Economic and Financial Review

Volume 59 | Number 4 Article 10

12-2021

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Idris A. Ayinde
Federal University of Agriculture, Abeokuta

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Idris, A. A. (2021). Rural Infrastructure and the Challenge of Food Security in Nigeria. Economic and Financial Review. 59(4), 107-129

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Rural Infrastructure and the Challenge of Food Security in Nigeria

Idris A. Ayinde *

I. Introduction

The term "infrastructure as defined by the Oxford Dictionary Online (2002) connotes "the basic physical and organisational structures and facilities (e.g., buildings, roads, power supplies) needed for the operation of a society or enterprise. Also, from an economic perspective, infrastructure, according to the Business Dictionary, in Lawal et al. (2019) is "investment of a country, firms or project that underlies and makes possible all its economic activities, which include; administrative, telecommunications, transportation, utilities, and waste removal and processing facilities, education, training facilities, healthcare, research and development".

Rural infrastructure, therefore, implies "the basic physical and organisational structures and facilities (e.g., buildings, roads, power supplies, irrigation networks, extension services, warehouses, and storage facilities) needed for the operation of a rural society" (Memon & Bilali, 2020). In same vein, rural infrastructure are those forms of physical, social, human and institutional capital, which enhances rural dwellers better performance in the aspect of production, processing and distribution activities, as well as improving their overall quality of life (Idachaba & Ekong, 1979; Egbetokun, 2009). Based on the above definitions, provision of infrastructure (whether rural or urban based) capital intensive and vital to a country's economic development and prosperity.

Among the daunting challenges facing the 21st century African continent, is the paucity or inadequacy of infrastructure. This has led to the under-developed or developing status of African countries, where huge economic activities, increased efficiency and competitiveness are impeded by poor transport networks, unreliable information and communication technology (ICT), epileptic power supply, and largely unimproved water supply and sanitation (OECD/ACET, 2020; Deloitte, 2021).

Infrastructure development in Africa is pivotal to advancing economic growth and enhancing the living standards of the African people (AfDB, 2020). It equally

* *Prof. Idris A. Ayinde is the Head, Department of Agricultural Economics and Farm Management, Federal University of Agriculture, Abeokuta, Nigeria. The usual disclaimer applies.*

promotes human development, poverty alleviation and achievement of Sustainable Development Goals (AfDB, 2020). In fact, rural development (through provision of adequate infrastructure) on a sustainable basis, is indispensable to the economic growth, social and environmental viability of any country. The rural areas of Nigeria face myriads of challenges ranging from poverty and food insecurity to climate change related issues, such as deforestation, land degradation leading to biodiversity loss, social exclusion and lopsidedness in environmental development. These have implications for food availability and attendant food security of both the rural and urban areas.

The United Nations (UN) projected the African continent's population to be almost double from 1.3 billion in 2019 to 2.4 billion in 2050, with majority of the growth coming from sub-Saharan Africa (SSA), argued to account for above half of the world's population growth within this period of time (UNDESA, 2019; OECD/ACET, 2020). Likewise, Africa's urban population is projected to speedily rise from 44.0 per cent of the total population in 2020 to 59.0 per cent in 2050 (UN, 2018; Minsat, 2018). These population explosion in SSA will have a huge effect on food demand in the region (UN, 2018; Minsat, 2018). In order to meet up with these huge expectations, there is need for the African continent to scale up infrastructure both in urban and rural areas to match the demands of increasing African population, in terms of production capabilities, labour force and food security (OECD/ACET, 2020).

II. Rural Infrastructure Development in Nigeria

Infrastructural development in Nigeria is mostly felt in the urban areas, while the rural areas suffer serious neglect. In Nigeria, it is evident that the rural areas, which produce the bulk of the food consumed in the country, suffer ageing farming population (Mitchell et al., 2008; Ayinde et al., 2012; Arslan, 2019). Despite this, the agricultural sector in Nigeria employs 36.0 per cent of the Nigerian working population, indicating a fall in the previous reports of 58.0 per cent in 1990s and early 2000s (World Bank, 2018; Edeme et al., 2020). Furthermore, 66.67 per cent of Nigeria's population resided in the rural area (World Bank, 2005), while it was 48.04 per cent in 2020 (World Bank, 2021). This progressive reduction in rural population is caused by myriads of challenges, mainly inadequate, poorly maintained or non-existent infrastructure. Idachaba (1985) presented three key classes of rural infrastructure in Nigeria. These classes and their components are rural physical infrastructure, rural social infrastructure, and rural institutional infrastructure.

(i) **Rural Physical Infrastructure:**

These are transportation facilities such as government roads (federal, state and local government owned), railways, bridges, ferry services and ports; storage facilities such as silos, warehouses, cribs, and open air facilities; processing facilities

such as machinery, equipment and buildings; irrigation, flood control and water resources development such as dams, irrigation and watering facilities, and drainage systems; soil conservation facilities and farm settlement electrification.

(ii) **Rural Social Infrastructure:**

These include healthcare facilities, such as hospitals, dispensaries, maternities and health centres; education facilities such as primary and secondary schools, teacher training colleges, technical schools, vocational schools, and adult education facilities; rural utilities such as electricity and water supply.

(iii) **Rural Institutional Infrasctructure:**

These are postal and telecommunication facilities such as post office, postal agencies, telephones (mobile phones). It includes financial institutions such as banks, credit societies, co-operative societies and related institutions; agricultural research facilities such as research sub-stations, experimental farms, and demonstration plots and, agricultural and training facilities; as well as marketing, crop and animal protection services, and farmers' unions/groups, community development projects embarked upon through self-help initiatives.

II.1 The Africa Infrastructure Index (AIKP): Option for Monitoring Infrastructural Development

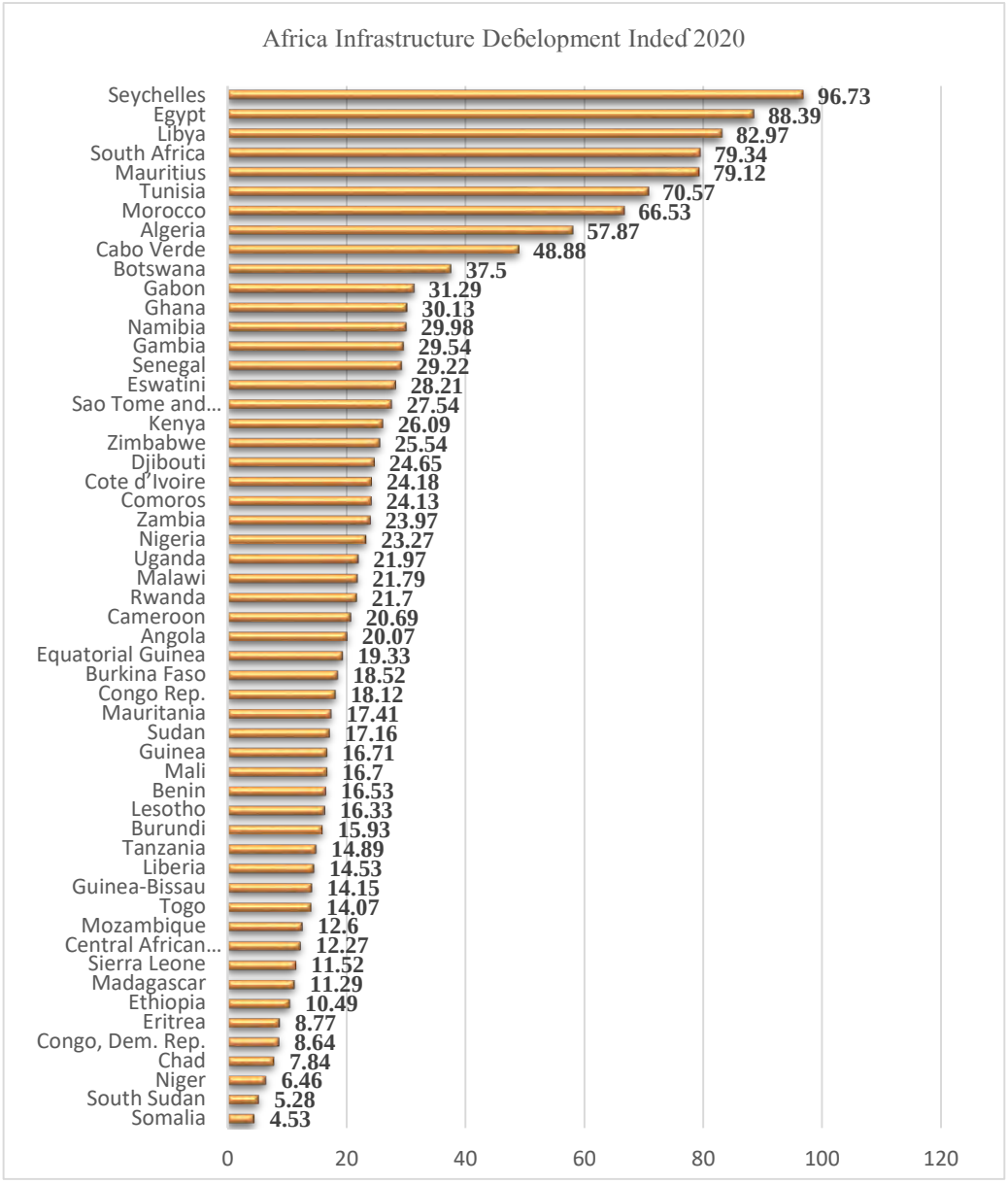
As part of infrastructure development drive in Africa, Africa Development Bank (AfDB, 2020), introduced an Africa Infrastructure Index (AIDI), a composite measure to monitor the status and progress of both rural and urban infrastructure development in Africa, including Nigeria. The yearly composite AIDI presents four main indicators, namely; (i) electricity; (ii) transport; (ii) ICT; and (iv) water and sanitation (AfDB 2020). AIDI serves three main objectives, which are to:

(i) monitor and evaluate the status and progress of infrastructure development across Africa;
(ii) assist in resource allocation within the framework of African Development Funds (ADF) replenishments; and
(iii) contribute to policy dialogue within and between the Bank, African countries, and development partners.

According to the latest composite AIDI (July, 2020), it is noteworthy that North Africa sub-region maintained the top spot with average AIDI of 74.05, while Central Africa had the lowest average AIDI of 11.29 between 2018 and 2020 (AfDB, 2020). The country scores (of 54 African countries) revealed the range of performance indices for the top 10 countries, which increased from 36.79-94.32 in 2018 to 35.50-96.73 in

2020. In Figure 1, the top 10 performers for the composite AIDI scores (comprising transport, electricity, ICT, and water and sanitation) are Seychelles (96.72) (1st), Egypt (88.39), Libya (82.97), South Africa (79.34), Mauritius (79.12), Tunisia, (70.57) Morocco (66.53), Algeria (57.87), Cabo Verde (48.88) and Botswana (37.50).

Figure 1: Africa Infrastructure Index (AIDI) 2020, Country Scores (54 countries)



Source: Author's compilation using Composite AIDI 2020 (Scores/100).

II.2 Nigeria's Infrastructure Index (2001-2020)

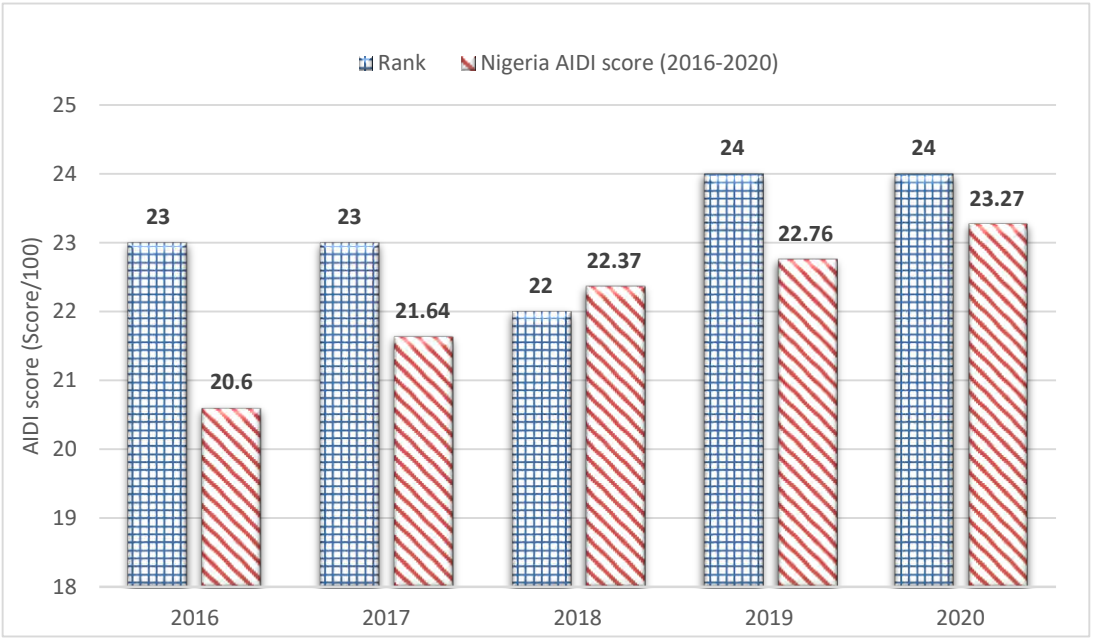
Nigeria's infrastructure development in the last two decades, using the composite Africa Infrastructure Index (AIDI) from 2001 to 2020, is shown in Table 1. The report indicates a substantial rise in the nation's AIDI from 8.78 in 2001 to 23.27 in 2020, though, this two-decadal increase is abysmally below the average of the top 10 countries in Africa in recent times. From Figure 2, out of 54 countries in Africa, Nigeria's AIDI scores fluctuate between 20.61 and 23.27, while its ranking ranged between 23rd and 24th position in recent five-year period (2016-2020). Seychelles was the topmost performer with AIDI scores ranging from 94.32 in 2018 to 96.73 in 2020 (AfDB, 2020). Nigeria's AIDI scores was never in the category of top 10 in two decades, while only countries like Ghana and Botswana and Cabo Verde were the only nations in the West African sub-region that have attained top 10 ranking in recent reports (AfDB, 2018; 2020). Moreover, to critically assess the state of Nigeria's infrastructure development in two decades, we shall delve into the four main indicators of the Nigeria's AIDI score which are as follow: (i) Transport Index (ii) Electricity Index (iii) ICT Index, and (iv) Water supply and Sanitation Index.

Table 1: Nigeria's AIDI Scores 2001-2020

Year	AIDI score (score/100)	Year	AIDI score (score/100)
2001	8.78	2011	NA
2002	9.24	2012	NA
2003	9.17	2013	17.58
2004	9.78	2014	19.35
2005	10.55	2015	20.45
2006	11.25	2016	20.60
2007	11.96	2017	21.64
2008	14.69	2018	22.37
2009	15.94	2019	22.76
2010	17.58	2020	23.27

Source: Author's compilation using AfDB 2013, 2016, 2018 & 2020.

Figure 2 : Nigeria Composite AIDI Score (2016-2020)



Source: Author's compilation using Composite AIDI score (Score/100) (2016-2020) AfDB 2018; 2020.

II.3 Nigeria's Transport Index (2001-2020)

Transport system is critical to agricultural production, especially the downstream (rural farmers) level and along its value chain. From Nigeria's transport index 2001-2020, an abysmally low score ranging from 5.35 in 2001 to 5.66 in 2020 was recorded (Table 2).

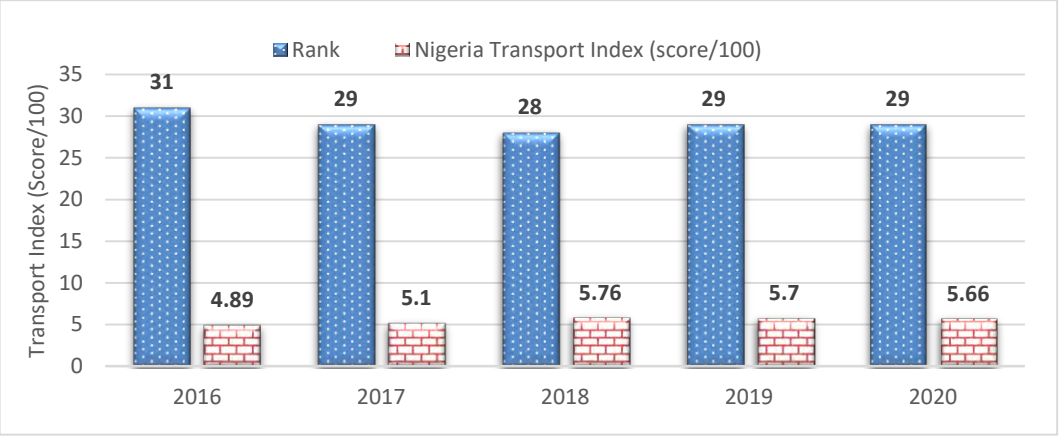
In recent reports, Nigeria's transport index (AIDI 2016-2020) scores ranged from 4.89 in 2016 to 5.66 in 2020, while it was ranked 31st in 2016 and improved to 29th position in 2017 (Figure 3). The indicators are measured in km per 10,000 inhabitants, as proxy for access to the paved road network in Nigeria and by total road network (per square kilometre (km^2) of exploitable land area). From the composite Africa transport index in recent reports, Egypt, Seychelles, Libya and Mauritius maintained the top 4 positions in 2018-2020 with transport index scores of 52.56, 51.81, 41.79 and 36.74 in 2016; 55.31, 51.67, 41.61 and 36.62 in 2019 and 54.87, 51.89, 40.42 and 36.70 in 2020 respectively (AfDB, 2020). The deplorable state of most of our rural roads has resulted in spike in prices of agricultural produce, reduced income of the farmers and non-commercialisation status, while increasing food insecurity of some smallholder farmers in the rural settings of the country.

Table 2: Nigeria's Transport Index 2001-2020

Year	Transport Index (score/100)	Year	Transport Index (score/100)
2001	5.35	2011	NA
2002	5.32	2012	NA
2003	5.29	2013	5.06
2004	5.23	2014	4.96
2005	5.20	2015	4.92
2006	5.17	2016	4.89
2007	5.14	2017	5.10
2008	5.12	2018	5.76
2009	5.09	2019	5.70
2010	5.07	2020	5.66

Source: Author's compilation using AfDB 2013, 2016, 2018 & 2020.

Figure 3: Nigeria's Transport Index Score (2016-2020)



Source: Author's compilation using Africa Transport Index score (Score/100) (2016-2020) [AfDB 2018; 2020].

II.4 Nigeria's Electricity Index (2001-2020)

The National Bureau of Statistics (NBS) in the recent Nigeria Demographic and Health Survey 2018 indicated that 59.0 per cent of household population in Nigeria had access to electricity, of which 83.0 per cent of urban households had access, while only 39.0 per cent of the rural households had access to electricity (NPC and ICF, 2019). Moreover, Africa's Electricity index revealed that Nigeria's electricity index score fluctuated between 1.95 in 2003 to 2.72 in 2020 (Table 3), indicating serious challenge of accessibility of Nigerians to the country's energy sector. Many of the rural areas in Nigeria have not even been connected to the national grid and were left with no hope of having access to electricity (Nigerian Energy Support

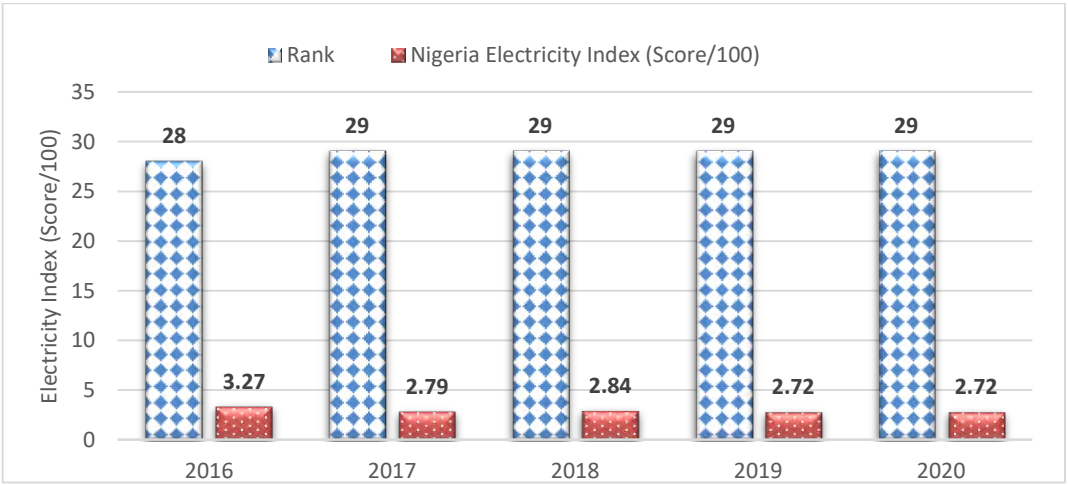
Programme-NESP, 2015). Energy is pivotal to the farmers' increased production and processing of the agricultural produce especially in the rural areas. From the recent Nigeria's electricity index scores (2016-2020), the country's rank ranged from 28th to 29th position out of 54 countries in the continent (Figure 4) (AfDB 2018; 2020).

Table 3: Nigeria's Electricity Index 2001-2020

Year	Electricity Index (Score/100)	Year	Electricity Index (Score/100)
2001	NA	2011	2.29
2002	NA	2012	2.08
2003	1.95	2013	2.69
2004	2.00	2014	2.71
2005	2.74	2015	2.81
2006	2.50	2016	3.27
2007	1.94	2017	2.79
2008	2.77	2018	2.84
2009	2.65	2019	2.72
2010	2.56	2020	2.72

Source: Author's compilation using AfDB 2013, 2016, 2018 & 2020.

Figure 4: Nigeria's Electricity Index Score (2016-2020)



Source: Author's compilation using Africa Transport Index score (Score/100) (2016-2020) [AfDB 2018; 2020].

II.5 Nigeria's ICT Index (2001-2020)

According to the Nigeria Demographic and Health Survey (2018), 31.0 per cent of urban women and 55.0 per cent men are more likely to have access or have used the internet, while only 6.0 per cent of rural women and 25.0 per cent rural men have used or have access to the internet in Nigeria (NPC & ICF, 2019).

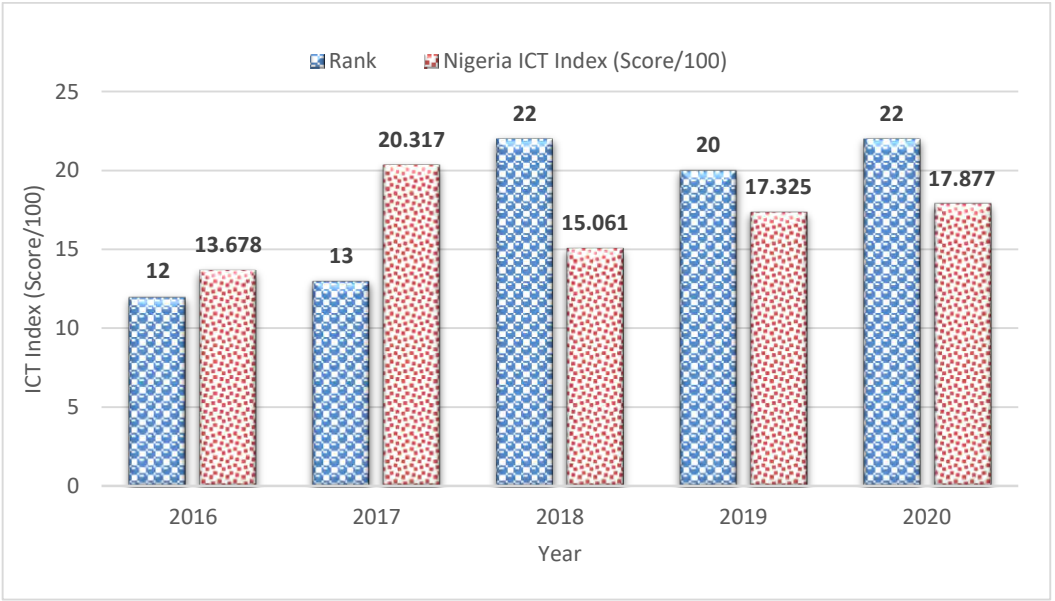
Moreover, Africa's ICT index revealed that Nigeria's ICT index score ranged from 0.09 in 2001 to 17.88 in 2020 (Table 4). From the AIDI recent report, Nigeria's ranking fell from 12th in 2016 to 22nd position in 2020 (AfDB, 2018; 2020) (Figure 5). There are many rural settings in Nigeria without internet connectivity, which is one of the limiting factors of smallholder farmers' commercialisation and rural access to important information in many sectors of the economy.

Table 4: Nigeria's ICT Index 2000-2020

Year	ICT Index (Score/100)	Year	ICT Index (Score/100)
2001	0.09	2011	NA
2002	0.28	2012	NA
2003	0.49	2013	9.62
2004	1.14	2014	14.06
2005	2.57	2015	21.74
2006	4.20	2016	13.68
2007	5.28	2017	20.32
2008	10.16	2018	15.06
2009	12.74	2019	17.33
2010	15.43	2020	17.88

Source: Author's compilation using AfDB 2013, 2016, 2018 & 2020.

Figure 5: Nigeria's ICT Index Score (2016-2020)



Source: Author's compilation using Africa ICT index score (Score/100) (2016-2020) [AfDB 2018; 2020].

II.6 Nigeria's Water Supply and Sanitation Index (2001-2020)

Water supply and sanitation is the fourth component of the indicators used in computing the composite Africa Infrastructure Development Index. Access to improved water and sanitation is crucial to the nutrition and health status of members of households both in rural and urban settings in Nigeria. According to recent Nigeria Demographic and Health Survey (2018), 74.0 per cent of households in urban areas had access to improved source of drinking water, while 58.0 per cent of the rural households in Nigeria had access to improved source of drinking water (NPC & ICF, 2019). Also, the report equally indicated that 56.0 per cent of Nigerian households used improved toilet facilities; 74.0 per cent in urban areas and 39.0 per cent in rural areas (NPC & ICF, 2019). Meanwhile, Africa's water supply and sanitation index (WSS) revealed that Nigeria's WSS index score ranged from 36.43 in 2001 to 65.62 in 2020 (Table 5).

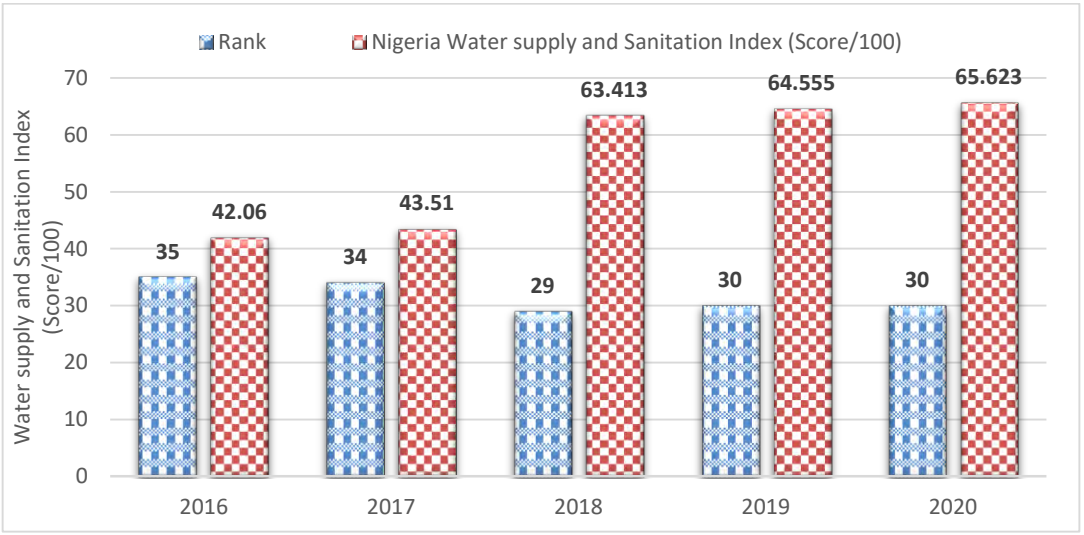
Table 5: Nigeria's Water Supply and Sanitation Index (2000-2020)

Year	Water supply and Sanitation Index (Score/100)	Year	Water supply and Sanitation Index (Score/100)
2001	36.43	2011	NA
2002	37.15	2012	NA
2003	36.66	2013	37.84
2004	37.38	2014	40.83
2005	37.61	2015	41.45
2006	36.89	2016	42.06
2007	37.61	2017	43.51
2008	38.34	2018	63.41
2009	37.84	2019	64.56
2010	37.84	2020	65.62

Source: Author's compilation using AfDB 2013, 2016, 2018 & 2020.

This is similar to the report of (NPC & ICF, 2019) indicating an improvement in the water supply and sanitation especially in the urban areas. Moreover, 42.0 per cent of rural households did not have access to improved source of drinking water, while 61.0 per cent of rural households in Nigeria did not have access to improved sanitation facilities (NDHS, 2018). From the AIDI recent report, Nigeria's ranking was 35th (42.06) in 2016 and 30th (65.62) position in 2020 (AfDB, 2018; 2020) (Figure 6).

Figure 6: Nigeria's Water Supply and Sanitation Index Score (2016-2020)



Source: Author's compilation using Africa Water supply and Sanitation index score (Score/100) (2016-2020) [AfDB 2018; 2020].

III. Food Security: A Global Challenge in the Face of the COVID-19 Pandemic

Access to healthy and sustainable food remained one of the most debated issues in the world in the recent times (Otekunrin & Otekunrin, 2020a). Food security is commonly defined as a complex and multifaceted concept that can be affected by culture, economy, environment and geographical space (EIU, 2018; Otekunrin et al., 2019a; Otekunrin et al., 2020b; Ayinde et al., 2020). The globally acceptable definition of food security was the one given by Food and Agriculture Organisation (FAO) as "*when all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for active and healthy life*" (FAO 1996).

The United Nations (UN) unanimously adopted the resolution of the agenda for sustainable development in its 2015 General Assembly, which led to the acceptance of 17 Sustainable Development Goals (SDGs) (UN, 2017). The SDG Goal 2 advocated the mandate for the actualisation of the food security goals, and set to address the importance of food security and nutrition within the confines of the SDG framework, reaching out to member States to "*end hunger, achieve food security and improve nutrition, and promote sustainable agriculture*" by 2030 (UN, 2017; IITA, 2017; Otekunrin et al., 2019a,b; Ayinde et al., 2020).

In 2020, it was revealed that the number of people affected by hunger globally continued to increase under the influence of the ravaging COVID-19 pandemic,

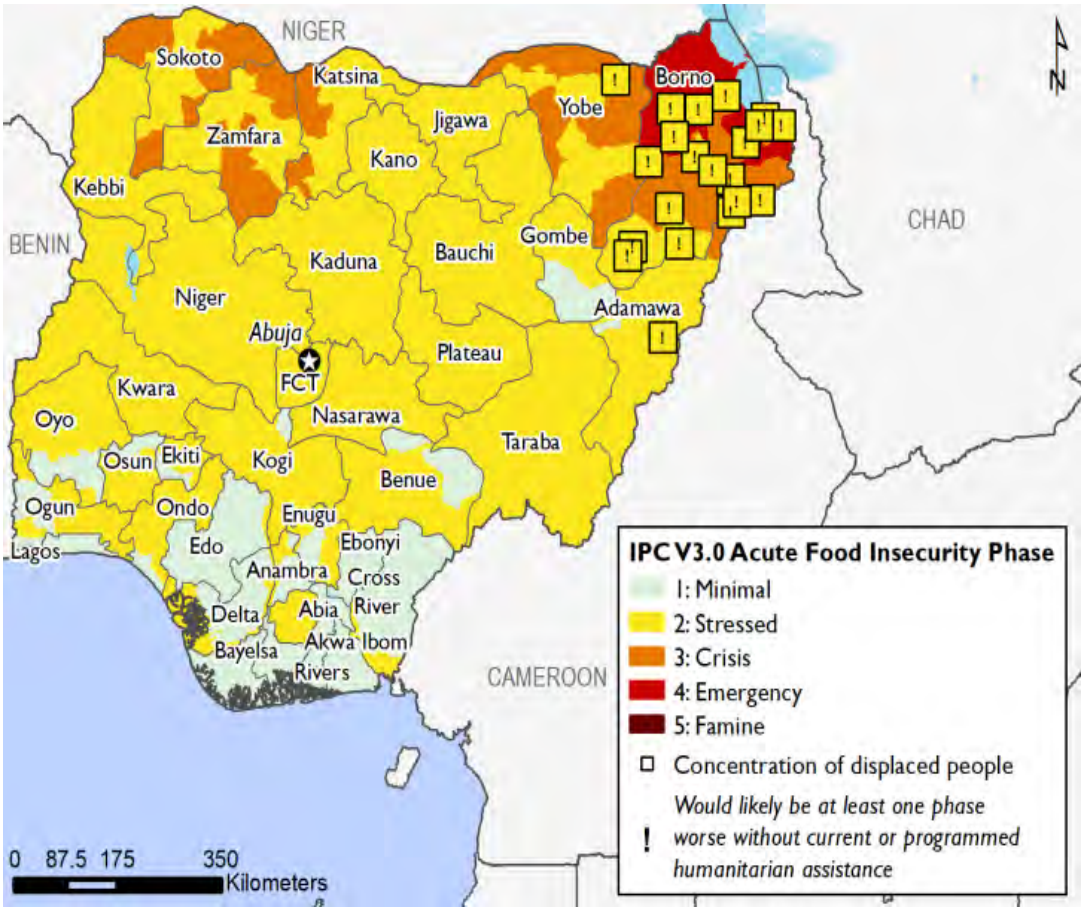
forcing the achievement of the decline in the prevalence of undernourished (PoU) from 2005 to 2014 to an abrupt end (FAO et al., 2021). Between 2019 and 2020, the PoU witnessed a surge from 8.4 per cent (650.3 million) to about 9.9 per cent (768.0 million), making the achievement of SDG 2 by 2030 close to becoming a mirage, especially in low- and middle-income countries (LMICs) (FAO et al., 2021). It is good to note that even though the influence of COVID-19 was great in deepening the level of hunger and food insecurity around the world, there are other contributing factors especially between 2019 and 2020. Nevertheless, the spike in hunger in 2020 is in line with the prevailing proof of the economic collapse originated by the COVID-19 calamity (FAO et al., 2021).

III.1 Nigeria's Current Food Security Status in the Mirror of Global Food Security Index (GFSI)

Nigeria is currently experiencing a hard time coping with the twin crisis of COVID-19 and food insecurity (Otekunrin et al., 2020b; Otekunrin and Otekunrin 2020b). According to the World Data Lab (2021), a total of 86, 802, 955 million (41.0 per cent of total population) people are living in extreme poverty in Nigeria within poverty threshold of $1.90 per day out of an estimated total population of 209, 663, 872 persons as at 26 August, 2021 (World Data Lab, 2021). Also, the Economist Intelligence Unit (EIU) revealed that Nigeria is ranked 100th with total food insecurity score of 40.1 (40.1/100) behind its African counterparts such as Mozambique (40.6), Congo Democratic Republic (40.7) and Angola (42.1) among 113 countries in the world (EIU, 2021). This is not surprising because, FEWS NET (2020), surmised that intense insurgent attacks in the Northern Nigeria have led to increased displacement of persons with attendant food needs. Also, recently, many households in the Northwest are negatively impacted by kidnapping, banditry, farmer/herder conflict mostly in Sokoto, Zamfara and Katsina States, with continued attacks making it difficult for people in the areas to engage in normal livelihood activities (Ayinde et al., 2020, Famine Early Warning Systems Network - FEWS NET, 2020; 2021).

The prevalence of acute malnutrition is also projected to rise continuously in Northern areas of the country occasioned by limited food consumption, higher rates of measles, cholera and malaria, especially in the North-East. Figure 8 shows the projected food security outcomes in Northeast Nigeria in June 2021 to September 2021 (FEWS NET, 2021).

Figure 8: Projected Food Security Outcomes, June 2021 to September 2021.



Source: FEWSNET 2021.

Table 6 shows the data underlying Nigeria's latest GFSI (2020) overall, category and indicator scores and ranks. It reveals the present overall food security environment (Nigeria's GFSI) with score 40.1 (ranked 100) falling behind global average of 60.4 (by -20.3), which ranked the country in the moderate category. Furthermore, using the scores of the four indicators of food security; (i) Affordability, (ii) Availability, (iii) Quality and Safety and (iv) Natural resources and Resilience, Nigeria fell in the moderate (Availability and Quality and Safety) and weak (Affordability and Natural Resources and resilience) categories, with scores falling below the global average by -33.0, -10.5, -26.1 and -9.8, respectively. Also, all three of four indicators ranked above 100 out of 113 indicating serious food security challenges for the country (EIU, 2021).

Table 6: Nigeria Global Food Security Index (2020), Category and Indicator Scores and Rank

Colour code	Series	2020 Score (Nigeria)	2020 Rank (Nigeria)	Global Average score (2020)	Nigeria: compared to global average
	Overall Food Security Environment	**40.1**	**100**	**60.4**	**-20.3**
	1) Affordability	32.9	102	65.9	**-33.0**
	2) Availability	46.8	93	57.3	**-10.5**
	3) Quality and Safety	41.5	103	67.6	**-26.1**
	4) Natural Resources and Resilience	39.3	101	49.1	**-9.8**
	1) Affordability	**32.9**	**102**	**65.9**	**-33.0**
	1.1) Change in average food costs	24.5	104	70.7	**-46.2**
	1.2) Proportion of population under global poverty line	16.5	105	73.3	**-56.8**
	1.3) Inequality-adjusted income index	42.6	80	53.7	**-11.1**
	1.4) Agricultural import tariffs	60.7	=73	62.8	**-2.1**
	1.5) Food safety net programmes	25.0	=84	70.1	**-45.1**
	1.6) Market access and agricultural financial services	49.6	72	61.9	**-12.3**
	2) Availability	**46.8**	**93**	**57.3**	**-10.5**
	2.1) Sufficiency of supply	55.0	79	63.6	**-8.6**
	2.2) Agricultural research and development	20.1	106	38.2	**-18.1**
	2.3) Agricultural infrastructure	27.4	96	47.8	**-20.4**
	2.4) Volatility of agricultural production	66.9	56	61.6	**+5.3**
	2.5) Political and social barriers to access	29.5	105	59.4	**-29.9**
	2.6) Food loss	59.4	93	73.7	**-14.3**
	2.7) Food security and access policy commitments	50.0	=22	37.6	**+12.4**
	3) Quality and Safety	**41.5**	**103**	**67.6**	**-26.1**
	3.1) Dietary diversity	19.4	=100	48.3	**-28.9**
	3.2) Nutritional standards	50.0	=59	64.1	**-14.1**
	3.3) Micro nutrients availability	67.1	88	78.3	**-11.2**
	3.4) Protein quality	34.6	=107	68.4	**-33.8**
	3.5) Food safety	32.7	107	76.2	**-43.5**
	4) Natural Resources and Resilience	**39.3**	**101**	49.1	**-9.8**
	4.1) Exposure	70.6	38	64.3	**+6.3**
	4.2) Water	0.0	=78	20.0	**-20.0**
	4.3) Land	55.0	91	69.9	**-14.9**
	4.4) Oceans, rivers and lakes	25.8	53	27.4	**-1.6**
	4.5) Sensitivity	70.2	=61	70.1	**+0.1**
	4.6) Political commitments to adaptation	22.3	=84	38.9	**-16.6**
	4.7) Demographic stress	20.6	97	56.4	**-35.8**

Scores 80-100	Scores 60-79.9	Scores 40-59.9	Scores 20-39.9	Scores 0-19.9
VERY GOOD	GOOD	MODERATE	WEAK	VERY WEAK

Source: Global Food Security Index 2020. (Nigeria exported) Rank out of 113 countries where 1 = best "=" denotes tie in rank.

IV. Nexus between Rural Infrastructure Deficit and Food Security in Nigeria

Rural infrastructure development is a necessary condition for the attainment of food security of any nations of the world. Financing rural infrastructure (roads, crop storage equipment, provision of electricity, etc.) will help provide food security for millions of people living in hunger worldwide (Uzsoki &Turley, 2019). This is because majority of Nigerians suffering from hunger live in the rural areas, and one of the associated reasons for this situation is absence or lack of appropriate infrastructure to stimulate increased and sustainable agricultural production, which can change fortunes of the average farmers. Favourable agriculture support policies are needed to address these issues. In the same vein, agriculture is a veritable part of economic development and reduction of food insecurity. Stimulation of agricultural development in itself requires good roads, safe drinking water, adequate power supply, efficient communication services, adequate market access and, availability of functional storage systems.

Furthermore, Uzsoki and Turley, (2019) observed that:

1. One-third (about 1.3 billion tonnes per year) of total food produced for human consumption are wasted, therefore, storage facilities (such as grain silos, local-improved storage facilities) would improve the food supply situation with attendant ripple effect of curbing hunger and ensuring food security.

2. A quarter of the world's population lack access to electricity, while almost all (85.0 per cent) of the affected population live in the rural areas. So, provision of electricity would not only reduce energy cost and stimulate food access to the poor, it will also stimulate ease of agricultural product processing and provide conducive environment for farmers and rural immigration of labour into agriculture.

3. Feeder roads will provide opportunity for farmers to access inputs, market outputs and access ancillary social services that improve their quality of lives.

4. Agricultural productivity can double or more with improved irrigation services (rather than the sole rain fed agriculture currently operating in most rural Nigeria). Investing in water distribution project for farmers, would therefore, ensure more than 'one season' agricultural production, thereby increasing food access.

IV.1 Nigeria's Agricultural Infrastructure Performance contained in the Global Food Security Index

It is interesting to note that some of the datasets used to construct the Global Food Security index (GFSI) contained variables on rural infrastructure and related variables, thus showing the inter-relatedness of rural/agricultural infrastructure to food security. Effort was made to access the underlying datasets used to compute the GFSI by the Economic Intelligence Unit (EIU), these were then compiled and presented in Table 7. From the sub-indicator "Agricultural infrastructure", it could be seen from 2013 (from the first publication of GFSI in 2012) that the rural infrastructure index moved from 12.7 in 2012 and 2013, and rose to 27.4 in 2014; stagnating all through to 2020 (the latest edition of the GFSI report). This indicates low level of impact of agricultural development programmes over the years. Furthermore, all the indicators (crop storage infrastructure, road infrastructure and irrigation infrastructure) did not rise beyond the constant level recorded over the years, implying non-performance (EIU, 2021). This is because the scores obtained were less than half of the expected score (100.0 per cent) for these indicators (except for crop storage indicator, which peaked from 2014 and remained constant up till 2020), this behaviour portends serious challenge for the agricultural sector and rural development in the country, and thus the food security in the country.

Table 7: Nigeria's Agricultural Infrastructure Performance Contained in Global Food Security Index (2012-2020)

		Nigeria's GFSI								
Availability category	**Source**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
Agricultural Infrastructure	EIU calculation	12.7	12.7	27.4	27.4	27.4	27.4	27.4	27.4	27.4
Crop storage facilities	Qualitative scoring by EIU analysts	0.0	0.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Road infrastructure	EIU Risk Briefing	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0
Air, port and rail infrastructure	EIU Risk Briefing	17.5	17.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5
Irrigation infrastructure	FAO	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8

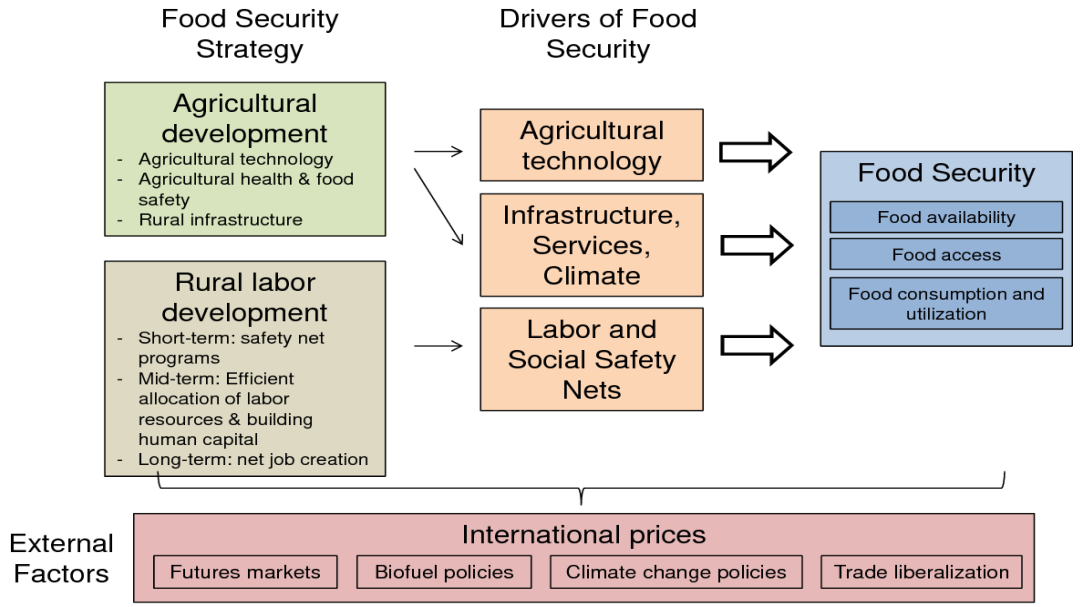
Source: Author's compilation using data underlying GFSI 2012-2020, EIU 2018 and 2021.

Irrigation infrastructure is almost non-existent because the unimaginable score of 0.8 (as computed by FAO) was reported throughout the period of this publication (2012-2020). Almost all the crops cultivated in Nigeria are rain-fed with just 1.0 per cent of

the crop land under irrigation. This shows the huge gaps in the agricultural sector that exacerbated the ever-increasing food insecurity in Nigeria.

Further relationship between rural infrastructural development and food security is summed up in the framework by Hernandez et al. (2012), as shown in Figure 9. The figure further buttressed the inter-relatedness of food security with agricultural development, with drivers such as agricultural technology, climate, infrastructure development, social safety nets (non-contributory aid provided to improve livelihoods of vulnerable and impoverished individuals, and families) and labour availability. Availability of these is thus expected to improve the four pillars of food security. From this framework, there is need for more concerted efforts to salvage both the rural infrastructure and food security environment in Nigeria (AfDB, 2020; EIU, 2021).

Figure 9: Framework for Rural Infrastructural Development and Food Security



Source: Hernandez et al. (2012).

V. Action Points towards Improving Rural Infrastructure and Food Security in Nigeria

The rural areas still remain the food basket of the country and the fulcrum of agricultural and economic development of the country. Efforts to provide adequate infrastructure to these areas, therefore, would have ripple effects on the food security situations in the country. There have been significant efforts by successive governments of Nigeria to improve rural infrastructural development, but the gains of these initiatives are far from being realised. Strategies/action points to

deal with rural infrastructure development, therefore, should take cognisance of the comparative advantage of each rural locations and these should include:

1. The Federal and Local Government Areas (LGAs) should promote pro-poor planning and budgeting at the national and local levels. This should be in the areas of developing the necessary infrastructure and encouraging rural population data collection, synthesis and analysis, to enhance the understanding of the contribution of farming households towards poverty and food insecurity reduction, as well as income generation;

2. Encourage the involvement of vulnerable segments, including women, youth and indigenous peoples and rural communities, in the design of local and national planning of rural development; and

3. Federal, State and LGAs should increase public-private investments in rural infrastructure in the rural areas. These should include:

    a) Provision of broad-based infrastructural facilities such as good roads, waterways and transport systems, storage and market facilities;

    b) Enhance access to safe drinking water and adequate sanitation;

    c) Build capacities and improve access to information and communications technologies;

    d) Improve storage infrastructure capacity, quality and practices to reduce post-harvest losses; and

    e) Develop human capital in the rural areas by:

        i. Strengthening rural health-care facilities and capacities;

        ii. Creating and developing educational programmes for rural communities aimed at disease prevention;

        iii. Reviving adult literacy programmes for the rural farming communities, as well as provision of vocational and entrepreneurship training in particular for youth, young girls, women and indigenous people;

        iv. Promoting rural communities' empowerment and rural leadership to stimulate participation of the farmers' representation in policy development meetings and decision-making; and

        v. Improve access to information to enhance planning and decision-making.

4. Prepare land-use schemes that support effective activities for both agricultural and non-agricultural services; and
5. Promoting programmes that support and promote farm production technologies consistent with the socio-economic situation of the rural farmers, should be prioritised by both the State and Federal government of Nigeria. This should be pursued with vigour.

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