

Socio-Economic and Environmental Issues: Implications for Food Security in Nigeria

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I. Introduction

Socio-economic activities within the agricultural sector have witnessed significant changes in recent times. Two major factors account for this recent development. Available evidence shows that over the last four decades, environmental challenges (such as pollution, extreme weather, fire disaster and deforestation, among others) have been on the increase in Nigeria. This is complicated by a weak institutional framework to stem the tide (Egbetokun et al., 2018; 2020). Also, the information from Nigeria Meteorological Agency (NIMET) shows that the annual mean climatic conditions (that is rainfall and temperature) in Nigeria have witnessed huge variation (NIMET, 2020; Egbetokun et al., 2020), which have possible implications for food security.

Also, the Coronavirus (COVID-19) pandemic and attendant socio-economic challenges, such as lockdowns and restriction of movement and other social and economic activities, have further affected food production and supply resulting in food security concerns in Nigeria. Other burning issues in the Nigerian economy, such as rising insecurity, farmer-herder conflicts, and rising unemployment, particularly among the youthful population, among others, have also made food insecurity a growing concern (Osabuohien, 2021; Popoola, 2021).

These two factors have become a binding constraint on food security. Some efforts have been made by the governments across countries to address food insecurity. However, the world's undernourishment remains an issue of concern due to the increasing number of hungry people globally (Matthew et al., 2019). The Food and Agriculture Organisation-FAO (2017) reported that the number of undernourished people globally remains significantly high, as it increased from 777 million in 2015 to 815 million in 2018 (FAO, 2018). Rapid population increase has been recognised as one of the main reasons for heightened food insecurity and slow economic growth in African countries including Nigeria (Anser et al., 2021; Oyawole et al., 2020). With regard to socio-economic and environmental shocks, African countries are unlikely

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to meet the United Nations (UN) Sustainable Development Goals (SDGs), especially, SDG-2, to achieve food security.

In Nigeria, the state of food insecurity is worsened by socio-economic issues such as, loss of jobs, business failure, increase in price of inputs and fall in the price of output, increase in the price of food items, among others. Factors, such as destruction of harvest by fire, poor rain and flood, pest and disease invasion that cause harvest failure, conflicts and wars, among others, are listed as the major environmental issues responsible for food insecurity (Anser et al., 2021; Oyawole et al., 2020).

Though, the UN Sustainable Development Goal 2 (SDG 2) is aimed at ending hunger, achieving food security and improving nutrition by the year 2030 by promoting sustainable agriculture, food insecurity could attain crisis levels in Nigeria. The country ranks 98th position out of 107 countries on the 2020 Global Hunger Index. In Nigeria, over 9 million people face food insecurity, and the United Nations (UN) Food and Agriculture Organisation (FAO) recently warned that unless appropriate policies are implemented, or resilience-focused and humanitarian actions are taken, millions of Nigerians are likely to suffer, while some of them are already being threatened by famine.

While the world population is projected to increase to at least 9 billion in 2050, Nigeria's population is projected to rise to over 400 million people by 2050. This will double the demand for food and accentuate food insecurity. In that regard, agricultural production needs to increase alongside the growing population that aids in the productive capacity of the agricultural sector. More importantly, is the need to improve the value chain by improving the level of processing, distribution and marketing of agricultural products. This is essential in mitigating post-harvest losses, as well as improving the returns from the agricultural sector that would make it attractive for the youths and investors.

Therefore, this paper sets out to, among others, investigate the state of food security in Nigeria, especially in relation to the current socio-economic and environmental issues affecting agricultural productivity, and then proffers some policy analytical models and recommendations for ensuring food security in the country.

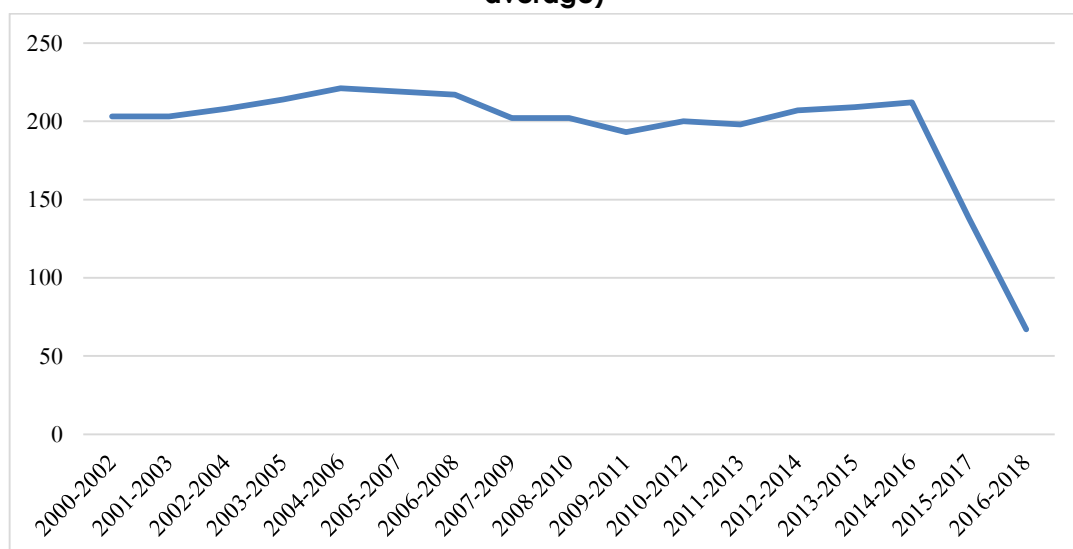
II. Dimensions of Food Security- Nigeria's Outlook

Basically, there are four main dimensions or components of food security which are: Availability, Access, Utilisation and Stability (FAO, 2019). These four components should be satisfied simultaneously to meet the objectives of food security.

Food availability entails physical, social and economic access to sufficient and nutritious food by all people and at all times. Such food must satisfy the dietary

needs and preferences of the people. Availability means the amount of food physically available in a region or place (Nwalie, 2017; Olaoye & Adewole, 2015). Food availability depends mainly on the level of local production. Availability implies that sufficient quantity and quality of food should be available, and every individual should have access to food (FAO, 2019; United Nations-UN, 2020). According to the United Nations (2020) and Goodall (2009), the availability of food is interpreted differently across countries. It simply means the availability of food to survive or to sustain a healthy life by having enough nutrients. The availability of food in a country is determined by the level of production. As presented in Figure 1, food production level showed a decline of 31.6 per cent between the period 2014-2016 and 2016-2018.

Figure 1: Average Value of Food Production in Nigeria (US\$ per person; 3-year average)



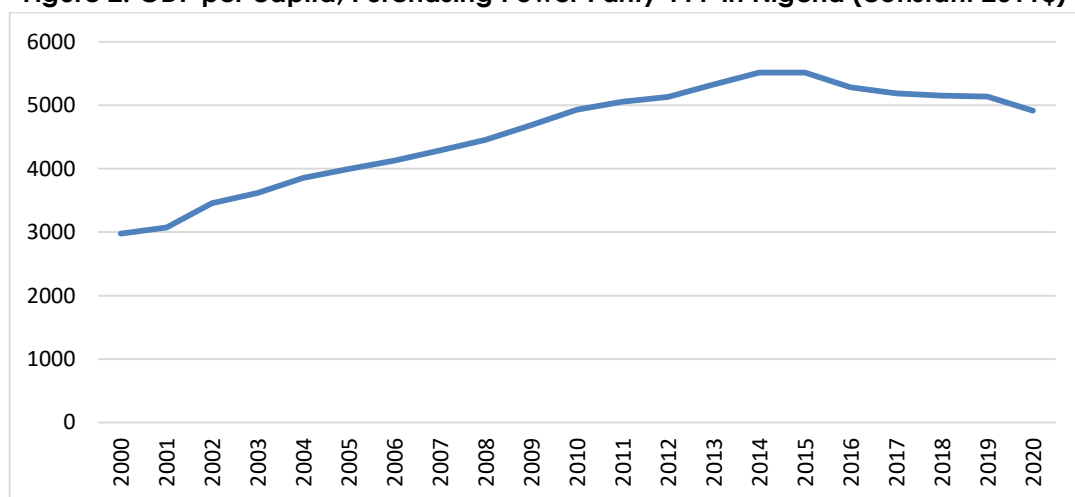
Source: FAO.

Food availability does not guarantee food access. This is because several factors such as institutional structures, government policies, businesses and the markets have an influence on food security at the household level (Osabohien et al., 2018; Ozkan & Fawole, 2017).

Food access refers to economic, social and physical access to food by all people. The availability of adequate amount of food at the regional, national or international level does not imply it is accessible at household level. It must be locally accessible and affordable, suggesting that every individual should have sufficient access to sufficient resources to have appropriate food to live a healthy life.

Household purchasing power, proxied by GDP per capita purchasing power parity (PPP) is the most critical determinant for food access. Access to food is closely associated with poverty, because poor people usually do not have sufficient resources to attain access to the right quantity and quality of food (Labo & Schelling, 2001). Households that are food insecure lack the necessary resources to pay the price for imports and access sufficient supply of food (Boussard, et al., 2006). The extent to which each member of a household has access to sufficient food depends, mainly, on GDP per capita (Benson, 2004). Figure 2 is the GDP per capita PPP in Nigeria, representing the level of food access. Though, food access in Nigeria showed an upward trend from US\$2,977 (GDP per capita) in 2000 to US\$5,516 (GDP per capita) in 2014, representing 54.0 per cent increase, the value shows a decline of about 89.0 per cent between 2014 and 2020.

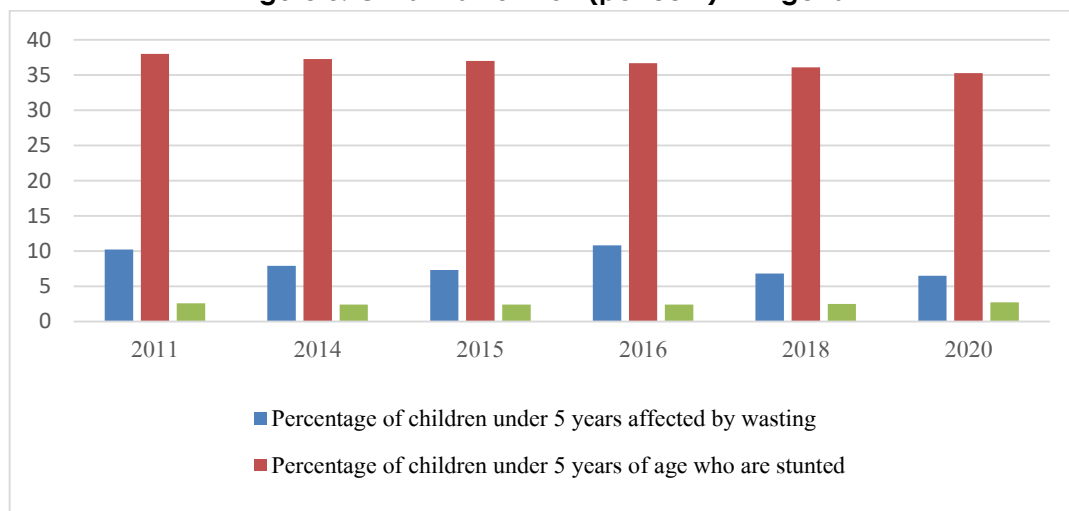
Figure 2: GDP per capita, Purchasing Power Parity-PPP in Nigeria (constant 2011\$)



Source: FAO.

Food utilisation is the proper biological use of food, requiring a diet providing enough energy and essential nutrients, potable water, and adequate sanitation. This is determined by the percentage of children who are undernourished or malnourished. Food utilisation implies that the amount of nutritional food intake by an individual should be safe, of the right quality and be enough for a diet that provides adequate energy and vital nutrients (FAO, IFAD, UNICEF, WFP & WHO, 2019). Figure 3 shows the percentage of child malnutrition in Nigeria.

Figure 3: Child Malnutrition (per cent) in Nigeria

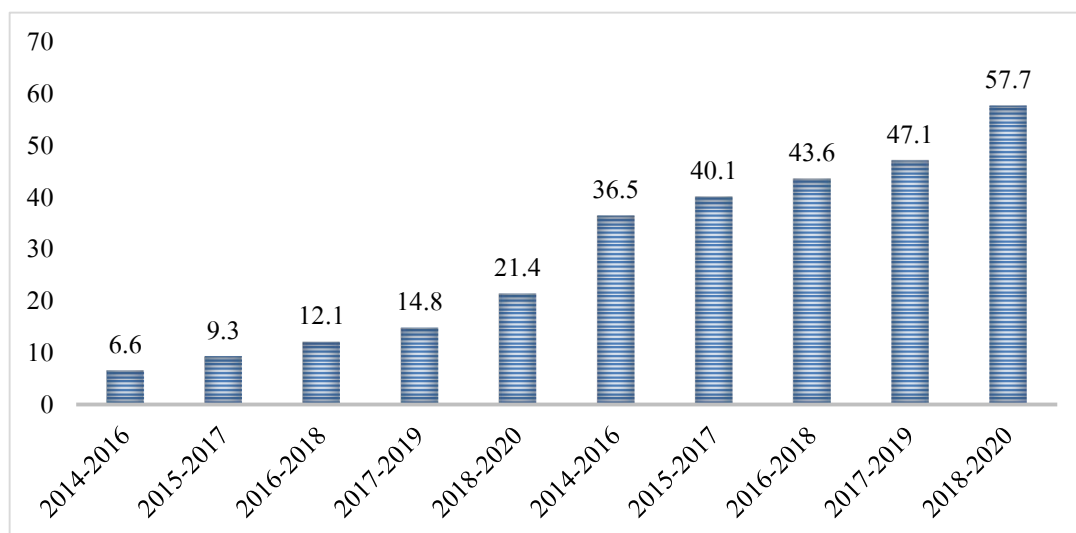


Source: FAO (2021).

Food stability implies that every individual should have access to enough food at all times with no encumbering risk factors and entails food availability, accessibility and utilisation over time for food security (FAO, IFAD, UNICEF, WFP and WHO, 2019). Therefore, it is appropriate to say that the stability component or dimension of food security is the overarching component that encompasses the other dimensions. A person who has adequate access to quality food today is still considered food insecure if he has periodic inadequate access to food, which may cause his nutritional level to deteriorate. The number of undernourished people, prevalence of undernourishment, number of severely food insecure people and prevalence of food insecurity are the major determinants of food stability.

Evidence reveal that the number of persons who experience food insecurity in Nigeria has been on the rise (Bramlett, 2018). Figure 4 presents the prevalence of severe food insecurity in Nigeria, capturing stability dimension of food security. From the chart, the prevalence of severe food insecurity rose from 6.6 per cent in the period 2014-2016 to 57.7 per cent in 2018-2020, indicating instability in food availability, access and utilisation in Nigeria.

Figure 4: Prevalence of severe food insecurity in total population (per cent) (3-year average)



Source: FAO.

III. Socioeconomic and Environmental Factors Driving Food Security in Nigeria

III.1 Socioeconomic Factors

Studies conducted across the globe to examine the influence of socioeconomic factors on food security have shown that various household and individual characteristics such as education, income, salaries, household size, occupation, amongst others, determine the chances of the (un)availability of food (Adeniyi & Dinbabo, 2019; 2020; Ibukun & Adebayo, 2021; Kolawole, 2017). According to the State of Food Security and Nutrition in the World (SOFI) (2021) report, important socioeconomic drivers of food security, especially when observing its impact across food systems are human conflicts, poverty, income level, gender inequalities, availability of a nutritious diet, the business cycle, technology and innovation, among others (FAO et al., 2021).

Consequently, besides from poor policy interventions and climate challenges, conflict influences food security (Ujunwa, Okoyeuzu, & Kalu, 2019). Ujunwa et al. (2019) utilising secondary data for 14 ECOWAS countries find that conflict, specifically armed conflicts, significantly affect food security among member states, negatively. In Nigeria, insecurity remains a huge challenge (Meagher, 2014). Studies show that insurgency has contributed to food insecurity challenge faced within the Nigerian economy, as production and distribution channels of the agricultural value chain have been impacted (Kah, 2017; George, Adelaja and Weatherspoon, 2019).

Furthermore, studies show that the continued farmer-herder conflicts are negatively impacting on the food production and distribution chains (for instance; North-Central and South-West), thereby exacerbating food insecurity (Alao et al., 2019; Tanko, 2019; Yakubu et al., 2020). Therefore, it is evident in the literature that conflict is an important determinant of food security as it affects different levels of the agricultural value chain.

Insecurity has led to drastic reduction in food production, loss of lives and property, large-scale displacement of people, have also wreaked havoc on the country's food security leading to elevated prices. The artisanal small-scale fish growers in the Niger-Delta region produce around half of the fish consumed in Nigeria. Oil spills and overfishing have escalated the problem, impeding access to fish, which accounts for around 40.0 per cent of all animal protein consumed in Nigeria.

III.2 Environmental Factors

Environmental degradation arising from factors such as climate change, flooding due to unusually heavy rain-falls over a long period of time, excessively long dry seasons, pollution, deforestation, increasing population growth and desertification, have continued to take toll on food security in Nigeria. Environmental issues and other farm-related shocks (like pest-infestation, crop failure, crop theft, etc) explain how factors like climate change impacts the entire agricultural value chain, influence food availability and security within the country. Thus it is important to take into cognisance environmental issues and shocks (Bolaji-Olutunji et al., 2008; Okoli and Ifeakor, 2014; Metu et al., 2016; Ogundipe et al., 2019) as these factors are found to significantly influence and impact food security in Nigeria (Ogundipe et al., 2019; Igbokwe-Ibeto, 2019).

Also, natural disasters like erosion, drought, desertification, flooding and socioeconomic shocks have all resulted in poor agricultural practices, land and environmental degradation, and a drop-in crop production. About 90.0 per cent of Nigeria's food is being produced by small-scale farmers with less than two hectares of land under cultivation (Edefe, Osabuohien & Osabohien, 2021). It is imperative for small farm holders to use sustainable agricultural practices that safeguard land, soil, water, or precision farming techniques that amenable to natural calamities, to boost production. (Edefe et al., 2021).

IV. Brief Discourse on Some Agricultural Policies/Programmes in Nigeria

IV.1 Major Agricultural Policies/Programmes (October 1960 -January 1966)

In the post-independence era, new strategies were developed to achieve more fair agricultural growth. Earlier surplus extraction policies were swiftly transformed into

an export-led growth strategy. Each of the three regions in Nigeria at the time was prominent for one major cash crop namely cocoa, groundnut and palm produce in the Western, Northern, and the Eastern Regions, respectively. Interestingly, there was no agricultural programme, project, or scheme in place to achieve the goals of the surplus extraction policies.

Several agricultural research institutes and associated extension research liaison services were established in the early 1960s. The following are some of the important institutions:

- i. Agricultural Extension and Research Liaison Service (AERLS), created in Ahmadu Bello University, Zaria in 1963;
- ii. International Institute of Tropical Agriculture (IITA) founded in 1967; and
- iii. The International Livestock Centre for Africa (ILCA).

IV.2 During Military Era and Second Republic (January 1966 – May 1999)

Some of the major agricultural policies within this period include:

National Accelerated Food Production Programme (NAFPP): The National Accelerated Food Production Programme (NAFPP) was established in 1972 during General Yakubu Gowon's administration. The initiative aimed to achieve a considerable increase in maize, cassava, rice, and wheat production in the northern states through subsistence production in a short period of time.

The inability of certain farmers to organise co-operatives resulted in their exclusion from the programme, as it relied on the dispensing of credits and farm inputs through co-operative societies. The Federal Government's abrupt withdrawal of financing due to the introduction of another initiative (notably Operation Feed the Nation-OFN) affected the continuity of the programme. The research and extension workers' demonstration trials on some selected farmers' plots did not provide a good depiction of the outcome of the programme.

Agricultural Development Projects (ADP): The Agricultural Development Projects (ADP) were established in 1974. The framework was first known as the Integrated Agricultural Development Projects (IADP), which began as pilot projects in the states of North East (Funtua), North West (Gusau), and North Central (Gombe) in 1974. The initiative depended heavily on small-scale farmers to signal a rise in food production. It also included a feedback information method, which is a decentralised decision-making process that allowed farm families/households to provide feedback on an innovation and technology.

Some issues that arose during the project's execution were a lack of funds due to a drop-in oil prices that began in 1982, which caused delays in recruiting qualified

employees and the provision or purchase of materials and infrastructure required for the project's launch. As a result, implementation took substantially longer than expected. Second, ADP prioritised modern/high input technologies such as sole cropping, whereas the majority of farmers adopted mixed/relay cropping. There was also a delay in the supply of subsidised input for the programme.

Operation Feed the Nation (OFN): General Olusegun Obasanjo launched Operation Feed the Nation (OFN) on May 21, 1976. The initiative was established to promote enhanced food production throughout the country through the active involvement and participation of Nigerians in agriculture. Nigerians, regardless of their profession, were expected to be able to sustain themselves partially or entirely through farming. The programme documented the occurrence of endemic poultry diseases, particularly new castle disease, which wiped out the birds due to a lack of quarantine and routine inoculation/vaccination.

River Basin Development Authorities (RBDAs): In 1976, the River Basin Development Decree 25 was passed, establishing 11 RBDAs. The authorities' initial goal was to improve the economic potentials of existing water bodies, primarily with regards to irrigation and fishing, with hydroelectric power generation and domestic water supply as secondary goals. The programme's goal was later expanded to include other areas, most notably crop production and rural infrastructure development.

Teething issues were discovered in the programme, which included extensive political meddling that affected their operations and expansion of the number of authorities out of proportion. Furthermore, large public funds were squandered in order to streamline the sizes and activities of RBDAs through the sale of non-water assets. Input distribution credit services, infrastructure development, and personnel development are examples of policy instruments.

The Green Revolution (GR): President Shehu Shagari launched the Green Revolution (GR) campaign in April 1980. The programme was aimed at increasing food and raw materials production to promote food security and self-sufficiency. Also, it aimed to increase cattle and fish production to meet domestic and export demands, as well as to increase the country's foreign exchange revenues through export. The initiative did not meet its goal of increasing food supply since most of the projects in the programme were delayed. There was also no monitoring and evaluation of the initiatives for which large quantities of money were spent.

DFRRI -Directorate for Food Roads & Rural Infrastructure: The Directorate was established in Nigeria in January 1986 by General Ibrahim Babangida's administration. The programme was aimed to improve the rural people's quality of life (improvement in nutrition, housing, health, employment, road, water, industrialisation, and so on) and standard of living. The Programme necessitated the

use of several resources available in rural areas, as well as widespread participation by rural residents.

DFRRI was targeted at ensuring more food at a lower cost and improved rural conditions in order to reduce the rate of rural-urban migration; increase the quality of rural life and, by extension, its productive capacity, ensuring greater utilisation of rural regions' potentials. The issue with DFRRI was not one of enthusiasm or relevance, but of a disparity between the magnitude of rural underdevelopment and the needed resources available to address it.

Better Life Programme (BLP) for Rural Women: Mrs. Maryam Babangida (wife of Nigeria's then-president) established the Programme in Nigeria in 1987. The programme emphasised encouraging and motivating rural women to improve their living conditions. In order to facilitate assistance, the programme also educated the rest of Nigerians about the issues faced by rural women. The programme was overhyped and condemned by those who feared it would transform into a fashion show. Furthermore, cultural and religious inhibitions of Muslims that do not enable easy access to women in 'purdah' restricted participation, resulting in a low degree of benefit accruing from the programme.

National Agricultural Land Development Authority (NALDA): The authority's goals include providing strategic public support for land development, assisting and promoting better uses of Nigeria's rural land and resources, increasing profitable employment opportunities for rural dwellers, raising the standard of living of rural people, and targeting and assisting in achieving food security through self-reliance and sufficiency. Also, NALDA carried out a national agricultural land development programme to alleviate the issues associated with the under-utilisation of abundant farmland and, as a result, boost farmers' food production levels through the expansion of farmers' farmland holdings.

NALDA's overall purpose was to encourage farmers to cultivate more than they could consume so that surpluses could be sold at local markets or exported to other countries for foreign exchange earnings (Aluko, 2020). The land reform act/decreed has been condemned the most for allowing high-ranking officials to seize land that belonged to poor people.

Family Support Programme (FSP)/Family Economic Advancement Programme (FEAP): This was launched in 1996 during late General Abacha's administration. Health, education, women in development, agriculture, child welfare and youth development, disability, destitution, and income production were all highlighted in the programme. The scheme also permitted the supply of shelter for the less privileged in the society by leveraging the government's housing programme at that time. Unfortunately, these programmes (FSP and FEAP) disappeared as soon as

the administration that launched them was dethroned, limiting their impact on women and the general public.

National Fadama Development Project (NFDP): The NFDP was created in the early 1990s to promote simple, low-cost improved irrigation technology under World Bank finance. The difficulty with the project is that unrestrained irrigation water application might damage and deplete the soil's productive capacity, however an environmental impact study completed on behalf of the NFDP revealed that the programme does not constitute a severe threat to the environment (Aluko, 2020).

IV.3 Democratic Era (May 1999 to Present)

National Economic Empowerment and Development Strategy (NEEDS): President Olusegun Obasanjo established the NEEDS in 2003. The essential components of this development plan were poverty eradication, job creation, wealth creation, and value reorientation through agriculture.

National Special Programme on Food Security (NSPFS): This programme was launched in January 2002 and introduced in all 36 states of the Federation during Olusegun Obasanjo's administration. The programme's overall goal was to enhance food production while also eradicating rural poverty.

National Food Security Programme (NFSP, 2008 – 2011): The Federal Ministry of Agriculture and Water Resources published the National Food Security Programme (NFSP) in August 2008 intending to achieve food security by guaranteeing that all Nigerians have access to high-quality food while also making Nigeria a major food exporter.

Agricultural Transformation Agenda (ATA, 2011-2015): Was aimed at restoring sustainable agriculture to the Nigerian economy, which was based on a business-like approach led by the private sector. In the Agricultural Transformation Agenda (ATA), agriculture is a business, and agricultural policies should promote agriculture as a business, The ATA focused on how to increase the productivity, efficiency, and effectiveness of Nigeria's agricultural sector, as well as create jobs, earn foreign exchange, and reduce food import (Obayelu, 2015).

The Agriculture Promotion Policy (APP, 2016 – 2020): The Agriculture Promotion Policy (APP) was created under President Muhammadu Buhari's administration. It was designed to address two economic issues: a lack of food for local consumption and imports, and a lack of foreign cash obtained from agriculture exports. The goals of the policy are to:

- i. Improve production in a number of domestically oriented crops and activities as a top priority. These include rice, wheat, maize, aquaculture (fish), dairy milk, soya beans, poultry, horticulture (fruits and vegetables), and sugar, among others.
- ii. Prioritise the production of cowpeas, cocoa, cashew, cassava (starch, chips, and ethanol), ginger, sesame, oil palm, yams, horticulture (fruits and vegetables), beef, and cotton for export markets.

A number of gaps identified in these agricultural policies/programmes, are listed below:

- i. The policies and programmes have a short lifespan.
- ii. Agriculture policy is weak and ineffective.
- iii. Delay, embezzlement, misappropriation, and a lack of funds to pursue specific policies and programmes through to completion
- iv. Different programmes and projects have conflicting roles.
- v. Monitoring and assessment of the programmes/projects is either lacking or inadequate.
- vi. Regional policies/programmes are inconsistent or incompatible with national policies/programmes.
- vii. The focus is mostly on food and animal production.
- viii. Inadequate technical advisory/extension services.
- ix. Weak interaction between and among stakeholders.

V. Some Case Studies (Micro-Macro Discourse)

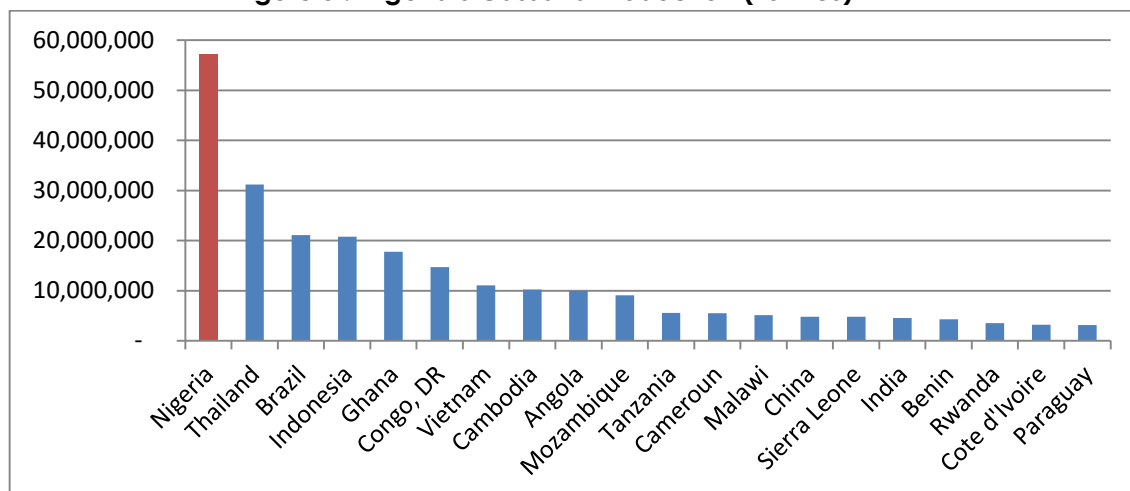
This section provides some micro-macro discussion on efforts towards food security using two major staple crops (cassava and rice) in Nigeria as case study.

V.1 The Case of Cassava

Cassava is one of the 10 Central Bank of Nigeria (CBN) intervention commodities for agribusiness value chain development, with an estimated opportunity gap of 11.8 million metric tonnes in 2019 (CBN, 2019).

In 2018, Nigeria was the highest producer of cassava worldwide, accounting for about 21.5 per cent of global production with about 57.13 million metric tonnes yearly from about 3.7 million hectares of land. The irony is that within the same period, the country was only able to export 9,628 tonnes with a value of about US\$913,000, which accounted for paltry 0.06 per cent export share (see Figure 5 and Table 1).

Figure 5 : Nigeria's Cassava Production (Tonnes)



Source: World Atlas (2020) and FAOSTAT (2021).

Table 1: Selected Countries' Share in Global Cassava Export

S/N	Country	(per cent) Export Share	Export Value in (\$'000)
1	Thailand	81.00	1,360,000
2	Vietnam	13.00	213,000
3	Cambodia	1.70	28,000
4	Paraguay	0.81	13,600
5	Germany	0.64	10,700
6	USA	0.14	2,360
7	Nigeria	0.06	913

Source: FAOSTAT (2021).

One question that comes to mind is whether Nigeria should focus mainly on producing for domestic consumption or for export. However, it has also been noted that the country imports most of the starch used by pharmaceutical companies (Adebayo & Silberberger, 2020). This further supports the need for more value chain development to process the products and benefit from the derivatives and by-products, as well as reduce post-harvest losses. Also, the country's average yield of cassava (about 3.63 metric tonnes per hectare) is lower than the potential yield of 40 metric tonnes per hectare (FAO, 2020). Nigeria's yield per hectare is one of the lowest in the world. One of the reasons adduced is that cassava production in Nigeria is dominated by small-scale farmers with low efficiency and dependence on traditional means of propagation and rainfall (Adebayo & Silberberger, 2020).

Some efforts have been made to boost the production of cassava, such as the establishment of the Nigeria Cassava Growers Association (NCGA) in 1982, which is the registered body for cassava farmers with branches in all the States and Federal

Capital Territory-FCT ((NCGA, 2020; Ohaegbu, 2021). The NCGA's activities cover small-scale and large-scale cassava farmers, and it assists members in different ways such as cooperative schemes, acquisition of farmlands, information dissemination, cluster farming, among others. It also serves as a kind of interface between over 250, 000 farmers and government agencies.

Another effort of the government was an initiative in 2003 during the administration of President Olusegun Obasanjo. One of the policy interventions was to boost the production of cassava and use the product for baking flour, pharmaceutical fillings and sweeteners. The policy could be said to have been impactful as the production of cassava almost doubled within the period (Observatory of Economic Complexity, 2018; Ohaegbu, 2021). However, the initiative on cassava flour did not enjoy continuity during the administration of President Umaru Musa Yar'Adua (Ebewore & Isiorhovoja, 2019). In 2013, President Goodluck Jonathan 're-activated' the import substitution policy of wheat with cassava flour under the 'cassava bread initiative'. Unfortunately, after the end of the administration of President Goodluck Jonathan, the initiative was not pursued as one would have expected.

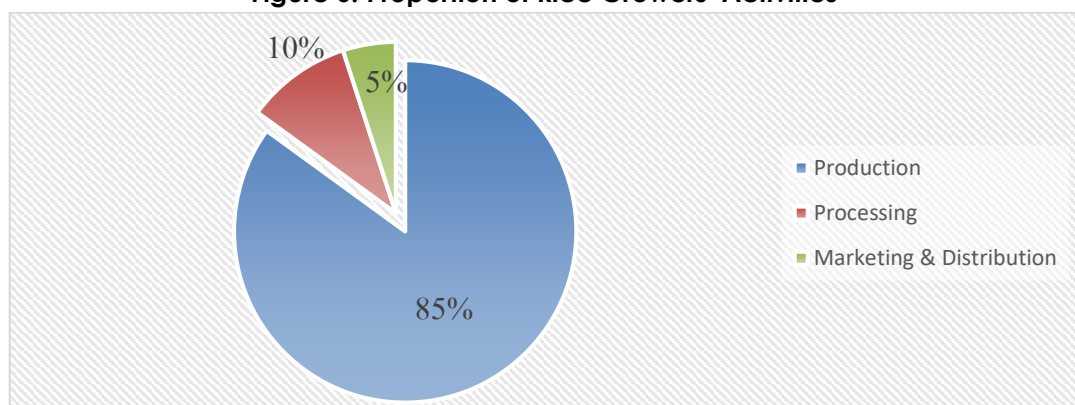
V.2 The Case of Rice

Rice is one of the priority crops within the framework of Nigeria's agricultural transformation agenda (ATA) given its increasing relevance and prominence in terms of consumption. This is essential as Nigeria is one of the largest food importers globally with annual food import of US\$10.00 billion in 2015 and rice having a huge proportion of it (Obayelu, 2015). As at 2016, the level of local rice production was about 4.8 million tonnes (Osabuohien, Okorie & Osabohien, 2018). However, there has been a huge gap between domestic demand and supply of rice in Nigeria as rice consumption is said to increase yearly by 10.0 per cent (Osabuohien et al., 2018).

Until recent times, rice production is characterised by small-scale farmers with low productivity arising from the use of traditional technologies. However, private investors are beginning to participate in the production of rice in Nigeria, including Flour Mills of Nigeria, Bidda-Badeggi, Niger State; Ebony Rice, Ikwo, Ebonyi State; and Dominion Farms, Gassol, Taraba State, among others (Osabuohien, et al, 2018). As noted by Harold and Tabo (2015), rice is a priority crop in the implementation of the New Partnership for Africa's Development (NEPAD) and Comprehensive Africa Agriculture Development Programme (CAADP).

Like the case of cassava, most of the efforts are in production. As depicted by the study on rice by the Rice Growers' Association of Nigeria in Osabuohien et al., (2018), more than 80.0 per cent of the activities concentrate on rice production with processing, marketing and distribution sharing the remainder (see Figure 6).

Figure 6: Proportion of Rice Growers' Activities



Source: Osabuohien et al. (2018).

Major challenges include financial constraint, limited access to quality inputs, un-mechanised processes, birds' infestation, weak linkages for marketing and distribution, among others.

Some efforts of the government to boost rice production include: Presidential Initiative on Increased Rice Production (PIIRP), Nigerian National Rice Development Strategy (NRDS), Presidential Agricultural Transformation Agenda (PATA), Cross-Commodity Input Support, Fertilizer Policy, Cross-Commodity Price Support Measures, Guaranteed Minimum Price, and National FADAMA Development Project (NFDP).

VI. Policies on Agricultural Development, Socio-economic and Environmental Issues: Implications for Food Security in Nigeria

VI.1 Addressing Food Security in Nigeria

From the critical assessment of various programmes and policies reviewed in this paper, the issue of continuity has been a challenge. The programme and policies put in place by previous government should not be allowed to die when another administration takes over. This is because the ruling government serves as both the coordinating and umpire stakeholder, especially in attaining food security in the economy, among other important government programmes. Thus, the need for continuity which would allow for long-term planning and investment is essential in improving the performance of the agricultural sector in moderating the environment and reducing socio-economic challenges confronting agricultural productivity in general and food security.

The quest to address the fundamental challenge of food insecurity demands the adoption of a suitable model approach. Such an approach can help refocus the

efforts of stakeholders and moderate the environmental challenges to the contextual realities regarding the issues relating to food security in Nigeria.

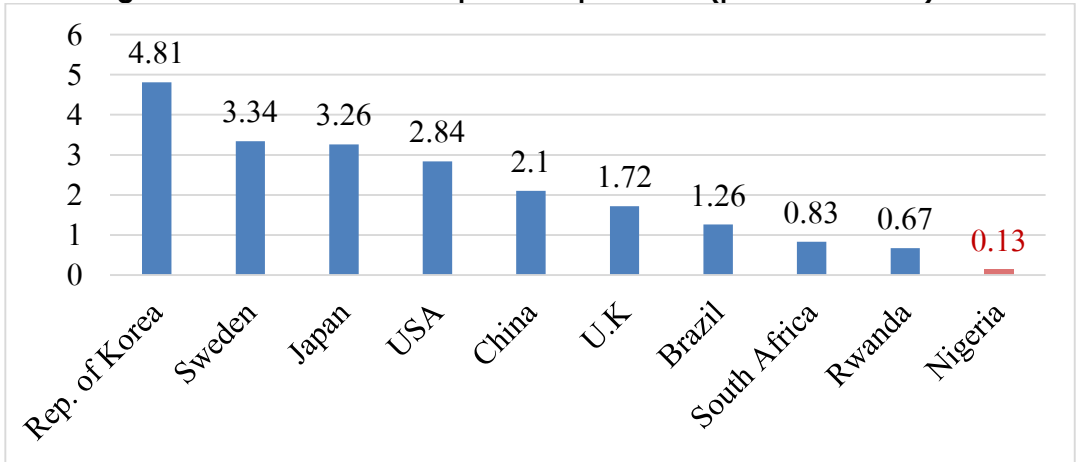
A related observation is the fact that emphasis is mainly placed on the production aspect of agricultural activities. Most of the programmes and policies did not have clear-cut agenda for off-farm activities particularly the issue of distribution, processing and preservation, and marketing (i.e. value chain development). Unfortunately, evidence has shown that more than three-quarters of the returns from agricultural activities revolve around the value chain (Lawal, 2019; Osabuohien, 2020). Thus, for the agricultural sector in Nigeria to be positioned to play a crucial role in tackling food insecurity, frantic efforts need to be placed on value chain development.

Furthermore, the role of research and development (R&D) was not essentially pursued nor given due emphasis, which creates a kind of lacuna between knowledge creation and utilisation towards the attainment of sustainable food security status in the Nigerian economy. Available evidence indicates that the expenditure on R&D as a percentage of gross domestic product (GDP) in Nigeria is far lower than those of selected economies across the world (see Figure 7).

For instance, R&D expenditure as a percentage of GDP in Nigeria is more than 37 times lower than the value for South Korea. Even within the African continent, Nigeria's expenditure on R&D as a percentage of GDP is more than 5 and 6 times lower than those of South Africa and Rwanda, respectively. This reverberates the need for more frantic effort towards research and development.

This development raises the critical question of how Nigeria can cope with the dynamic wave of food security challenges, hinging on socio-economic issues such as increase in population, rural-urban migration, and price volatilities, among others. The stance of this paper is that embracing research and development can guarantee continuous improvement in the drive towards addressing the challenge of food insecurity in Nigeria.

Figure 7: Research & Development Expenditure (per cent of GDP)

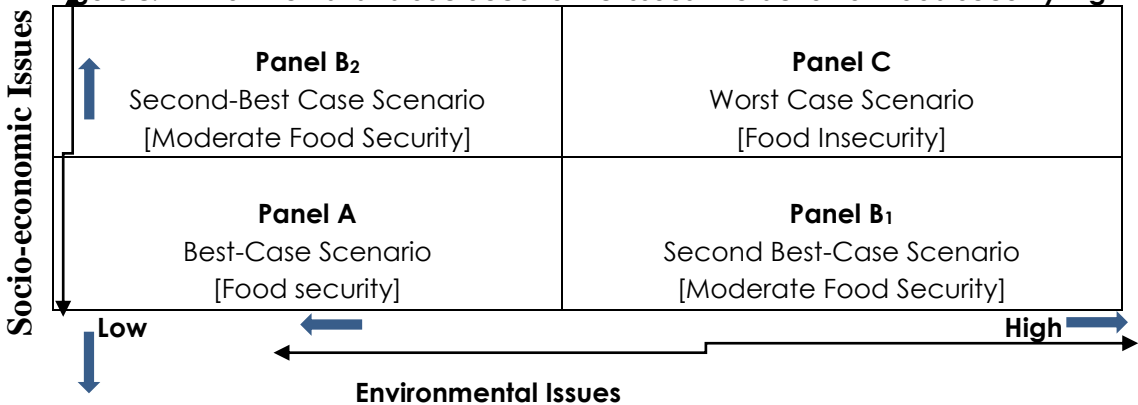


Sources: UNESCO Institute for Statistics (2020); Olayinka (2021) and Osabuohien (2021).

VI.2 Proposed Analytical Policy Model for Food Security in Nigeria

This paper proposes a schematic model in addressing the concerns based on the connection between socioeconomic and environmental issues and how they affect food security. This is presented in Figure 8.

Figure 8: Environmental and Socioeconomic Issues Interaction on Food Security High



Source: The Authors' Compilation.

In Figure 8, Panel A is the best-case scenario, which is the state of food security. In the case, environmental issues such as destruction of harvest by fire, pest and disease invasion, drought and flood that cause harvest failure, among others are low. In addition, at this stage, socio-economic issues such as loss of jobs, business failures, death of income-earning households, increase in price of inputs, increase in price of commodities, and fall in price of output, theft, and conflicts are also low. The implication of this is that, in Panel A, a reduction in environmental and

socioeconomic issues result in food security. This scenario calls for policy intervention such as social protection and stakeholders' commitment to mitigate shocks and vulnerability.

Panels B₁ and Panel B₂ are the second-best case scenarios, which is moderate food security. At this stage, though, socio-economic and environmental issues may be declining, but slower than case A, where socio-economic and environmental issues are reducing faster. At this stage, environmental and socio-economic concerns are moderately low, unlike panel A where the issues are at the lowest. It implies that as environmental and socio-economic issues are reducing, food insecurity is also reducing. Panel C is the worst-case scenario, which is the condition of food insecurity. Hence, socio-economic and environmental issues are high. The implication is that, as socio-economic and environmental issues are increasing, the state of food security begins to decline, or even decline faster than creating a state of food insecurity.

VII. Summary and Conclusion

Nigeria has made many policies toward improving the contribution of the agricultural sector in the economy; however, there is a need to fine-tune some of the policies, particularly regarding food security. This calls for a reinvention of an innovative approach through the engagement of all concerned stakeholders to expedite joint actions to redevelop resilient policies and programmes. Also, there needs to establish a platform for the pursuit of agricultural sector reforms that can effectively address the fundamental challenge of food insecurity in Nigeria, towards the attainment of self-sufficiency and for export. Developing the Nigerian agricultural sector therefore, requires a synchronised process to enable the sector to attain developmental heights that can enhance its potentials, and contribution to broad macroeconomic benefits, such as the provision of employment, local tax and foreign revenues. A critical concern in the Nigerian agricultural sector is the age-long dominance of subsistence agricultural practices.

There is a need for systemic intervention in the transformation of the agricultural sector including the modernisation/formalisation of the informal sector. The sector could serve as a key contributor to food security and provide a shock-absorbing platform for overall macroeconomic stability. The sector is currently a source of livelihood for a significant portion of the population that functions outside the formal economic sector. It is also a potential source of long-term tax revenue.

Some approaches to sector transformation include: identification and engagement with key and affected stakeholders in the informal sector; joint development of acceptable transformative approaches to regularise the participation of the private sector; joint development of improved approaches to the continuous

advancement of the Nigerian informal sector, enactment; and enforcement of fair regulatory guidelines in the informal sector through an institutional support system.

The need for systemic intervention in the transformation of the agricultural sector including the modernisation/formalisation of the informal sector. The sector could serve as key contributor to food security, providing a shock-absorbing platform for overall macroeconomic stability. The sector is currently providing sources of livelihood for the teeming population that function outside the formal economic sector. It holds the potentials to provide a source of long-term tax revenue. Approach to sector transformation include: identification and engagement with key and affected stakeholders in the informal sector; joint development of acceptable transformative approaches to healthy and profitable interactions with the organised private sector; joint development of improvement approach to continues advancement of the Nigerian informal sector; as well as the enactment and enforcement of fair regulatory guidelines in informal sector through an institutional support system.

Furthermore, there is the need for value chain development to reduce post-harvest losses and improve infrastructure; with a view to boosting agricultural production and ensuring food security, and that the private sector leadership should promote key value chain participants by taking responsibility for articulating and implementing agriculture's growth plan. The sector managed by private sector should be well maintained, with government intervention limited to regulation and certification. There is the need for continuous evaluation to measure the impact of programmes implemented towards addressing food security challenges with a view to identifying areas that require improvement over time. In addition, to incentivise production, fiscal policies should be geared at lowering taxes on inputs, equipment among other items. Finally, smallholder farmers who are responsible for the production of the greater percentage of food in the nation, should also be trained to have access to market information systems to plan appropriately and avoid risks and uncertainties.

References

- Adebayo, W. G., & Silberberger, M. (2020). Poverty reduction, sustainable agricultural development, and the cassava value chain in Nigeria. In Osabuohien, E. (Ed). *The Palgrave Handbook of Agricultural and Rural Development in Africa*, 525-551.
- Adeniyi, D. A., & Dinbabo, M. F. (2019). Factors Influencing Household Food Security Among Irrigation Smallholders in North West Nigeria. *Journal of Reviews on Global Economics*, 8, 291-304.
- Adeniyi, D. A., & Dinbabo, M. F. (2020). Efficiency, food security and differentiation in small-scale irrigation agriculture: Evidence from North West Nigeria. *Cogent Social Sciences*, 6(1), 1749508.
- Alao, D. O., Shaibume, B., Ogunwemimo, T., Alao, E. M., & Ogunwemimo, O. (2019). Herdsmen/native farmers' violence in Benue State and food security in Nigeria. *Mediterranean Journal of Social Sciences*, 10(6), 38-38.
- Aluko, O. I. (2020). Agricultural policy and food security in Nigeria: A rational choice analysis. In *The Palgrave Handbook of Agricultural and Rural Development in Africa* (pp. 475-491). Palgrave Macmillan, Cham.
- Anser, M. K., Osabohien, R., Olonade, O., Karakara, A. A., Olalekan, I. B., Ashraf, J., & Igbinoba, A. (2021). Impact of ICT Adoption and Governance Interaction on Food Security in West Africa. *Sustainability*, 13(10), 5570.
- Benson, T. D. (2004). Africa's food and nutrition security situation: where are we and how did we get here? (Vol. 37). Intl Food Policy Res Inst.
- Bolaji-Olutunji, K. A., Adebagbo, C. A., & Tolawo, O. A. (2008). Environmental degradation and sustainable food security in Nigeria. *Journal of Agriculture, Forestry and the Social Sciences*, 6(2).
- Boussard, J. M., Daviron, B., Gérard, F., & Voituriez, T. (2006). *Food Security and Agricultural Development in Sub-Saharan Africa*. Rome: FAO.
- Bramlett, S. (2018). Top 10 Facts about Poverty in Nigeria. Retrieved from: <https://borgenproject.org/10-facts-about-poverty-in-nigeria/>
- Central Bank of Nigeria (CBN), (2019). *Annual Report- 2019*, Abuja: CBN, December
- Ebewore, S. O., & Isiorhovoja, R. A. (2019). Knowledge Status and Disease Control Practices of Cassava Farmers in Delta State, Nigeria: Implications for Extension Delivery. *Open Agriculture*, 4(1), 173-186.
- Egbetokun, S., Osabuohien, E., Onanuga, O., Akinbobola, T., Gershon, O. & Okafor, V. (2020). Environmental Pollution, Economic Growth and Institutional Quality: Exploring the Nexus in Nigeria. *Management of Environmental Quality*, 31 (1), 18-31.
- Egbetokun, S., Osabuohien, E. S., & Akinbobola, T., (2018). Feasible Environmental Kuznets and Institutional Quality in North and Southern African Sub-regions. *International Journal of Energy Economics and Policy*, 8(1), 104-115.
- Edafe, O, Osabuohien, E., & Osabohien, R. (2021). Large-scale Agricultural Investments and Female Employment in Nigerian Communities. *IOP Conference Series: Earth Environmental Science*, 655. (1), 012068.
- FAOSTAT (2019). Food and agriculture data. Retrieved from: <http://www.fao.org/faostat/en/#data/>
- FAOSTAT (2021). Food and agriculture data. Retrieved from: <http://www.fao.org/faostat/en/#data/>

- Food and Agriculture Organisation of the United Nations (FAO), (2017). The state of food security and nutrition in the world 2017: Building resilience for peace and food security. Available from: <http://www.fao.org/3/a-l7695e.pdf>.
- Food and Agriculture Organisation of the United Nations (FAO), (2018). The state of food security and nutrition in the world 2018: Building resilience for peace and food security. Available from: <https://www.fao.org/3/I9553EN/i9553en.pdf>.
- Food and Agriculture Organisation (FAO), (2019). *Strengthening Sector Policies for Better Food Security and Nutrition Results*, Policy Guidance Note 13 (2019). Retrieved from <http://www.fao.org/3/ca7149en/ca7149en.pdf>.
- Food and Agriculture Organization of the United Nations (FAO) (2020). Rome, Italy: FAOSTAT 2020
- Food and Agriculture Organisation (FAO), (2021). <http://www.fao.org/faostat/en/#data/RFN>
- Food and Agricultural Organisation, International Fund for Agricultural Development, United Nations International Children's Emergency Fund, now officially United Nations Children's Fund, The United Nations World Food Programme and World Health Organisation (FAO, IFAD, UNICEF, WFP & WHO), (2019). The State of Food Security and Nutrition in the World 2019. Safeguarding against economic slowdowns and downturns. Rome, FAO.
- Food and Agricultural Organisation, International Fund for Agricultural Development, United Nations International Children's Emergency Fund, now officially United Nations Children's Fund, The United Nations World Food Programme and World Health Organisation (FAO, IFAD, UNICEF, WFP & WHO) (2021). The State of Food Security and Nutrition in the World 2021, Transforming food systems for food security, improved nutrition and affordable healthy diets for all, SOFI Working Paper #240p, Italy, Rome
- George, J., Adelaja, A., & Weatherspoon, D. (2020). Armed Conflicts and Food Insecurity: Evidence from Boko Haram's Attacks. *American Journal of Agricultural Economics*, 102(1), 114-131.
- Goodall, A. H. (2009). Highly cited leaders and the performance of research universities. *Research Policy*, 38(7), 1079-109
- Harold, M., & Tabo, R. (2015). Feeding Africa. United Nations Economic Commission for Africa, An Action plan for African Agricultural Transformation. Abdou Diouf International Conference Center Dakar, Senegal.
- Ibukun, C. O., & Adebayo, A. A. (2021). Household food security and the COVID-19 pandemic in Nigeria. *African Development Review*, 33, 75-87.
- Igbokwe-Ibeto, C. J. (2019). Climate change, food security and sustainable human development in Nigeria: A critical reflection. *Africa's Public Service Delivery and Performance Review*, 7(1), 1-9.
- Kah, H. K. (2017). 'Boko Haram is losing, but so is food production': conflict and food insecurity in Nigeria and Cameroon. *Africa Development*, 42(3), 177-196.
- Kolawole, P. (2017). Agricultural science and technology research to support food security. *Journal of Emerging Trends in Educational Research and Policy Studies*, 8(2), 103-106.

- Labo, J., & Schelling, D. (2001). Design and Appraisal of Rural Transport Infrastructure. *Ensuring Basic Access for Rural Communities*.
- Lawal, K. (2019). Investment prospectus: maize, soybeans and cassava value chains in Nigeria. *Investment prospectus: maize, soybeans and cassava value chains in Nigeria*
- Matthew, O. A., Osabohien, R., Ogunlusi, T. O., & Edafe, O. (2019). Agriculture and social protection for poverty reduction in ECOWAS. *Cogent Arts & Humanities*, 6(1), 1682107.
- Meagher, K. (2014). Beyond terror: addressing the Boko Haram challenge in Nigeria. *Norwegian Peace Building Resource Center Policy Brief*.
- Metu, A. G., Okeyika, K. O., & Maduka, O. D. (2016). Achieving sustainable food security in Nigeria: Challenges and way forward.
- Nigerian Cassava Growers Association (NCGA), (2020). NCGA. Retrieved from www.ncga.org.ng
- Nigeria Meteorological Agency (NIMET), (2020). Weather Forecast. <https://www.nimet.gov.ng/>.
- Nwallee, M. (2017). The paradox of food insecurity in Nigeria (2011-2017). *African Journal of Agriculture and Food Security*, 5(5), 202-208.
- Obayelu, A. E. (2015). Transformation from subsistence to commercial agriculture in Nigeria: The effects of large-scale land acquisition on smallholder farmers. In Osabuohien, E. (Ed). *Handbook of Research on In-Country Determinants and Implications of Foreign Land Acquisitions* (pp. 409-431). IGI Global.
- Observatory of Economic Complexity (OEC) (2018). Cassava. Retrieved from <https://oec.world/en/profile/hs/cassava>
- Ogundipe, A. A., Obi, M., & Ogundipe, O. M. (2020). Environmental Degradation and Food Security in Nigeria. *International Journal of Energy Economics and Policy*, 10(1), 316-324.
- Ohaegbu, A. V. (2021). Knowledge Management and Cassava Agribusiness Capabilities in Nigeria: The Moderating Role of Exports Orientation. Doctoral thesis submitted to Department of Business Management, Covenant University, Ota.
- Okoli, J. N., & Ifeakor, A. C. (2014). An overview of climate change and food security: adaptation strategies and mitigation measures in Nigeria. *Journal of Education and Practice*, 5(32), 13-19.
- Olaoye, T. A., & Adewole, W. A. (2015). Incidence of Food Security among Farming Households in Ogbomosho Agricultural Zone. *Journal of European Academic Research*, 2(11), 14708-14714.
- Olayinka, A. I. (2021). Making Nigerian Institutions the Preferred in Africa. Presentation on *Preparing the Nigerian Educational Sector for African Continental Free Trade Area (AfCFTA) Implementation*, July.
- Osabohien, R., Osabuohien, E., & Urhie, E. (2018). Food security, institutional framework and technology: Examining the nexus in Nigeria using ARDL approach. *Current Nutrition & Food Science*, 14(2), 154-163.
- Osabuohien, E. (2020). *The Palgrave Handbook of Agricultural and Rural Development in Africa*, Cham-Switzerland: Palgrave Macmillan
- Osabuohien, E. (2021). Building Resilience for SDGs Attainment in a Dynamic World: Reductionist and Holistic Perspectives from Nigeria. Keynote Presentation at *12th Annual Ibadan Sustainable Development Summit (ISDS), on Building Resilience for the Attainment of SDGs in the face of COVID-19 Pandemic and*

- a *Changing World*, Centre for Sustainable Development, University of Ibadan, Nigeria. August.
- Osabuohien, E. S., Okorie, U. E., & Osabohien, R. A. (2018). Rice production and processing in Ogun state, Nigeria: qualitative insights from farmers' association. In Obayelu, E. (Ed). *Food Systems Sustainability and Environmental Policies in Modern Economies*, 188-215.
- Oyawole, F. P., Dipeolu, A. O., Shittu, A. M., Obayelu, A. E., & Fabunmi, T. O. (2020). Adoption of agricultural practices with climate smart agriculture potentials and food security among farm households in northern Nigeria. *Open Agriculture*, 5(1), 751-760.
- Ozkan, B., & Fawole, W. O. (2017). Food insecurity risks perception and management strategies among households: Implications for zero hunger target in Nigeria. *Readings Book*, 748.
- Popoola, L (2021). Introductory Remarks at 12th Annual Ibadan Sustainable Development Summit (ISDS), on *Building Resilience for the Attainment of SDGs in the face of COVID-19 Pandemic and a Changing World*, University of Ibadan, Nigeria. August.
- Tanko, M. (2021). *Technology Adoption, Technical Efficiency, and the Welfare of Rice Farmers in Northern Ghana* (Doctoral dissertation, The University of Newcastle, Australia).
- Ujunwa, A., Okoyeuzu, C., & Kalu, E. U. (2019). Armed conflict and food security in West Africa: socioeconomic perspective. *International Journal of Social Economics*, 46(2), 182-198
- United Nations (UN), (2020). Bringing youth back to agriculture in Southern Africa, United Nations, Washington D.C. <https://www.un.org/africarenewal/news/bringing-youth-back-agriculture-southern-africa>
- World Atlas, (2020). Exports of cassava equivalent in Nigeria. in Nigeria. <https://knoema.com/data/nigeria+cassava-equivalent+foreign-trade-exports>.
- Yakubu, S. M., Musa, M. W., Bamidele, T. E., Ali, M. B., Bappah, M. T., Munir, R. T., & Manuwa, A. (2020). Effects of farmer-herder conflicts on rural household food security in Gombe State, Nigeria. *Journal of Agricultural Extension*, 25(1), 11-20.