,675 confirmed cases and a mortality rate at 3,155. A lot of people have argued that the effect of COVID-19 in Nigeria has been understated. Logically, higher numbers are

expected from a populated country. However, there has been scant testing of COVID-19 all through the cities of Nigeria (18).

Figure 1.1 is a graph showing the reported COVID-19 cases and deaths in Nigeria on a logarithmic scale.



The Federal government set up a task force and introduced a 6ft distancing, regular wearing of nose masks, curfews, and movement restrictions in the first half of March 2020. These actions were taken due to the increasing rate of the pandemic (19). They also suspended the NYSC orientation camps nationwide while the state governments closed all schools in their province, and local authorities and constituencies also prohibited social or public gatherings involving more than 20 persons. The Nigerian government imposed a travel embargo on 13 nations on March 18. These nations had the highest COVID-19 prevalence rates at the time. In the months that followed,

provinces with high infection rates were ordered into lockdown, with only necessary employees being permitted to commute.

Information-sharing, testing, isolation, and treatment of COVID-19-infected individuals in the nation were all the responsibility of the Federal Ministry of Health in collaboration with the Nigerian Center for Disease Control (NCDC) (15,20). Additionally, to aid suffering households and the owners of small and medium-sized businesses hit by the epidemic, the federal government offered palliative and stimulus measures, particularly for the purchase of food. Each province received an allocation and distribution of approximately 50 billion naira in total (21).

Movement Restrictions and curfews were enforced across the country at both federal and state levels. Starting from 11 pm on the 30th of March, the federal and state announced a 2-week lockdown in Abuja FCT, Lagos, and Ogun. Some state governments including Ekiti, Delta, Taraba, and Cross River have also declared dusk to dawn curfews (22). Adamawa, Bauchi, Bayelsa, Kwara, and Rivers also enforced lockdowns of major inter-state borders, bridges, markets, and religious and social centers. In most places, the lockdown was extended for up to 4-10 weeks.

Inevitably, these measures disrupted the regular business flow and led to the shutdown of several business ventures. Most especially, it was a hard blow to small business owners. Also, the closure of interstate borders and bridges, which is important in logistics and supply chains disrupted commuters of food, goods, and services. For example, most of the farm produce in Nigeria is transported from the North to the remaining parts of the country. Also, dairy, proteins, and legumes are transported from the south to other parts of the country (8). Thus, leaving Nigeria vulnerable to a shortage of supplies, cash flow problems, and food scarcity. This response has also led to a hike in food prices, impeded food supply chains (domestic and international), increased unemployment rates, and food shortages, especially in poor households. The aftermath of all these effects would be food insecurity.

2.2. Food Supply

According to the Food and Agriculture Organization (23), the pandemic has had a significant impact on both the supply and demand for food products. Although other phases have been impacted, these two are crucial for the country's food security. Food security is thus under

jeopardy. Most countries had enough food in their supply systems at the start of the pandemic. However, restrictions and other related factors caused an imbalance in the food supply. The fear of the pandemic resulted in panic buying, as people feared scarcity or inaccessibility of Food products during the lockdown.

For many agri-based countries, COVID-19 caused a reduction in Food production as farm producers invested less in their products. This was because of a drop in purchasing power and demands. Some food imports, particularly from developing nations, are gotten for developed nations. As a result, their country will be highly exposed to supply shortages of such farm products in the event of a supply disruption. Figure 2.1 below further explains this, demonstrating that industrialized nations, Europe, and Asia are most exposed to the food supply. (24).

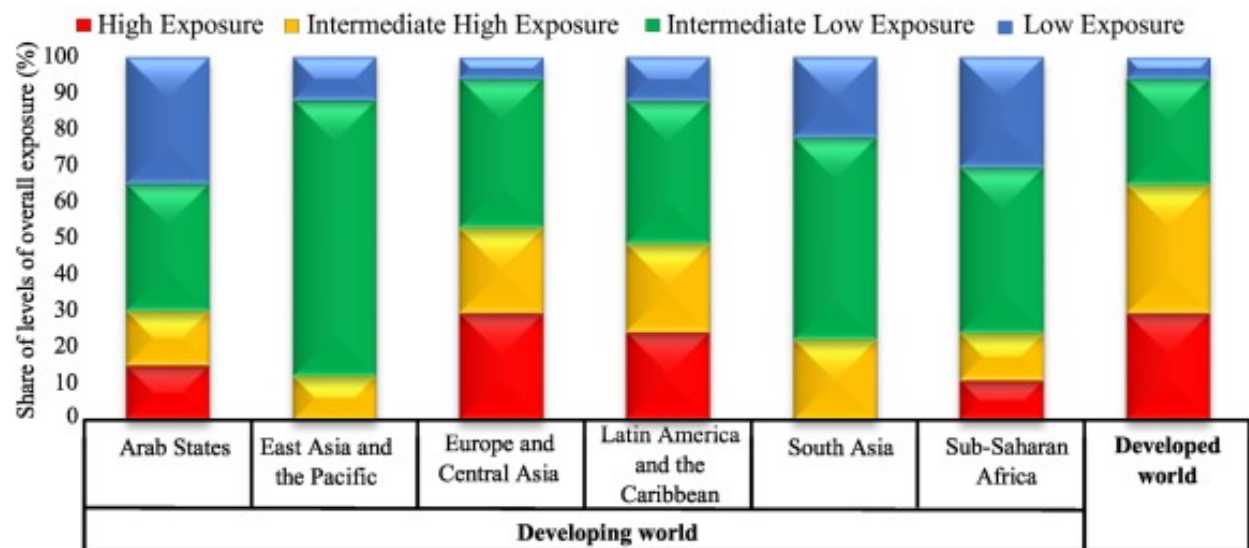


Fig. 2.1 Comparison of the overall supply exposure of developing nations to developed nations (24).

The network of systems that begins with the farmers and finishes with the customers is extremely important to Nigeria's food supply. In these networks, a lot of major players like manufacturers, packagers, distributors, retailers, and storage units have been restricted hence causing a shortage of Food since the Pandemic (25). It is significant to remember that most of the food consumed in Nigeria is either imported or grown by small-scale farmers. This is true because the nation's

agricultural industry is characterized by subpar processing facilities, low irrigation farming, an unsatisfactory system of land ownership, poor output, and climate change (26).

Beforehand, the announcement of the lockdown and restrictions caused a whole lot of panic of so resulting in people stocking up for the foreseeable future. Owing to this, the food supply was stretched and at a point, could not tolerate the demand for Food products. A major responsibility of the FAO is to propagate the Food supply chain network by dealing with its root systems (8). So, they had to offer temporary solutions to Food shortages caused by the mobility of labor in agricultural systems, the nonavailability of human labor, and the ever-increasing demand for Food.

The case is quite different with Imported and exported goods. Nigeria has always been a major importer and always exports less. Data released by the FAO pre-COVID-19 (2016-2019) showed that its imports of Agro-products were at N3.35 trillion while export was at N803 billion (9). With other countries closing their borders and international trade heavily impeded, the reliance on foreign agricultural products relatedly plunged the Agro-economy of the country and caused Food insecurity (20).

The lockdown of states during the pandemic was done systematically in 3 phases. Phase 1 was the first lockdown of three major states due to their high incidence rate. Lagos and Abuja International Airports were temporarily closed. The Nigerian Railway Cooperative (NRC) has also suspended the commuting of passengers and agricultural products. This is a big problem because the NRC is the main transporter of food from northern Nigeria to other areas. Phase 2 covers the inclusion of several states and borders. This is also a big problem as Nigeria relies heavily on dairy products from its neighbors. Phase 3 saw the suspension of social events and public gatherings. Although some markets were allowed to open at intervals, the hike in prices, loss of income due to unemployment, absence of certain food, and fear of the virus were big factors hindering the purchase of Food (27).

On the other hand, the pandemic's reduction in the movement of people, products, and services paved the way for small-scale farming and the eating of food that was grown at home. However, given the size of the average family and the enormous population of the nation, these were insufficient. Food imports decreased as a result of the pandemic, insufficient agro-product supply,

and rising food demand. By that time, the nation was forced to rely only on foods that were grown or supplied locally, which resulted in an increase in the cost of these products (28). For local farmers, this measure increased the profitability of the agricultural sector. The COVID-19 limitations resulted in redundancy of trained and human work.

Inevitably, farm output was greatly reduced as most Farming staff and workers were laid off. A national labor shortage led to increased unemployment in the agricultural industry, lower pay, and a decline in everyone's purchasing power (29). The agriculture industry in Nigeria needs to be rebuilt and improved, as shown by this domino effect.

2.3. Food Demand

Consumer demand is an important expression of requirements in several food and agricultural policies (USDA). The shock and impact of COVID-19 is not limited to food supply, it goes beyond demand. However, demand risks arise mainly in developing countries where consumers do not have sufficient funds, reserves, or funds to buy food. Developing countries that rely heavily on imported food are more vulnerable to such demand shocks (23). Figure 2.2 below demonstrates that due to a decline in purchasing power, the southern part of Asia, the Middle East, and sub-Saharan Africa had the biggest exposures to demand shock during COVID-19. This reduction was also due to a loss of income (as a definite number of people were left unemployed) and a steep increase in the price of imported rice (due to the reduction of labor and capital inputs in production countries). The implications of final income and final pricing on the pandemic are currently being researched (24). However, COVID-19-related increases in demand for labor-intensive goods such as dairy, fruits, and vegetables resulted in a decrease in the nutritional content of the average diet rather than a rise in calorie shortage, according to Amare et al (29).

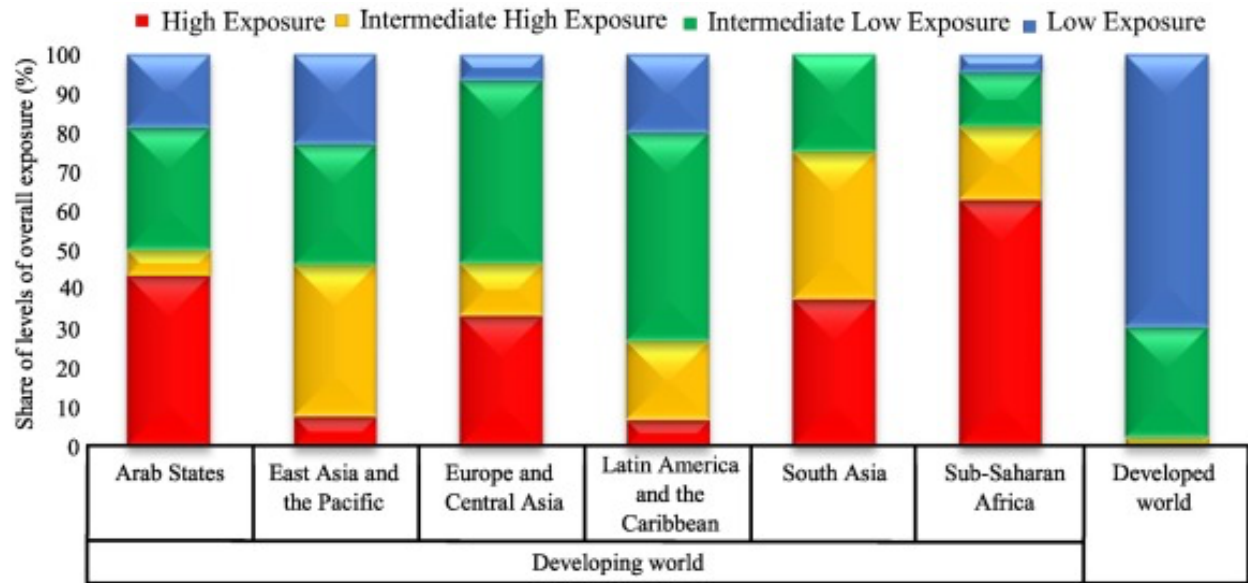


Fig. 2.2 Comparison of Developing and Developed countries' Exposure to Global Demand (24).

The extension of COVID-19 lockdowns beyond 3 months in most countries was also a very large factor in the demand shock. Since most people had to stay at home, there was a need to stock up for months. There was also major Panic-buying due to the fear of how deadly the pandemic might turn or how long the lockdowns will last. Momentarily, this event caused scarcity in grocery supplies as most consumed foods were not available in grocery stores and markets. For instance, the scarcity of Corn, Rice, and wheat in some countries caused a change in human consumption and behavior (30,31).

The Government and agricultural institutes in several countries, including Nigeria set up regulations to stabilize the demand and supply shocks during the pandemic. These regulations briefly ensured the limited purchase of essential grocery items but in the long run, was insignificant due to the population density. Towards October 2020, Demand was greatly reduced due to Inflation and ever-increasing food prices, owing to income loss and decrement. Hence, a drop in purchasing power (8). For instance, the loss of jobs caused a reduction in purchasing power with about 24% unable to afford staple foods (32). As explained by (33) in his research,

Figure 2.3 shows the response of Nigerians to the income shocks caused by COVID-19.

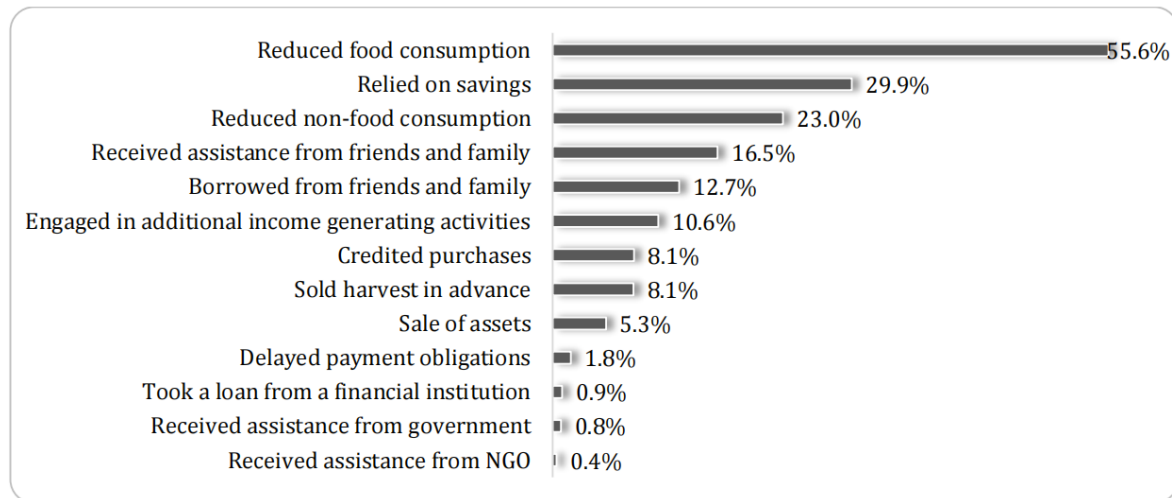


Figure 2.3 Coping Strategies of Nigerians to Income shocks caused by COVID-19 (33)

It was discovered that 55.6% of households in Nigeria reduced the amount of Food consumed, with 29.9% relying on savings. Other adaptation strategies include cutting back on non-food consumption, soliciting help from friends and family, taking on more jobs, and buying on credit. Although the government dispersed palliatives to its citizens, its percentage was insignificant. This happens due to the population and corruption of the country. Since almost all homes reduced their food intake during the epidemic, this indicates that the pandemic's effects go beyond poverty to include household food and a healthy diet. (33).

Income is a great determining factor in Food demand in developing countries hence a loss of timely income could influence food consumed. Notwithstanding, (30) in his research reported that households in India that had fixed income show no significant change in food demand, but they had disruptions in supply owing to the pandemic. To maintain the security of Food and a nutritional diet, an income flow is needed as it influences food demand. Reduced food accessibility will reduce general food consumption, malnutrition (especially among children), and disease (34).

2.4. Food Policy

Every developing nation has always battled to find ways to raise both the standard of living for its people and its economy. The situation is the same in sub-Saharan Africa. Here, the government acknowledges the necessity of different sources of income for the advancement and growth of the economy (35). FAO contends that investing in and concentrating on the country's agricultural sector will be significantly more beneficial for overall economic growth, eradicating hunger, and removing food insecurity than concentrating on other areas. Investments in small-scale agriculture could therefore help with job creation and food production, especially in the wake of the terrible COVID-19 crisis, enabling rural communities to recover from the pandemic's aftereffects (36,37). By making significant investments in rural agricultural initiatives, this growth will be possible. The provision of adequate facilities for processing, storing, and transport, subsidies, profitable returns on investment, and co-ops for products can help local farmers become more autonomous, mitigate the effects of catastrophic events, increase rural wealth, enable more dependable and superior food systems, provide comparatively more food security, and demonstrate exceptional resilience in the state's weaker provinces. (38).

Many countries and governmental organizations came up with refined methodologies and policies to ensure food availability since the COVID-19 pandemic. Some of the methods implemented in Sub-Saharan African countries include prioritizing agricultural practices and operations as essential businesses to keep them active, adequately providing farm markets with cheap yet nutritious food, and making food accessible and purchasable in proximity to customers. Despite severe limitations and curfews on travel, imports, and income losses, these measures were still implemented (39). Unfortunately, despite the efforts made by these nations, the situation with regard to food security did not significantly improve.

Nigeria has developed strategies to minimize COVID-19's effects in several ways. The interest rates on interventional funds were first lowered by the Central Bank of Nigeria (CBN) to 5% from 9% on March 16, 2020. Small and medium-sized businesses (SMEs) from all around the nation were also given easy access to these loans. Additionally, they provided SMEs in the healthcare and pharmaceutical industries with interventional funding totaling about N100 billion (32). There were also introduced import duty exemptions for pharmaceutical industries. Additionally, in May

2020, SMEs and affected households were given access to a N50 billion credit line. To ensure that funds are available to farmers, these funds are accessible at all Agricultural Lending Microfinance banks.

Subsequently, the Nigerian Youth Investment Fund (NYIF) was established in July 2020. Youth were expected to use this cash between 2020 and 2023 to invest in the skills required for sustainable development. Each beneficiary of the fund received between N250,000 and N3 million, based on the candidate's business or abilities demonstrated, from a total approved budget of N75 billion (40). Additionally, to support agriculture, the National Agricultural Seed Council (NASC) provided farmers with 81,000 metric tons of seed for sowing during the lockdown, including maize, millet, rice, groundnuts, and soybean. Likewise, subsidized 50kg bags of NPK fertilizer were sold at N5000 instead of the prior N5500 (41). These actions were a part of the palliatives the federal government provided to farmers in order to lessen the impact of COVID-19.

These actions, along with government financial incentives, were anticipated to cost around N635 billion and had the potential to generate up to 5 million new employments in the agricultural sector, as well as increase agricultural production, guarantee food security, and advance agro-economics. Nevertheless, despite these efforts, Nigeria's dire situation has not much improved.

Food insecurity in Nigeria's various regions is strongly correlated with the country's constantly expanding population. In essence, food insecurity is a major problem in the Northern region, where population growth is the highest. This was mostly brought on by a decrease in farming activity due to conflicts between farmers and cattle herders as well as general unrest in the area (42). The federal government's unwillingness to support the agriculture sector exacerbates food insecurity in the northern region. This resulted from a lack of funding and the allocation of finances to other crucial industries like healthcare before and during the COVID-19 pandemic (43).

Food processing plants were shut down nationwide due to COVID-19-related restrictions. Consequently, this has caused a huge waste of domestic crops. Approximately 40% of the total amount of food produced, according to the World Bank's study, was wasted as a result of the pandemic (44). Also, key suppliers like India, Vietnam, and Cambodia restricted shipments of these items to meet domestic demand, and the already imported agro-foods were quickly depleted

as well (35). Regrettably, scarcity has caused prices for locally grown staple foods and vegetables to rise sharply and become unaffordable for the typical individual (43). In spite of the dire circumstances, the World Bank has also demonstrated that the nation can feed itself, improve Agro-economics, increase food security, and achieve policy goals by reducing imports, promoting local farming, eradicating corruption in the farming-agro sector and government parastatals, and providing adequate processing and storage facilities to reduce loss of Food. (44)

2.5. Determinants of Food Security in Nigeria

Global threats are conditions that can be expected to cause a global decline in living standards, and political, environmental, and population crises. The top 5 global risks are Cybersecurity, climate action, energy transition, healthcare system, and food security. While the food security of any nation greatly depends on an incessant increase in population, climate change, extinction of some species, and global corruption, a non-curable Pandemic could also impede it. (Matuschke, 2009).

Africa as a continent is still experiencing a rise in the rate of Hunger and Malnutrition. Despite the start of initiatives to end hunger by 2030, malnutrition prevalence in Africa ranges from 2.2% to 77.3%. Approximately 26% to 38% of children under the aged of 5 in East Africa are malnourished. This is as of November 2021 (8). Also, the FAO stipulates that about 17 million children in Nigeria are malnourished. In recent times, the issue of Food security and how to properly manage it has become a challenge for many governments and institutions (45,46). Nigeria for instance majorly practices small-scale farming. About 80% of Farming in the country is run by smallholder farmers and they are the heart of Food production in the country (47) with most of such farmers lacking the ability to feed their families. One would think that farmers shouldn't have problems with food supplies. However, these farmers tend to suffer low productivity caused by fragmented land holdings, lack of irrigation-based farming, global warming, poor storage, and market structures.

Since Nigeria gained its independence in 1960, some interventions were brought up to enhance cultivation, create employment, and ensure food access and use. Operation Feed the Nation (OFN) and the Agricultural Development Project (ADP) in 1976, the River Basin Development Authority (LNRBDA) in 1978, The Green Revolution in 1980, the Family Support Program (FSP) in 1992,

and the National Special Program for Food Security (NSPFS) in 2021 are some of the interventions that focused on food production and the development of water resources. Of all these programs, only the ADP and NSPFS are still ongoing.

The Federal Ministry of Rural and Agricultural Development (FMARD) was established in 1966 to promote agriculture and rural development. The Standard Organization of Nigeria (SON) was established in 1971. The Directorate of Foods, Roads, and Rural Infrastructure (DFRRI) was established in 1986 to oversee programs for rural development. The National Agency for Food Drug Administration and Control (NAFDAC), which was established in 1993 to oversee and regulate the production, importing, and distribution of food and drugs, was also established. As of 2004, Laws like the National Agricultural Seeds Act, the Agricultural Loan Scheme Act, the Agricultural Import Regulation Act, the Environmental Impact Assessment Act, and the Sea Fisheries Act were declared to regulate the Food and Agricultural sector. Unfortunately, these implementations have yielded little or no results (48).

The Population growth in Nigeria has contributed to the availability of Food and the level of Hunger in the country. According to Erokhin and Gao (49), about 50% of Nigerians live below the poverty line with Sokoto and Taraba having the highest percentages. A Nigerian is considered poor when their income is less than 335 US dollars per year. Osabohien also hypothesizes that nearly 23 percent of Nigerian households will experience food insecurity in 2020 (46). With 25% affordability, 39.5% availability, 55.6% quality and safety, 53.7% sustainability and adaptation, and an overall score of 42%, the Global Food Security Index (GFSI) in 2022 ranked Nigeria 107th out of 113 nations. This is a rapid decline from the 2019 index, where Nigeria came in at 96th with 48.2%. Currently, this puts the country below Zambia, Chad, Congo DR, and Sudan (47).

Issues such as Poor policies, diseases and infections, barriers to accessing the market, imbalanced imports and exports, and an underdeveloped agricultural sector need to be carefully investigated and solved. The federal government has enacted measures to reduce monsoon farming in Nigeria. The first of such project is the Kano River Irrigation Project (KRIP) established in Northern Nigeria in 1970 (50). Subsequently, the Ejele-Ejebe, Azara-jere, Sabke, and Sepeteri irrigation projects were completed while others like the Bakalori and Hadeja Valley irrigation projects are

still under construction. Their objectives are to encourage irrigation farming whilst helping agricultural crop growth and multi-cropping, reducing the effect of inadequate rainfall, adding to economic growth, and reducing food insecurity (51).

2.6. Capital Intensity in Food Production

The Intensity of Food production is also known as Farming intensity or farming input. This issue is basically the level of input used by farmers on a particular land for the purpose of Food production. Inputs can be in the form of Capital or Labor. Capital intensity can range from Low, Intermediate to High. Low inputs make the best use of free or easily sourced natural and human resources like vegetation, water, soil, human skills, labor, and knowledge. Intermediate inputs are purchased from outside the farm sector and usually include seeds, fertilizer, pesticides, feeds, and electrical power. High-input or industrialized agriculture is characterized by heavy machinery, chemically induced crops, and fossil fuels. (52). Regardless of the form of intensity, any discontinuation in the supply of these inputs will possibly lead to a reduction in output. That is, the higher the importance of these inputs, which could lead to greater output or supply disruptions (53).

Production of food depends heavily on capital (28). The agricultural production systems of high-income nations like the United States of America, Canada, France, Latin America, and several Arab states heavily rely on intermediate inputs. In high-income nations, this input may account for as much as 80% of the value of the product. In low-income nations, however, input can fall below 10% of output value. In essence, low-income nations are less vulnerable to interruptions in the supply of intermediate inputs but would see a decline in production. Due to their reliance on intermediate inputs, high-income countries are typically at a disadvantage if these input supplies are unavailable.

Sudden interruptions in the supply of intermediate inputs may be caused by pandemics such as COVID-19. A good example is seeds, fertilizers, and pesticides used in Grain and Oilseed production in North America. During the pandemic, there was a plunge in output due to the disruption of these inputs supplied to farmland as restrictions due to local and international restrictions. On the other end, low-income countries were less affected by the non-availability of

intermediate input as they majorly depended on low inputs, which were readily available or in proximity to the farm/farmland. These are the cases observed in Tanzania and Kenya, where the percentile of intermediate inputs compared to output is less than 15%. It was also less than 10% in Gambia and Chad (8).

Since the advent of the Pandemic, access to intermediate farm inputs has been impeded. This is more common in areas like China, Thailand, Japan, South Korea, and the United States which first experienced the Pandemic. For example, a critical look at China showed a steep drop in the production of pesticides. Consequentially, this situation resulted in low availability and inflated market prices leaving many farmlands susceptible to attacks and reducing crop production. This situation is not limited to middle-input countries, as it extends beyond low-input countries. Due to the scarcity of Pesticides, the price per kg and logistics cost of pesticides to Kenya, Tanzania, Uganda, and Ethiopia skyrocketed. Owing to this, local locust outbreaks in these countries could not be contained and this caused a threat to food security (24).

2.7. Labor Intensity in Food Production

Concerning the intensity of Labor in Food Production, skilled and manual human labor is of crucial need, especially when capital intensity is little or not available. Normally, high-income countries engage in Capital intensity to save labor, while low-income countries use the labor intensity in Agriculture as a bid to save capital. However, both work together and inputs of both in the agricultural process will increase crop yields. The Labor intensity is calculated by the proportion of employees per unit of output against the value-added gross domestic product (GDP) per person. The ratio of capital and labor intensity in agricultural production shows the relation between the employment of manual labor and capital stock or investments in the farming system (54).

Generally, Pandemics have been known to cause a shortage of manual labor needed for Agricultural processes. These hindrances could range from an illness that impedes agility, strength fear, curfews, and quarantine restrictions. These shocks are prevalent in Low-income countries as they are heavily dependent on labor-intensive farming. For instance, Mato Grosso in Brazil popularly known for producing Grains was greatly hit by the COVID-19 shock as operations as

restrictions and lockdowns caused farms and food processing facilities, to close in a bid to reduce the spread of the virus in the community (8).

The impacts of COVID-19 on the production of Food may not be limited to the type of input used but also the variations at which they are used. Normally, the capital-intensive farming system is majorly used in high-income countries, however, many cash crops such as fruits and vegetables produced in these countries are labor-intensive. Even more than that, beef and meat processing systems, slaughterhouses, and abattoirs require labor intensity in their activities. There is growing evidence that the spread of COVID-19 has affected labor intensity in agricultural practices due to its health impacts and restrictions (24).

The US Department of Agriculture (74) explained that the borders of the United States and Mexico had to be closed following an exponential growth in the COVID-19 incidence rate. Owing to this decision, there was a shortage of skilled and manual labor because most of the farmers were Mexican. Also, the H-2A visa program that Mexican farmers needed to work on US soil could not be issued due to the closure of consulates.

Another example is the labor intensity of meat, beef, mutton, and seafood processing in Beijing, China, which lacks the required manual laborers. The health risk and quarantine situations caused the closure of most abattoirs resulting in a shortage of meat supply and a hike in the price of meat. The biggest wholesale hubs for meat and seafood in Beijing, Xinfadi, and Jingshen were also shut down. Similar problems exist in other provinces (55). Localized disruptions in transport and logistics have affected family farms, as only large, scaled farms or companies are authorized to disperse meat to urban and rural areas to reduce the transmission of COVID-19 (8).

In Nigeria, COVID-19 has caused a reduction in Labor input as most farms were unattended to. Labor shortages are also pushing farmers to adopt mechanized farming, but this is limited to large farms (56).

2.8. Global Exportation of Agro-Foods and Products

The export of agricultural products is the main source of income for many low-income countries. Owing to this fact, a disruption in production and supply in these countries will cause an efflux of cash inflow. We should note that since these are developing countries, a reduction in export earnings will greatly affect the country. For instance, about 50% of export earnings of some Latin American countries like Guatemala (export Bananas, Coffee, Palm Oil, Nutmeg, and Raw sugar), Paraguay (export Meats, Cereals, and Oilseeds), and Argentina (export Corn, Wheat, and Soybean oil) come from agricultural products. Reliance on sales of these products exposes these countries to the onslaught of COVID-19. (8,28).

The impact of COVID-19 on global trade was investigated by the United Nations ECLAC (57). Due to supply and demand shocks, they recorded a 17.7% reduction from January to May 2020 compared to the prior years. They came to the conclusion that Latin America and the Caribbean are the emerging region that is most adversely affected and emphasized the significance of ongoing regional integration.

Developing Sub-Saharan African countries like Benin, Guinea-Bissau, and Malawi, whose export earnings from agricultural products exceed 70% were also exposed to the COVID-19 shock (8). The COVID-19 pandemic caused a quarterly change in the quarterly turnover rate, according to studies on how the pandemic affected the performance of exporting enterprises in the Benin Republic. The COVID-19 pandemic has caused a 53.308% decrease in quarterly turnover, according to survey data from 122 MSMEs and MSMIs in 4 Benin localities.

A severe drop in supply and disruption of exportation also occurred in India. This event was followed by a demand shock which drastically affected their economy. India is a low-income country with over 40.3% of its exports from agri-foods. The country mainly exports rice and sugar. In research conducted by Veeramani and Anem (58) analyzing the impact of the pandemic on India's aggregate sectoral exports, they found that there was a 10% decrease in export services. This rate is low compared to their export competitors. However, due to their struggling economy, the effect was quite large. They concluded that the country incorporates digital services in its exports and also ensures that stimulus checks are made available.

Exports from nations where the COVID-19 pandemic originally spread were also impacted. Overcrowding caused operations at the Chinese ports of Shanghai and Tianjin to be interrupted. As a result, shipments of seasonal tropical fruits like apples, grapes, and citrus were hampered during that time of year. The timely unloading of chilled containers was not possible. Tropical fruits are perishable foods, therefore this has caused a considerable loss of them. Cargo operations in the ports were hampered by a shortage of containers brought on by the importation of pigs in reaction to the African swine fever. Sales were further hampered by the shutdown of some wholesale markets because of quarantine regulations. These conditions caused an increase in the price of these exports as seen in the prices of red-flesh dragon fruit from Thailand and prices of longan fruit from (24).

From January to March 2020, the number of COVID-19 infections in China surged dramatically, but the number of new export orders for products and services fell by as much as 50%. (59). Chinese exports took the first hit, causing a decline of about 17% in the first two months (60). However, because agricultural products account for 2.5% of the Chinese export value, its effects were insignificant. Wei, Jin, and Xu (61) reported that by April, China registered an increase of 1.9% compared to the previous year and its proportion in world exports rose to a record 14.2% in their research on the effects of the pandemic on imports and exports in China, Japan, and South Korea. This growth was majorly due to their rapid response to the management of the pandemic in the second quarter of 2020. Exports from Japan and the South also rose towards the third quarter of the same year. Covid-19. Essentially, standard regulations and management can lessen the effect of COVID-19 on exports.

2.8.1. Exportation of Food and Agricultural Products in Nigeria

Nigeria majorly exports cocoa beans, sesame seeds, and cashew nuts. Agri-foods represent a very low percentage of its export with Crude and refined oil being the most exported products. After all, the Covid-19 pandemic has had its fair share of effects on Agricultural products being exported and in turn, affected the economy of the country. World Trade Organization (WTO) (59) estimated

a decline in real exports of agricultural products between 6.5% and 12.7%. A 5.9% decline in agricultural products exported was also recorded in the third quarter of 2022.

By providing a sector-based analysis, Dushime & Osele's research (62) demonstrated the financial impact of COVID-19 on the Nigerian economy. They estimated that agricultural products contributed 26.59% of the economy, but the pandemic rendered this growth inconsequential. The document also claimed that COVID-19 has slowed the country's GDP growth and advocated for the necessity to diversify the exports of the nation away from mostly crude oil and towards agricultural goods. They also recommended using tax money to promote long-term economic expansion.

In their research of the pandemic's effects on the Nigerian economy, Onyekwena & Ekeruche (63) talked about how COVID-19 has decreased aggregate demand. In an effort to slow the economy, they also noticed a fall in consumption, investment, and net exports, with only government spending rising. They emphasized that the drop in exports may have been caused by lockdowns, travel restrictions, border closures, a lack of export markets, and interruptions in the global supply chain. The writers reiterated the necessity of increasing healthcare sector investments and diversifying the nation's income from oil exports.

Bello and Gidigbi (64) examined how trade affected Nigeria's economic expansion during the pandemic. Without using parametric analysis, the researchers looked at patterns in trade (imports and exports), economic growth, and other economic variables affected by the epidemic and came to the conclusion that it had a negative influence on trade. They claimed that the trade system's disturbance caused a slowdown in economic growth.

In addition, Idris & Oruonye's (65) analysis of the socioeconomic effects of the epidemic in Nigeria was conducted. The Covid-19 pandemic had an impact on all facets of economic activity, according to the report. They advised the government to increase its revenue stream and take precautions against future financial instability. There is overwhelming evidence that threats to food security include rising food costs, export restrictions, and revenue losses brought on by the recession.

2.9. Global Importation of Agro-Foods and Products

In food import-dependent countries, the trade of agricultural products ensures accessibility of food at reasonable prices to people and ensures the availability of food varieties needed for nutrition (66). However, a key factor in trade and economic development is the incorporation of Agricultural global value chains (GVCs) (8). There was a global decrease in trade and economic activity during the pandemic. International commodity shortages and prices are cited as root causes (9). Meanwhile, importers of Agricultural products may profit from lower import prices, helping them positively adjust to the recession caused by the Pandemic. Emphatically, a reduction in import fees could help combat Food insecurity, especially in low-income food-importing economies. It is of great advantage as it affords them to buy more agricultural products at a reduced rate.

High Dependence on Food imports, however, could result in demand shocks if there are disruptions in international supply. These shocks will ultimately affect the accessibility and availability of food. For example, a reduction in human labor, logistical constraints, congested ports, non-functional processing and storage facilities, or a limited number of skilled personnel at ports critically affected imports of Food products. These impacts were observed in the China-South Korea trade in the first quarter of 2020 observed (61). In addition, a reduction in the export rate of Soybeans from Mato Grosso in Brazil has impeded the processing of soybeans in China. China happens to be the world's largest Soybean importer. Hence, a disruption in imports resulted in undersupply of Soybeans for crushers in the country. Momentarily, a scarcity of soy sauce and cooking oil occurred. China Oil and Foodstuffs Corporation (COFCO) estimates that this situation could last for several months. (67).

Likewise, regional regulations during the pandemic resulted in a virtual standstill of the world air transport system. Hence, the transport of fruits and vegetables through the Cargo operations was halted. These measures resulted in the supply of fewer tropical fruits, and vegetables to the import regions. The largest importers of tropical fruits, the United States and the European Union were affected by this supply shock. India reported a 70% decline in exports of fruits and vegetables due to increased air freight charges (68). In addition, the price of mangoes in Cambodia has fallen

sharply due to the reduction in export orders. Malaysian exports to China and Singapore also dropped by 20-50% (69).

China's Cherry imports from Chile were stuck in the ports for a very long time. Owing to log-jammed wharves and warehouses and a reduction in sales. Even while wholesale markets are starting to open again, the fruit's financial impact is still significant. Chilean investors lost around USD 70–80 million in cherry revenue during this time. It was later summed up to USD 100 million with the inclusion of other tropical fruits (28). China has also halted tea imports from Iran amid the pandemic. Iranian tea prices have fallen as a result of the action, which has hurt export revenues. East Africa Tea Trade Association (EATTA) tea auctions were postponed due to lockdown precautions during the outbreak. Consequently, tea sales dropped by 20% with a 3% drop in regional tea prices (68). These scenarios could put consuming countries in dire situation.

Being the major importer of rice, Sub-Saharan Africa has seen a decline in the region's access to healthy food as a result of supply disruptions. (70). Due to their dependence on food imports, low-income developing economies will be extremely vulnerable to disruptions in imports. They are more vulnerable to demand shocks from reduced or absent tourism, which will affect export earnings (8). In their research, Arumugam, Nagai, and Haneishi (71) suggested that, in order to reduce the pandemic-related increase in the country's food consumption, commodities tax reductions and limits on food imports should be gradually eased.

2.9.1. Importation of Food and Agricultural Products in Nigeria

Nigeria is a major importer of wheat, sugar, seafood, and milk. The country depends on \$10 billion worth of imports to tackle the deficiency in its food and agricultural production. Major sources of the country's agricultural imports are Europe (dairy products), Asia (parboiled rice), the United States (wheat and soybeans), South America (Cereals and fish), and South Africa fixed Fruits and oilseeds(72).

The Nigerian government established agricultural programs like the (ABP) Anchor Borrowers Program, which works to convert the nation's oil-based economy into an agro-based one and increase the Central bank's credit financing of the Agricultural sector, to combat the effects of

COVID-19 on trade and the economy. The National Agricultural Technology and Innovation Plan (NATIP) was also put into effect. The goal of this approach was to speed up Nigeria's economic recovery. It replaces the (APP) Agricultural Promotion Policy, which was created in 2016, but terminated when the pandemic arrived. (73).

In 2020, Nigeria recorded a total value of USD 18,957 million in Imports of consumer goods. With a value of over USD 2 million worth of wheat from the U.S., the country ranked 5th in its wheat imports in the world second only to Japan. Other imported food in the same year includes Soybeans, ethanol, condiments, seafood, wine, and dairy products (44). There was an increase in demand for Staples like Bread, semolina, and pasta with their shares being 60%, 20%, 10%, and 10% respectively (72).

COVID-19 measures have caused an increase in prices of indigenously produced staple foods in the first quarter of 2021. Consequently, this forced consumers to resort to cheaper commodities as there was a decrease in customer purchasing power. For instance, a 47% increase in wheat importation due to inflated prices of rice and Garri was recorded between January to March 2021. As a result, Nigerians have turned to semolina, pasta, and noodles.

Imports of Parboiled rice majorly from Thailand and India continue to cover about 50% of the demand for Rice in Nigeria. Thai and Indian rice accounted for 65%. and 20% of imported rice. Parboiled rice dominates imports with a consumption annual rate of \$4.0 billion. Owing to the Pandemic, supply disruptions have caused a steep in the price of Rice. The Anchor Borrower's Program (ABP), introduced at the advent of the Pandemic has helped increase local production of Rice. However, the cost of Paddy farming and milling remains high. Border closures have also caused Imported rice which enters the market illegally through the country's leaky borders to be cut short. Typically, rice bound for the country is first transported to seaports in neighboring countries before being transported out of the Nigerian market by road. COVID-19 led to border closures leading to rice seizures at the border (8).

Frozen seafood and dairy products are Nigerians' most sourced foods for animal protein. The country boasts of seafood market worth over USD 3 billion. The most consumed fishes in Nigeria

are Bonga, mackerel, tilapia, and catfish. Although there is a blooming fish sector in Nigeria, the cost of high inputs has limited local fishing and hydroponics production of tilapia and catfish. Nigeria is the world's largest producer of Catfish, but they are banned by the USDA for import and export. Negligence on the part of (NFFD) Nigeria's Federal Fisheries Department to fulfill guidelines in the self-reporting tool (SRT) has caused this ban to exist to this day. Consequently, catfish farmers and investors loosed a huge market opportunity for packaged and smoked catfish. (72,74).

Despite having the 4th highest cattle population in Africa, the dairy sector has been unproductive. Some small pastoral households in the northern part of the country produce raw milk. However, these products are not approved for general consumption. On the other end, large multinationals that produce dairy products use 97% of imported milk. Dairy by-products like ice cream, chocolate milk, and yogurt are made over from imported milk powder. What's more, Infant formula, cheese, and butter are mostly imported from Asia and Europe. Since this food is mainly consumed by children, their demand continues to grow and supply disruption is a negative impact of the pandemic (72).

MATERIALS AND METHODS

3.1. Study setting

This study is a cross-sectional survey to determine how the pandemic has affected Nigeria's Ministry of Agriculture and Rural Development (FMARD) staff members' perceptions of food security and policy. Staff are between the ages of 18-65. Data were collected from all participants upon the completion of a consent form.

3.2. Study Participants and Sample Size

The entire staff of the Federal Ministry of Agriculture and Rural Development was selected for the study. These include skilled and unskilled staffs who live in the country's capital, Abuja. Although the total number of staff as of May 2022 (46% female and 54% male) was about 1,535 the sample size was determined using Epi Info version 3.0. A total of 630 participants based on calculations was the ideal sample size, with a confidence interval (CI) is 95%, and a 3% Margin of Error.

3.3 Study Methods and Instruments

A web-based, closed-ended questionnaire created by the University of Vermont and John Hopkins University is the primary tool used for this study's data collection. The request to use this material was granted by the authors. The questionnaire aimed at acquiring important and detailed information from participants. It consists of 28 closed questions in 5 sections. The first section included socio-demographic and socio-economic information. The second section includes general information about COVID-19 and food consumption. fixed third section asked questions about Food accessibility before and during the pandemic. fixed fourth part focused on questions about eating and purchasing behaviors while the fifth included perspectives and experiences about food policies.

3.4. Research Variables

Independent variables are COVID-19 and FMARD staff. The dependent variables are Food Security and Food Policy. Inclusion criteria are current staff of FMARD working at the time of the research. Exclusion criteria are ex-staff and family members or associates of FMARD Nigeria.

The Questionnaire used in the research was divided into 5 parts. The first part focused on socio-economic variables like age, gender, level of education, income, years of experience, and family size. The second, third, and fourth parts focused on the Food security variable, asking questions about Food availability and supply, accessibility, utilization, and stability respectively. The 5th part focused on the Food policy variable. Here Questions were asked if there were changes in Food policies since the pandemic.

Food security was measured as a multi-dimensional concept, encompassing food availability, accessibility, utilization, and stability before and during covid 19. Data from all five parts were combined to assess the overall food security situation among FMARD staff during the COVID-19 pandemic.

Food policy was accessed by asking questions on food policy changes during the pandemic. It included questions related to different aspects of food policy, including sector-wide and institutional policies, information and communication strategies, trade and product flows, labor policies, restrictive measures, and agricultural and food support policies.

3.5. Data Collection Methods

Google Forms was used to publish an online survey. The link to this survey was distributed to participants' official emails. The questionnaire was accessible to responders for a fixed 2 months. This time frame is due to elections and slow compliance. The questionnaire was approved by the University of Vermont, John Hopkins, and Yeditepe University Public Health Departments. The questionnaire was also properly checked and verified by the dissertation supervisor. Her inputs and modifications were integral to the final draft of the questionnaire.

3.6. Statistical Analysis

Simple frequencies and percentages were used as descriptive statistics tools to measure the various socioeconomic and demographic characteristics. Subsequently, Cronbach's alpha coefficient of .941 (94%) was obtained, which analysis suggests that the survey or measure is likely to produce consistent and reliable results. In order to investigate the connection between food safety, food

policy, and COVID-19, an OLS regression analysis was used. A p-value of 0.05 was deemed significant. Version 29.0 of IBM SPSS for Mac was utilized for the entire analysis.

3.7. Ethical approval

The Yeditepe University Ethics Committee gave its consent for the study, The approval number for this ethical thesis is 202208Y0274.



RESULTS

4.1. Introduction

This chapter presents the results of the data analysis and interpretations of the survey results obtained from the target respondents. For this analysis, descriptive statistical tools were used in analyzing the collected data. In addition, inferential statistics were used to test the formulated hypotheses. Demographic data analysis is outlined in tables with simple frequencies and percentages of respondents and interpretation of the data. Respondents answered a total of six hundred and fifty (650) questionnaires, of which six hundred and thirty (630) were valid, resulting in a response rate of 97%.

4.1. Respondents' Socio-Demographic Profiles.

Table 4.1: Outlining the respondent's sociodemographic traits.

Variables	Frequency	Percentage
Age group		
25 below	74	11.7%
26-35	404	64.2%
36-45	91	14.4%
46-55	36	5.7%
56 & above	25	4.0%
Total	630	100%
SEX		
Male	366	58.1%
Female	246	39%
Non-Binary	0	0%
Prefer not to say	18	2.9%
Total	630	100%
Level of Education		
First school leaving certificate	24	3.8%

High school graduate	94	14.9%
Associate degree / technical school / appreciation	21	3.3%
Bachelor's degree	394	62.5%
Postgraduate Degree (Masters, Phd) / professional certificate	97	15.4%
Total	630	100%
How long you have been in Ministry of agriculture		
0 - 2 Years	444	70.5%
3 - 5 Years	103	16.3%
6 – 11 Years	23	3.7%
11 years and above	60	9.5%
Total	630	100.0%
Education Qualification		
Director	31	34%
Administrative staff	152	49%
Senior staff	42	15%
Junior staff	2	2%
Total	100	100%
House Income Range Before Tax		
Less than NGN100,000	149	23.7
NGN100,000 to NGN149,99	138	21.9
NGN150,000 to NGN249,999	108	17.1
NGN250,000 to NGN349,999	79	12.5
NGN350,000 to NGN499,999	76	12.1
NGN500,000 to NGN749,999	13	2.1
NGN750000 to NGN999999	17	2.7
NGN1,000,000 or more	50	7.9

4.2. Analysis of Demographic Information

The frequency distribution and demographic data of the respondents are further presented in this section. As shown in Table 4.1, the age group of 26-35 represents the majority of the respondents at 64.2%, while the age group of 25 and below only represents 11.7% of the total respondents. The age group of 36-45 is 14.4%, 46-55 represents 5.7%, and those 56 and above represent 4.0%. There is a decrease in the percentage of respondents as the age group increases. Males make up more than half of the responders (58.1%), while females make up 39%. Non-binary respondents and those who prefer not to say represent a very small percentage of the total respondents (0% and 2.9%, respectively).

62.5% of respondents have a bachelor's degree, followed by postgraduate/professional degree holders (15.4%). High school graduates represent 14.9% of the total respondents. Only a small percentage of respondents have a first school leaving certificate (3.8%) or an associate degree/technical school/appreciation (3.3%). The highest percentage of respondents (71.4%) have been working in the Ministry of Agriculture for 2 years or less, while only 15.8% have been working for 3-5 years. The smallest percentage of respondents (3.5%) have been working for 3-5 years. The majority of the respondents (49%) are administrative staff, followed by directors (34%). Senior staff and junior staff represent a small percentage of the respondents (15% and 2%, respectively).

The highest percentage of respondents (23.7%) fall in the income range of less than NGN100,000, followed by NGN100,000 to NGN149,999 (21.9%) and NGN150,000 to NGN249,999 (17.1%). The income range of NGN1,000,000 or more represents 7.9% of the total respondents, while the income range of NGN500,000 to NGN749,999 represents only 2.1% of the total respondents.

Table 4.2: How many people in each of the following age categories are now living in your home? (A home is defined as all persons who are currently residing there, whether they are family or not.)? [Aged over 65]

No of individual	Frequency	Percent
0	460	73.0%
1	90	14.3%
2	46	7.3%
3	18	2.9%
4	10	1.6%
6	6	1.0%
Total	630	100

In the demographic data table 4.2, it appears that the majority of respondents (73%) do not have anyone over the age of 65 living in their household. Only 14.3% of respondents have one person over the age of 65 living with them, while 7.3% have two people in this age group living with them. Two percent or less of homes have three or more adults over 65, while one percent or less of households have four or more adults over 65.

Table 4.3 How many people in each of the following age categories are now living in your home (A home is defined as all persons who are currently residing there, whether they are family or not)?
[Aged 18 - 65]

No of individual	Frequency	Percent
0	78	12.4%
1	48	7.6%
2	149	23.7%
3	165	26.2%
4	88	14.0%
5	47	7.5%
6	39	6.2%
7	16	2.5%
Total	630	100

The demographic data table 4.3, shows that the survey asked respondents about the number of children aged 18-65 who currently live in their household. The table shows that the largest percentage of respondents (26.2%) have three people in this age group living with them, while 23.7% have two people, and 12.4% have none. In this age range, homes with one person make up a small fraction (7.6%), whereas households with four or more individuals make up an even smaller portion (less than 5%).

Table 4.4: How many members of the following age groups are now residing in your household (defined as all people currently residing in your household, whether family or not)? [Children 5 – 17]

No of individual	Frequency	Percent
0	401	63.7%
1	114	18.1%
2	45	7.1%
3	36	5.7%
4	16	2.5%
5	8	1.3%
7	10	1.6%
Total	630	100

In the demographic data table 4.4, it shows that the survey asked respondents about the number of children aged 5-17 who currently live in their household. The data shows that the majority of respondents (63.7%) do not have any children in this age range living with them. Among those living with children in this age group, the most common household size was one child (18.1%), followed by two children (7.1%) and three children (5.7%). The proportion of families with four or more children in this age group is very small (less than 1%).

Table 4.5: How many members of the following age groups are now residing in your household (defined as all persons residing in your household, whether family or not)? [Children under 5]

No of individual	Frequency	Percent
0	481	76.3
1	70	11.1
2	31	4.9
3	38	6.0
6	10	1.6
Total	630	100

In the demographic data table 4.5, it indicates that the survey asked respondents about the number of children under 5 who currently live in their household. The data shows that the majority of respondents (76.3%) do not have any children under 5 living with them. Of those who do have children under 5 living with them, the most common household size is one child (11.1%), followed by three children (6.0%) and two children (4.9%). Less than 1% of homes have four or more children under the age of five.

4.3. Inferential Statistics

Formulated Hypothesis One:

H₀: There is no relationship between COVID-19 and food security.

H₁: There is a relationship between COVID-19 and food security.

Table 4.6: OLS Regression Estimation of Effect of Food Security on COVID-19 (N=630).

Variables	Parameter	Co-efficient	Std. Err	T-value	p- value
Constant		2.969	1.180	2.517	0.012
Covid 19	X1	-.111	.031	3.561	0.000***
Age	X2	-.856	.195	-4.391	0.000***
Gender	X3	-.126	.301	-.417	0.677
Level of education	X4	.079	.168	.470	0.638
Years of experience	X5	.434	.177	2.446	0.015**
Income range	X6	.072	.166	.433	0.665
R square	.601	.063	.078	.815	0.415
Adj R²	.500				
F- ratio	5.9				

***< 0.01-1%

** 0.01-0.05= 5%

Interpretation of Result

Results in Table 4.7 shows the t- value and p-value and coefficients value of the analyzed. The OLS regression estimation aims to understand the effect of various independent variables on the effect of covid 19 on food security. The linear model of R² of .601 implies that 60.1 % of the total variations in food security on FMARD staff are due to COVID-19.

The variable "COVID-19" represents the impact of the pandemic on FMARD staff's food security. In this case, the negative coefficient of -0.111 (95% CI: -0.173 to -0.049, $p < 0.001$) suggests that an increase in the COVID-19 factor is associated with a decrease in the dependent variable. This implies that as the impact of COVID-19 becomes more pronounced, their food security tends to decrease. The low p-value (0.000***) indicates that this relationship is statistically significant and is unlikely to occur by chance.

The variable "Age" represents the age of FMARD members. The negative coefficient -0.865 (95% CI: -1.238 to -0.474, $p < 0.001$) indicates that older members tend to be less food security compared to younger respondents. The low p-value (0.000***) suggests that this relationship is statistically significant. The variable "Years of experience" represents the working experience attainment by FMARD staff. The positive coefficient of 0.434 (95% CI: 0.088 to 0.780, $p = 0.015$) suggests that higher levels of experience are associated with high food security. The low p-value (0.015**) indicates that this relationship is statistically significant. An F ratio of 5.9 (greater than 1.0) shows that the model is a good fit for the data and the null hypothesis is false.

OLS regression analysis suggests that the COVID-19 pandemic, age, and years of experience in FMARD have significant effects on FMARD members' food security. However, gender ($B = -0.126$, 95% CI: -0.714 to 0.462, $p = 0.677$), level of education ($B = 0.079$, 95% CI: -0.251 to 0.409, $p = 0.638$), and income ($B = 0.072$, 95% CI: -0.253 to 0.396, $p = 0.665$) do not appear to have a statistically significant effect based on the provided information. Overall, the regression analysis's findings provide compelling support for the alternative hypothesis (H_1) that COVID-19 has an impact on food security.

Formulated Hypothesis Two:

H_0 : There is no effect of COVID-19 on food policy.

H_1 : There is effect of COVID-19 on food policy.

Table 4.7: OLS Regression Estimation of Effect of Food Policy on FMARD members' Perceptions about Covid 19 (N=630)

Variables	Parameter	Co-efficient	Std. Err	T-value	p- value
Constant		2.014	.268	7.508	0.000
Covid 19	X1	-.037	0.007	-5.193	0.000***
Age	X2	-.209	0.044	-4.709	0.000***
Gender	X3	.039	0.069	0.562	0.574
Level of education	X4	-.158	0.039	-4.108	0.000***
Years of experience in FMARD	X5	.198	0.040	4.929	0.000***
R square	.571	-.049	0.038	-1.277	0.202
Adj R²	.481				
F- ratio	18.755				

***p value < 0.01-1%

Interpretation of Result

Results in Table 4.8 show the t- value and p-value and coefficients value of the analyzed data. The OLS regression estimation aims to understand the effect of various independent variables on the effect of COVID-19 on food policy. The linear model of R² of .571 implies that 57.1 % of the total variations in food policy is as a result of COVID-19.

The variable "COVID-19" represents the impact of the pandemic on FMARD staff's perceptions. The negative coefficient -0.037 (95% CI: -0.051 to -0.023, p < 0.001) suggests that an increase in COVID-19 cases or severity is associated with a decrease in members' perceptions about Covid-19. The low p-value (0.000***) indicates that this relationship is statistically significant.

The variable "Age" represents the age of FMARD members. The negative coefficient -0.209 (95% CI: -0.295 to -0.123, p < 0.001) indicates that older members tend to have lower perceptions of Covid-19 compared to younger staff. The low p-value (0.000***) suggests that this relationship is

statistically significant. The variable "Level of education" represents the educational attainment of FMARD members. The negative coefficient -0.158 (95% CI: -0.234 to -0.082, $p < 0.001$) suggests that higher levels of education are associated with lower perceptions about Covid-19. The low p-value (0.000***) indicates that this relationship is statistically significant.

The variable "Years of experience" represents the working experience attainment by FMARD staff. The positive coefficient of 0.198 (95% CI: 0.120 to 0.276, $p=0.015$) suggests that higher levels of experience are associated with high perceptions of Food Policy during the pandemic. The low p-value (0.015**) indicates that this relationship is statistically significant. A F-ratio of 18.755 (greater than 1.0) shows that this model is a good fit for the data and the null hypothesis is false.

OLS regression analysis suggests that the Covid-19 pandemic, age, level of education, and years of experience in FMARD have significant effects on FMARD members' perceptions of COVID-19. However, gender ($B=0.039$, 95% CI: -0.095 to 0.173, $p = 0.574$) does not appear to have a statistically significant effect based on the provided information. Overall, the regression analysis's findings provide compelling support for the alternative hypothesis (H_1) that COVID-19 has an impact on food policy.

4.4. Summary of Findings

Using the OLS regression analysis, the first formulated hypothesis was realized. The results demonstrate a link between COVID-19 and food security. As a result, we accept the alternative hypothesis (H_1), which asserts that there is a relationship between COVID-19 and food security, and reject the null hypothesis (H_0), which indicates there is no association between COVID-19 and food security.

An OLS regression analysis test was also conducted to confirm the formulated second hypothesis. The conclusions showed that COVID-19 had an impact on food policy. As a result, we accept the alternative hypothesis (H_1), which argues that there is a relationship between COVID-19 and food policy, and reject the null hypothesis (H_0), which states that there is no relationship between COVID-19 and food policy.

DISCUSSION, CONCLUSION, AND RECOMMENDATION

5.1. Introduction

It is important to reiterate that the aim of this study was to assess the impact of COVID-19 on food security and policy. The information gathered for this study was presented and rigorously examined, and the proper interpretations were provided in the chapter before this. Here, the result is extensively discussed and certain suggestions are presented that, in the researcher's opinion, will be very helpful in tackling the difficulties posed by pandemics on food security that might occur in the future.

5.2. Discussion

The impacts of COVID-19 on food security and policy were comprehensively observed in this study. Recent qualitative and quantitative data from Nigeria were used and served as a point of reference. Results found imply that the government's declaration of movement restrictions (such as curfews and lockdowns) was prompted by the advent and spread of the pandemic. As seen in this study, both have led to changes in policies and food security. This study also confirms once more that Food demand and supply shocks account for a majority of the pandemic's consequences.

Nigeria has been battling with Food insecurity before the pandemic. This has been greatly due to an underdeveloped agricultural system, poor practices, and storage systems. Although many policies seemed to help make progress, all results seemed insignificant when the COVID-19 pandemic started. It is no doubt that the COVID-19 pandemic has a significant negative effect on Food Security. The results presented found demographics like age, family size, dependency ratio, and years of work experience to be significant factors affecting food security during the pandemic. Evidence from these previous studies (29,45,47) provides empirical support for the association between food security and these demographic factors.

On the other end, this study demonstrates that the effects of COVID-19 on food security were not significant with respect to gender, level of education, and income. This is not unexpected due to the drastic implementation of policies in Abuja, Nigeria which affected both the rich and poor. The Nigerian government was not proactive in issuing restrictions and when the country was finally hit by the pandemic, measures taken were quite sudden and unfair to the people. Highly-educated households received larger incomes, which increased their purchasing power to buy the already inflated food products. This fact is consistent with (17,18,23,42) studies on factors affecting food security. However, the sudden and unexpected imposed curfew, restrictions, and cut in the supply of materials made income insignificant. The majority of FMARD staff depended on stored staple foods, food packages from the government and religious groups, government palliatives, and help from family and friends during the pandemic.

It is not unlikely that COVID-19 will have an impact on food policy. According to this study, the pandemic has significantly altered earlier dietary measures. Policies introduced by the government due to the pandemic consist of sector-wide and institutional, Information and communication, Trade and product flows, Labor, Restrictive, Agricultural, and food support measures. A good example is the ADP policy which replaced the APP used before the pandemic. This ensured more investment and support in the Agricultural sector (8,28,32,72). Also, financial and economic-oriented policies have been rolled out to combat the dreadful effects of the pandemic. The majority of these policies plan to move the country's dependence on Oil to the Agricultural sector.

The country imports a majority of its Food products and since the pandemic caused a shortage, there was the need to find ways to deal with the situation. While these policies are not entirely effective, they pave the way for a better food safety net (69). Demographics such as Age, level of education, and years of experience were significant to the Food policy during the pandemic. In context, senior staff members who are key players in the formation and enhancement of these policies definitely have a significant perception of their existence and implementation. The advent of the COVID-19 pandemic was an eye-opener to the government, actors, and policymakers to invest more resources in the Agricultural system of the country.

5.3. Conclusion

Agriculture is not immune to the COVID-19 pandemic's impacts. Mobility restrictions, unprecedented food inaccessibility, and lack of effective policies have caused a disproportionate impact on various demographic groups. This has seriously harmed the food supply and, as a result, food security. The government's decision to adopt more harsh steps to restrict the virus's spread as cases rise also contributed to the food insecurity situation. For posterity's sake, any strategy or measures that will be implemented should be based on the principle that protecting people's health and food security supersedes promoting economic growth.

5.4. Recommendations

Fighting against COVID-19 effects, this research suggests that Food Insecurity can be curtailed if Federal and state governments:

1. Become proactive in making policy decisions and disseminate information long before these measures are implemented so as to help people get prepared on ways to deal with them.
2. Increase Agricultural science and technology in the nation in order to diversify into greater production and exports of agri-foods. The population is increasing, and current agricultural yields cannot feed the people. Thus, lower productivity hinders economic growth.
3. Streamline Financial supports hassle and loans for SMEs and Agro-investors to secure land property rights and funds. Also, Improve human capital through better health and education.
4. Create and implements policies that will be well-regulated and maintain their functions.

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7. APPENDICES

APPENDIX 1: Ethical Approval



No : E.83321821-805.02.03-76
Subject : Non Interventional Clinical Research
Ethics Board Decision

To Dr. Öğr. Üyesi Hale Arık Taşyikan

Yeditepe University Non-Interventional Clinical Research Ethics Board has reviewed the research proposal placed upon ethical approval for the project as the research title, the researchers, the application number, the ethics board meeting details, and the provided documents have been outlined below. This research proposal has been evaluated by the members of the ethics board and full ethical **APPROVAL** has been granted.

Research Title:	The Effects of Corona virus (COVID-19) on Food Security in Nigeria
Researchers:	Davidolu Wafemi Solomon, Assist. Prof. Dr. Hale Arik Taşyikan
Application Number:	202208Y0274

ETHICS BOARD MEETING DETAILS			
Meeting Date:	14 September 2022	Meeting Place:	Online (Google Meet)

PROVIDED DOCUMENTS	
Wet signed application file, file uploaded to a CD or USB media, and electronic submission	
Title of research and the names of the researchers	
Letter of application	
Application Form	
Nature of the Research;	
• Type	
• Significance and distinctive value	
• Aims and objectives	
• Method	
• Management of the research	
• Widespread impact	
• Pertinence of the budget and reason (if applicable)	
• Timeframe and convenience	
• References	
Informed consent form (uniquely prepared for the research)	
Letter of Undertaking-1	
A commitment to undertake the responsibility of obtaining institutions permission from where the data collection will be made	
Letter of Undertaking-2	
A commitment to read the latest version of the World Medical Association Declaration of Helsinki and all relevant guidelines of the Ministry of Health	
Letter of Undertaking-3	

True copy by e-signature.

Document Tracking Address : <http://belgedogrulama.yeditepe.edu.tr/bg.aspx?id=AAFDD305-F614-4522-9C52-77C9E565A9E3>

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For Info: Didem ÖZDEMİR ÖZENEN

Profession: Başkan

Phone Number:



A commitment on whether there are previous ethical board applications
Letter of Undertaking-4 A commitment that no action will be taken during the research that is not included in the research budget and that will bring additional burden to the volunteer or the Social Security Institution
Letter of Undertaking-5 A commitment to reading the circular on treatment approaches and scientific research in COVID-19 patients
Letter of Undertaking-6 A commitment to reading the document of Research Application Permissions that is published by Ministry of Education
'Resume Forms' filled separately by all the researchers and signed
Additional documents (Scale permissions used, if any, etc.)

Prof. Dr. Didem ÖZDEMİR
ÖZENEN
Chair

Assoc. Prof. Dr. Gökhan ERTAŞ
Deputy Chair

Assoc. Prof. Dr. Elif SUNGURTEKİN
EKÇİ
Reporter

Prof. Dr. Feryal SUBAŞI
Member

Assoc. Prof. Dr. Binnur OKAN
BAKIR
Member

Assist. Prof. Dr. Elif Çiğdem KELEŞ
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Assist. Prof. Dr. Emine Nur
ÖZDAMAR
Member

Assist. Prof. Dr. Sevim ŞEN
Member

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Phone Number:



APPENDIX 2: Thesis Questionnaire

The Impact of Corona virus on Food security in Nigeria

This study is being conducted to understand how the COVID-19 (coronavirus) outbreak affects food security, production, access and logistics, buying and food access. This information will be used to inform policymakers and COVID-19 responses as they relate to food security.

The survey will take approximately 20 minutes.

If you provide your email address at the end of the survey, you can be entered in a raffle to receive one of 20,000 gift cards to a grocery store.

There are 28 questions in this survey.

General Demographics (part 1 of 5)

1. What year were you born?

Please write your answer here:

2. Which of the following best describes your gender identity?

Choose one of the following answers

Please choose **only one** of the following:

- Male
- Female
- Non-binary
- Prefer to self-describe

3. What is the highest level of formal education that you have completed?

Choose one of the following answers

Please choose **only one** of the following:

- Some high school (no diploma)
- High school graduate (incl. GED)
- Some college (no degree)
- Associates degree/technical school/apprenticeship
- Bachelor's degree
- Postgraduate (like Master's, PhD) / professional degree.

4. How long have you been in ministry of agriculture?

- (0-2) years
- 3-5 years
- 6-11 years
- 11 years and above.....

5. Position held by the respondent in ministry of agriculture

- Administrative staff
- Director
- Senior staff
- Junior staff

5b. Kindly briefly state your Job responsibility

.....
.....

6. How many people in the following age groups currently live in your household (household defined as those currently living within your household, including family and non-family members)?

Please choose the appropriate response for each item:

0 1 2 3 4 5 6 7+

Adults over 65:

Adults 18-65:

Children 5-17:

Children under 5

7. What is your zip code?

Please write your answer here

8. Which of the following best describes your household income range in 2019 before taxes?

Please choose only one of the following:

- Less than NGN100,000
- NGN100,000 to NGN149,999
- NGN150,000 to NGN249,999
- NGN250,000 to NGN349,999
- NGN350,000 to NGN499,999
- NGN500,000 to NGN749,999
- NGN750,000 to NGN999,999
- NGN1,000,000 Or more

General Information (Part 2 of 5)

In this survey we will refer to “since the COVID-19 outbreak” in many questions. We are using March 11th as a start date for the COVID-19 outbreak. While it had been building for some time, that was the date the World Health Organization declared that the outbreak was a pandemic. When we ask about “the year before the COVID-19 outbreak,” we mean March 11, 2019 to March 10, 2020.

9. Which of the following places did your household use to get food in the last year and since the COVID-19 outbreak (March 11th)? Check all that apply.

In the year before the COVID-19 outbreak	Since the COVID-19 outbreak (March 11th)
--	--

<i>Store:</i> Grocery store, supermarket, large bulk stores	
---	--

<i>Store:</i> Convenience store, corner store	
---	--

<i>Store:</i> Specialty store (ethnic market, co-op, health food store)	
---	--

<i>Delivery:</i> Grocery (like Jumia, konga and the likes)	
--	--

<i>Delivery:</i> Meal-kit (like Private restaurant and cafes)	
---	--

<i>Delivery:</i> Meals on Wheels	
----------------------------------	--

Restaurant: To go
(delivery, take-out,
curbside pickup)

**Restaurant or cafeteria -
eat-in**

**Programs that give food
(such as food pantry,
school food)**

**Meals served in group
setting like senior center,
church, or synagogue**

Local: Farmers' market

**Local: Direct from farm:
(Community Supported
Agriculture (CSA), farm
stand pickup / delivery)**

**Local: Garden, fishing,
foraging, hunting, or using
my own canned goods**

**Other (please specify below
if selected)**

Enter any additional places you get food:

Only answer this question if Other is selected above:

10. How true are these statements about your household's food situation in the last year before the COVID-19 and since the COVID-19 outbreak on March 11th?

Please choose the appropriate response for each item:

	In the year before the COVID-19 outbreak				Since the COVID-19 outbreak (March 11th)			
	Often true	Sometime true	Never true	I don't know	Often true	Sometime true	Never true	I don't know
The food that my household bought just didn't last, and I/we didn't have money to get more								
I/we couldn't afford to eat balanced meals								

Please choose the appropriate response for each item:

	In the year before the COVID-19 outbreak			Since the COVID-19 outbreak (March 11th)		
	Yes	No	I don't know	Yes	No	I don't know
Did you or other adults in your household ever cut the size of your meals or skip meals because there wasn't enough money for food? (If yes, please indicate how often below)						
Did you ever eat less than you felt you should because						

**there wasn't enough money
for food?**

**Were you ever hungry but
didn't eat because there
wasn't enough money for
food?**

How often did you cut the size of your meals or skip meals?

Only answer this question if the following conditions are met:

----- Scenario 1 -----

Answer was 'Yes' at question (Did you or other adults in your household ever cut the size of your meals or skip meals because there wasn't enough money for food? (If yes, please indicate how often below) Label In the last 12 months)

In the year before the COVID-19 outbreak	Since the COVID-19 outbreak (March 1111th)
---	---

Some	
Almost every month	Only one I don't know
but not every month	Two or more times a week
Twice a week	Daily

How often did this happen?

11. What were the typical types of transportation you used to get food for your household, in the last 12 months and since the COVID-19 outbreak? Check all that apply.

In the year before the COVID-19 outbreak Since the COVID-19 outbreak
 COVID-19 outbreak (March 11th)

Bus or other public transit

Own vehicle

Ride from friend/family/neighbor

Ride from taxi or app like Lyft/Uber

Someone brings food to me (delivery service or friend/family member)

Walk or bike

Other (please specify below if selected)

12. How often did these happen to your household when getting food, since the COVID-19 outbreak (March 11th)?

Please choose the best response for each item:

Never Sometimes Usually Every time Not applicable

Could not find AS MUCH food as I wanted to buy (food not in store)

**Could not find THE TYPES
of food my household
prefers to eat**

**Had challenges knowing
where to find help for
getting food**

**Had to go to more places
than usual to find the food
my household wanted**

**Had to stand too close to
other people, when getting
food (less than six feet away)**

**Reduced grocery trips to
avoid COVID-19 exposure**

Please describe the kinds of food you wanted and could not get, or the kinds of food you got and did not want:

Only answer this question if the following conditions are met:

Answer was 'Sometimes' *or* 'Usually' *or* 'Always' at (Could not find THE KINDS of food my household prefers to eat))

Please write your answer here:

If you had to stand too close to other people, what sort of place were you in? (such as store, food pantry, school food program, etc.)? Only answer this question if the following conditions are met:

Answer was 'Always' *or* 'Usually' *or* 'Sometimes' at question ' (Since the COVID-19 outbreak (March 11th), how often did these happen to your household? (Had to stand “too close for safety” to other people, when getting food (less than six feet away)))

Please write your answer here:

13. Have you or anyone in your household experienced a loss of income or job since the COVID-19 outbreak (March 11th)? Check all that apply.

	Happened at all since COVID-19 outbreak (March 11 th)	Still happening today
Yes, lost job		
Yes, reduced hours or income at job		
Yes, furloughed		
No, have not had any changes in job		

14. Have you received any money from these sources since the COVID-19 outbreak? Check all that apply.

___ Federal stimulus check

___ Friends or family

___ Unemployment benefits

Food Access (part 3 of 5)

15. What, if anything, would help your household to meet its food needs during the COVID-19 pandemic?

Please choose the appropriate response for each item:

	Not helpful	Helpful	Not applicable
Access to public transit or rides			
Different hours in meal programs or stores			
Extra money to help pay for food or bills			
Information about food assistance programs			
More (or different) food in stores			
More trust in the safety of food			
More trust in safety of food delivery			
More trust in safety of going to stores			
Support for the cost of food delivery			
Other (please specify below if selected)			

Enter other things that would make it easier for your household to meet its food needs during the COVID-19 pandemic:

Only answer this question if the following conditions are met:

Answer was 'Helpful' at question 'What, if anything, would make it easier for your household to meet its food needs during the COVID-19 pandemic? (Other (please specify below if selected))'

Please write your answer here:

How much extra money per week is needed to meet your household's food needs? Please provide your best estimate.

Only answer this question if the following conditions are met:

Answer was 'Helpful' at question (What, if anything, would make it easier for your household to meet its food needs during the COVID-19 pandemic? (Extra money to help pay for food or bills))

Please write your answer here: (numerical only or short answer)

16. On a scale from 1 (not at all worried) to 6 (extremely worried), what is your level of worry for your household about the following as it relates to COVID-19:

Please choose the appropriate response for each item:

1 (not at all worried)	2	3	4	5	6 (very Not worried applicable)
------------------------	---	---	---	---	---------------------------------

There will not be enough food in the store

The country will not have enough food to feed everyone

Food will become more expensive for my household

Food will become unsafe or contaminated

My household will not be able to get or will lose access to programs that

**provide free food or money
for food**

**My household will lose so
much income that we can't
afford enough food**

**My household won't have
enough food if we have to
stay at home and can't go
out at all (due to quarantine
or illness)**

Please describe any other worries you have about food and COVID-19:

Please write your answer here:

17. Which of the following strategies, if any, are you using now to afford food? If not using them now, how likely are you to use these if your household has challenges affording food in the future during the COVID-19?

Please choose the appropriate response for each item:

	Using now							Would use if needed in the future during COVID-19						
	Yes	Very unlikely	Unlikely	Somewhat unlikely	Somewhat likely	Likely	Very likely	Yes	Very unlikely	Unlikely	Somewhat unlikely	Somewhat likely	Likely	Very likely
Accept food from friends or family														
Borrow money from friends or family														
Buy different, cheaper foods														
Buy food on credit														

Buy foods that don't go bad quickly (like pasta, beans, rice, canned foods)

Get food from a food pantry or soup kitchen

Stretch the food that I have by eating less

Rely more on hunting/fishing/foraging/growing my own food

Other (please specify below if selected)

Enter other strategies your household is currently using or might use in the future:

Only answer this question if the following conditions are met:

----- Scenario 1 -----

Answer was 'Very unlikely' at question 17 (Which of the following strategies, if any, are you currently using or likely to use in the future during the COVID-19 if your household has challenges affording food? Indicate both current use where applicable and future use. (Other (please specify below if selected) Label Currently using))

Currently using:

May use in the future:

Other

Eating and Purchasing Behaviors (part 4 of 5)

18. Do you or someone in your household have a special diet?

Please choose **all** that apply:

- Food allergy that requires avoiding some foods (such as nut, wheat, dairy allergy)
- Food sensitivity that causes problems from eating some foods (such as gluten free or dairy intolerance)
- Need to avoid some foods for health condition like diabetes or kidney disease
- Religious restriction (such as kosher, halal)
- Vegetarian, vegan
- Weight loss diet that requires special foods
- Other:

19. Have you had challenges finding food that meets these food needs since the COVID-19 outbreak (March 11th)? (conditional only if yes to above)

	Yes	No	Not applicable
Which special food need? (carry from above)			
Which special food need? (carry from above)			
Which special food need? (carry from above)			

20. The next questions are about how you have been eating in the past month during the COVID-19 outbreak (since March 11th).

About how many cups of fruit (including 100% pure fruit juice) do you eat or drink each day?	• None
--	--

Examples of 1 cup for fruit include 1 small apple, 1 large banana, 1 cup (8 oz.) of 100% juice or canned fruit, or ½ cup of dried fruit.	• ½ cup or less • ½ to 1 cup • 1–2 cups • 2–3 cups • 3–4 cups • 4 cups or more
About how many cups of vegetables (including 100% vegetable juice) do you eat or drink each day? Examples of 1 cup of vegetables include 1 cup of cooked leafy greens, 2 cups of lettuce or raw greens, 12 baby carrots, 1 medium potato, or 1 large raw tomato.	• None • ½ cup or less • ½ to 1 cup • 1–2 cups • 2–3 cups • 3–4 cups • 4 cups or more
How often did you eat red meat (such as beef, pork, ham, sausage, veal lamb)? Do not include chicken, turkey or seafood. Include red meat you had in sandwiches, lasagna, stew, and other mixtures.	• Never • 1 time last month • 23 times last month • 1 time per week • 2 times per week • 34 times per week • 56 times per week • 1 time per day • 2 or more times per day
How often did you eat any processed meat, such as bacon, lunch meats, or hot dogs? Include processed meats you had in sandwiches, soups, pizza, casseroles, and other mixtures. Processed meats are those preserved by smoking, curing, or salting, or by the addition of preservatives.	• Never • 1 time last month • 23 times last month • 1 time per week • 2 times per week • 34 times per week

	• 56 times per week • 1 time per day • 2 or more times per day
--	--

21. Compared to before the COVID-19 outbreak, how have you been eating in the past month during the COVID-19 outbreak (since March 11th).

	More	Less	Same
I have been eating more, less, or about the same amount of fruits and vegetables per day.			
I have been eating more, less, or about the same amount of processed and red meats.			
I have been eating more, less, or about the same amount of fish and seafood.			

22. Please indicate your level of agreement with the following statements regarding eating during the COVID-19 outbreak (since March 11th)

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
I find myself eating when I'm feeling emotional (such as anxious, depressed, sad), even when I'm not physically hungry.					
I find myself eating when I am lonely, even when I'm not physically hungry.					
I find myself eating when I am stressed out, even when I'm not physically hungry.					
I am able to cope with my negative emotions (such as anxiety, sadness) without turning to food for comfort.					

23. Please indicate whether any of the following is true about your eating and shopping behaviors in the year before the COVID-19 outbreak and since the COVID-19 outbreak (March 11th):

Behavior	In the year before the COVID-19 outbreak	Since the COVID-19 outbreak (March 11th).
I choose local products	Often true, sometimes true, never true, don't know	Often true, sometimes true, never true, don't know
I buy products with low packaging	Often true, sometimes true, never true, don't know	Often true, sometimes true, never true, don't know

I use reusable shopping bags	Often true, sometimes true, never true, don't know	Often true, sometimes true, never true, don't know
I choose a vegetarian meal over a meat-based dish	Often true, sometimes true, never true, don't know	Often true, sometimes true, never true, don't know
I choose animal products with sustainability labels (such as pasture raised or grass-fed meats, or cage-free eggs)	Often true, sometimes true, never true, don't know	Often true, sometimes true, never true, don't know

24. Has your household done any of the following since the COVID-19 outbreak (March 11th)? Do you believe the average Nigerian household has done them, since that time? Check all that apply.

My household has done this I believe the average U.S. household has done this

Buy a lot more items in a single trip than before the outbreak (such as 50% more than my household needs)

Deliver food to a friend, neighbor, or family member

Donate to others or share

Keep normal shopping habits

Maintain a two week supply of food for my household in case we become ill or got quarantined

Social distanced by not seeing friends in person

Spend more time cooking

Throw away less food than normal

Throw away more food than normal because of extra buying

Volunteer related to the COVID-19 outbreak

Wore a mask in public

Perspectives and Experience about Food Politics (part 5 of 5)

25. On a scale from 1 (strongly disagree) to 6 (strongly agree), how much do you agree with the following statements:

Please choose the appropriate response for each item:

1					6	I
(strongl	2	3	4	5	(strongl	don'
y					y agree)	t

disagree

kno

)

w

The current COVID-19 outbreak is just like the seasonal flu

COVID-19 will affect other states more than mine

COVID-19 will affect other countries more than the Nigeria

COVID-19 will affect people like me

Food Politics in Nigeria has been effective in its approaches

New food policies have helped to combat food insecurity during the Pandemic

Nigeria should prioritize the economy over public health when it comes to COVID-19

Average people should stay at home as much as possible to prevent the spread of COVID-19

Food is not a source of COVID-19

**I felt prepared for the
COVID-19 outbreak**

**Touching food packages
can't transmit COVID-19**

**It is worth the health risk to
reopen the economy as soon
as possible**

**It is worth the health risk to
maintain the food supply
such as requiring farms and
food processing plants to
stay open, because we need
food.**

**If grocery or food delivery
workers went on strike, I
would take action to
support them (like shop
elsewhere, sign a petition,
contribute money)**

**26. Do you know anyone with symptoms of, or diagnosed with, COVID-19? (If so, who?
Check all that apply.**

Please choose **all** that apply:

- Yes, family
- Yes, friend(s)
- Yes, myself
- Yes, other
- No, I don't know anyone

27. Have you had to quarantine in your home due to COVID-19 (for example because of illness, exposure or symptoms)?

- Yes
- No

28. Do you have any additional comments or experiences related to the issue of food during the COVID-19 outbreak that you would like to share? Please use this space:

Please write your answer here:

Submit your survey.

Thank you for completing this survey.

APPENDIX 3. Curriculum Vitae

Personal Informations

Name	David Oluwafemi	Surname	Solomon
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Education

Degree	Department	The name of the Institution Graduated From	Graduation year
University	Physiology	Olabisi Onabanjo University, NG	2016
High school	Sciences	Command College, NG	2009
Languages		Grades (#)	
English		Native	
Turkish		A2	

All the grades must be listed if there is more than one (KPDS, ÜDS, TOEFL; EELTS vs),

Work Experience (Sort from present to past)

Position	Institute	Duration (Year - Year)
HIV Adherence Counsellor	Gwamna Awan General Hospital KD	-2 years (2018-2020)
		-

Computer Skills

Program	Level
Microsoft Office	Excellent

SPSS Data Analysis	Good
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***Excellent , good, average or basic**

