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FOOD SYSTEMS PROFILE - NIGERIA

Catalysing the sustainable and inclusive transformation of food systems

Nigeria

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Catalysing the sustainable and inclusive transformation of food systems

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FOOD SYSTEMS PROFILE NIGERIA

Key messages

Nigeria is the most populous country in Africa and the fourteenth largest country in the world. Its population exceeds 210 million people, and it covers an area of 923 768 km^2, which is surrounded by the Atlantic Ocean to the south and the Sahelian countries of the Niger and Chad to the north. The agriculture sector employs more than one-third of the population and accounts for approximately 23 percent of the gross domestic product (GDP), comprising mainly smallholder farmers who tend to be highly dependent on rainfed agriculture. Given its very large deficit between local food production and demand, the country is highly dependent on imports to meet its dietary requirements. This situation is aggravated by a high population growth rate and urbanization, which also intensifies pressure on natural resources.

The major staples of Nigeria are cassava, yam, maize, sorghum, rice and millet, which cover about 65 percent of the cultivated area. The major cash crops are cocoa, oil palm, cotton, groundnuts, ginger and sesame.

Nigeria relies on its substantial oil and gas resources, which, combined with the entrepreneurship of its mainly young population, have contributed to a changing, more business-friendly environment over two decades of civilian rule and nearly 60 years since independence (Oxford Business Group, 2019). The challenges of economic inclusivity and wider equity remain; most Nigerians living below the poverty line.

Several aspects of food systems of Nigeria require urgent attention:

High dependence on oil revenue and food imports to feed its people, high population growth (the rate of growth is 2.5 percent and the population is projected to reach 400 million by 2050) and urbanization (more than 4 percent annually), which has been occurring for several decades, pose formidable challenges to the food system. Food imports have more than quadrupled in recent decades, from a value of USD 964 million in 1995 to USD 4.57 billion in 2016 (Posthumus, *et al.*, 2019), resulting in a substantial trade deficit for the agrifood sector. The most imported commodities are rice, wheat, milk and fish.

Extreme poverty with high regional inequalities (e.g. in Sokoto state, 81 percent of the population is poor; in the Niger state, poverty incidence is 34 percent). In 2020, about 40 percent of the population was at the national poverty line (forecast to reach 45.2 percent in 2022 due to the COVID-19 pandemic), and 39.1 percent were living in extreme poverty (less than USD 1.90 per day). More than one-fifth (21.4 percent) of the population was estimated to be **severely food insecure** in 2019, sharply higher than 6.6 percent recorded in 2015. **Factors contributing to this were continued internal conflicts, high unemployment and the effects of climate change**.

The agriculture sector relies on rainfed subsistence agriculture, smallholder farmers constitute approximately 88 percent of the farming population, the average farm size is 0.5 ha characterized by low yields (for example, post-harvest losses of fruits and vegetables is estimated to be about 50 percent annually) and food safety issues prevail, such as food-borne diseases, which causes about 200 000 deaths annually and result in an economic burden of approximately USD 3.6 billion per year.

Triple burden of malnutrition. In 2018, the prevalence of stunting, wasting and underweight among children under the age of five was 37 percent, 7 percent, and 22 percent, respectively, representing a minimal improvement since 2008 (41 percent, 14 percent and 23 percent, respectively). Approximately 68 percent of children and 58 percent of women were found to have some degree of anaemia in 2018. In Nigeria deaths related to high body mass index increased by 29 percent in females and 79 percent in males during the period 1990–2015.

Increasing pressure on land resource (including forest ecosystems) and inappropriate land use constitute an environmental-related food security challenge. Population growth has led to increased demand for food products which is associated with rapid expansion of arable land for food crops production and expansion of grazing land for ruminant animals. Consequently, a loss in vegetation cover is occurring, which, in turn, is accelerating erosion and desertification in many parts of the country, leading to the depletion of soil nutrients and land degradation.

Weak implementation of relevant policies and legislation due to lack of funding and human resources, weak institutional and intersectoral coordination, overlapping mandates among different multilateral agencies, an infrastructure deficit, political instability and conflicts are major stumbling blocks to a transition towards a sustainable food system.

Recognizing the complexity of the Nigerian food systems, several opportunities can be identified:

Out of the total 70.8 million ha of agricultural land available, only 34 million ha is under cultivation in 2022. Additionally, the Nigerian food system is informal and slowly expanding, characterized by a focus on food production and food security that has the potential to grow and thus provide for diets that are adequate, varied, affordable, safe and healthy (including consumption of fish). Traditional culinary practices in Nigeria also are comprised of mixed dishes, so there is high potential to increase diet diversities. Furthermore, the country has access to the untapped market potential within the Economic Community of West African States (ECOWAS), which is comprised of 15 countries and a consumer market of approximately 400 million people.

Finally, based on this food systems assessment, there are four key challenges for the country to transition towards a sustainable food system: (a) food system vulnerability to internal and global shocks; (b) underdeveloped agrifood value chains; (c) food system vulnerability to climate change and contribution to natural resource degradation; and (d) poor diet quality and high prevalence of food and nutrition insecurity. The identified systemic levers in each of these areas are, as follows:

- to address **vulnerability to shocks**: enhance public and private investments in the agricultural sector, improve credit availability to smallholder farmers, and promote good governance through transparency and accountability;

- to improve **underdeveloped value chains**: strengthen implementation of the relevant policies, and increase awareness among food system actors, along with developing a strong regulatory and monitoring mechanism to promote safe food practices;

- to focus on **vulnerability to climate change and natural resource degradation**: promote good governance and stakeholder engagement to limit natural resource degradation and develop climate resilience, and strengthen smallholder farmers' adaptive capacity to climate change; and

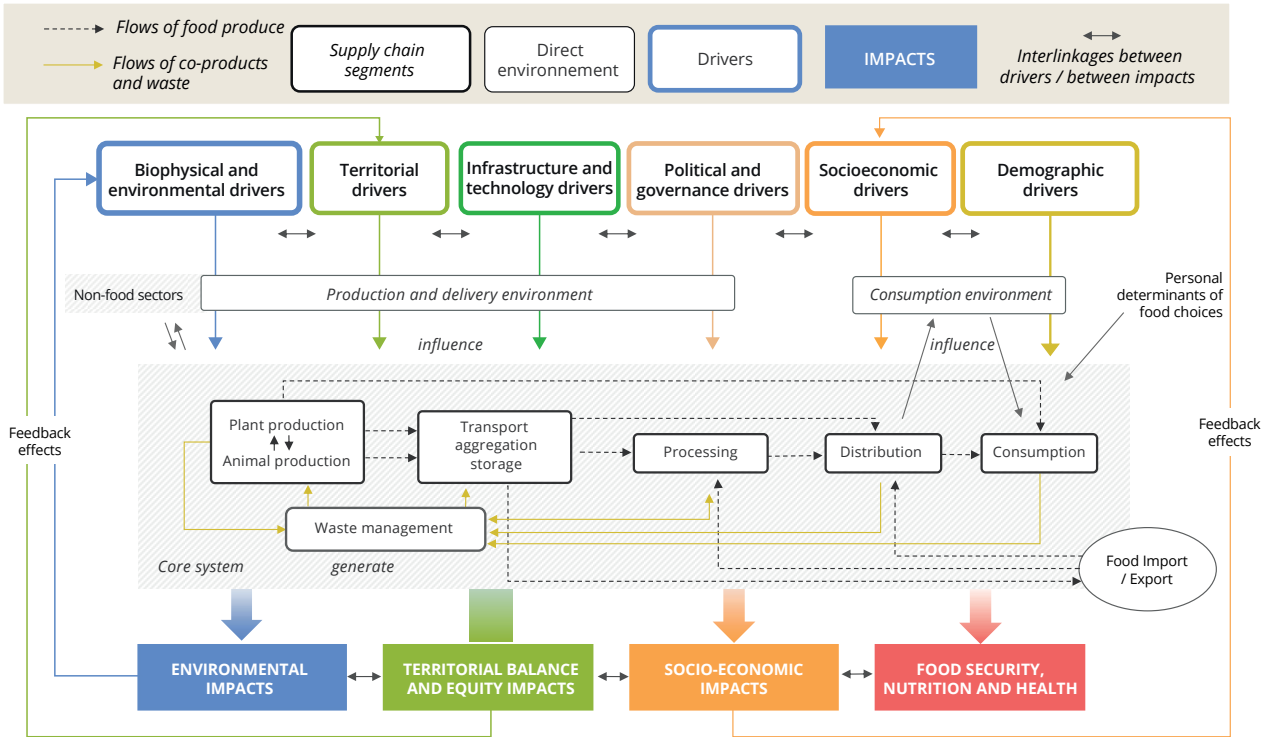
- to tackle **poor diet quality and food and nutrition insecurity**: strengthen policy and institutional frameworks to implement food and nutrition security policies and programmes, and strengthen subregional level platforms to promote behavioural change in dietary practices.

Methodology and process

This brief is the result of a collaboration between the Government of Nigeria, the Food and Agriculture Organization of the United Nations (FAO) and the European Union in close collaboration with FAO experts. It was implemented in Nigeria between April and October 2021. The methodology used for preparing this brief is the result of a global initiative of the European Union, FAO and CIRAD to **support the sustainable and inclusive transformation of food systems**. This assessment methodology is described in detail in the joint publication entitled *Conceptual framework and method for national and territorial assessment: catalysing the sustainable and inclusive transformation of food systems* (David-Benz *et al*., 2022).

The assessment integrates qualitative and quantitative data analysis with participatory processes by mobilizing public, private and civil society stakeholders. The approach includes interviews with key stakeholders and a consultation workshop to refine systemic understanding of the food system and discuss potential levers to improve its sustainability. The assessment process thus initiates participatory analysis and stakeholder discussion on the strategic opportunities and constraints to sustainable transformation of food systems. The approach assesses the actors and their activities at the core of the system, together with their interactions along the food chain as well as the environments directly influencing their behaviour. Conditioned by long-term drivers, these actors generate impacts in different dimensions that in turn influence drivers via a number of feedback loops (see Figure 1).

Figure 1. Analytical representation of the food system



Source: David-Benz H., Sirdey N., Deshons A., Orbell C. & Herlant P. 2022. *Conceptual framework and method for national and territorial assessment: catalysing the sustainable and inclusive transformation of food systems.* Rome, Montpellier, Brussels. FAO, CIRAD and European Union.

The approach involves a detailed understanding of the key challenges along the four dimensions of sustainable and inclusive food systems: (i) food security, nutrition and health; (ii) inclusive economic growth, jobs and livelihoods; (iii) sustainable natural resource use and environment; and (iv) territorial balance and equity. Aimed at identifying critical issues affecting the sustainability and inclusivity of food systems, the assessment is both qualitative and quantitative in nature. Critical challenges and key food systems dynamics are specified in the form of **Key Sustainability Questions** (KSQs), whose answers (see schematic representations for all KSQs) help identify **systemic levers** and areas of action that are essential to bring about desired transformations in food systems.

This approach is designed as a preliminary rapid assessment for food systems and can be implemented over a period of 8–12 weeks. The methodology has been applied in more than 50 countries as a first step to support the transition towards sustainable food systems.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National context: key figures

The indicators in Table 1 show trends in key areas of development, which also feed into the achievement of the Sustainable Development Goals.

Table 1. Country level data – Nigeria

Indicators	2000	2010	2020	Comments
Population growth rate (%)	2.5	2.7	2.5	Constant high rate of population growth[1]
Rural population share (%)	65.3	57.2	48.3	Declining rural population;[2] still comprises close to half of the population, representing about 100 million people
Urban population growth rate (%)	4.0	4.7	4.1	Constant high rate of urbanization[3]
Population (by age) (% of total population) 0–14 years of age 15–64 years of age 65 years and above			 43 54 3	Majority of population young, offering potential human capital, but posing a challenge to provide them with effective education and employment[4]
GDP/capita (USD)	1 450	2 464	2 396	Sharp rise occurred between 2000 and 2010, and then declined steadily by 2020[5]
Share of agriculture (%) of GDP	21.4	23.9	23.4	Relatively stable share but slowly trending lower[6]
Rate of unemployment (%)	3.83	3.77	9.7	Sharp rise in unemployment[7]
Manufacturing and value addition as a percentage (%) of GDP	13.93	6.53	12.67	Large decline over a 10-year period, and then trended slightly higher starting in 2010[8]
Annual Inflation rate (%)	6.9	13.7	11.4 (2019)	Continues to be high
Access to electricity (%)	43	48	55.8	Steady increase over the past two decades[9]
Access to basic water, sanitation and hygiene (WASH) (%): National Urban Rural			 (2019) 9 15 6	Acute inadequate access to basic WASH services nationally[10]
School enrolment, primary (gross percent) (%)	24.6	44.2	43.5 (2018)	Substantial increase from 2000 to 2020, but more than half of the relevant age population remains out of the coverage[11]
Forest area (%)	27.3	25.5	23.7	Declining forest area[12]

Sources: (1) World Bank. 2022: Population Growth annual percentage. In: The *World Bank IBRD – IDA Data bank*. Washington, DC. Cited 25 March 2022. https://data.worldbank.org/indicator/SP.POP.GROW?locations=NG

(2) World Bank. 2022. Trading Economics: Nigeria Rural Population. In: *The World Bank IBRD – IDA Data bank*. Washington, DC. Cited 25 March 2022. https://tradingeconomics.com/nigeria/rural-population-percent-of-total-population-wb-data.html

(3) World Bank. 2022. Trading Economics: Urban Annual Population growth. In: The *World Bank IBRD – IDA Data bank*. Washington, DC. Cited 25 March 2022. https://tradingeconomics.com/nigeria/urban-population-growth-annual-percent-wb-data.html

(4) World Bank. 2022. Population Ages 15-64 (% of total Population). In: *The World Bank IBRD – IDA Data bank*. Washington, DC. Cited 25 March 2022. https://data.worldbank.org/indicator/SP.POP.1564.TO.ZS?locations=NG

(5) World Bank. 2022. Trading Economics: Nigeria GDP per capita. In: T*he World Bank IBRD – IDA Data bank*. Washington, DC. Cited 25 March 2022. https://tradingeconomics.com/nigeria/gdp-per-capita#:~:text=GDP%20per%20capita%20in%20Nigeria%20averaged%201840.99%20USD%20from%201960,of%201201.40%20USD%20in%201968.&text=Nigeria%20GDP%20per%20capita%20%2D%20values,updated%20on%20November%20of%202021

(6) World Bank. 2022. Agriculture, forestry, and fishing, value added (% of GDP). In: *The World Bank IBRD – IDA Data bank*. Washington, DC. Cited 25 March 2022, https://data.worldbank.org/indicator/NV.AGR.TOTL.ZS

(7) Word Bank. 2022. Unemployment, total (% of total labor force) (modeled ILO estimate). In: T*he World Bank IBRD – IDA Data bank*. Washington, DC. Cited 25 March 2022. https://data.worldbank.org/indicator/SL.UEM.TOTL.ZS

(8) World Bank. 2022. Manufacturing value added. In: *The World Bank IBRD – IDA Data bank*. Washington, DC. Cited 25 March 2022. https://data.worldbank.org/indicator/NV.IND.MANF.ZS?locations=NG

(9) World Bank. 2022. Nigeria Access to Electricity (Percent of Population). In: *Trading Economics*. Washington, DC. Cited 25 March 2022. https://tradingeconomics.com/nigeria/access-to-electricity-percent-of-population-wb-data.html

(10) National Bureau of Statistics. 2019. National outcome routine mapping of water sanitation and hygiene services levels; Summary of Survey Findings 2019. https://www.nigerianstat.gov.ng/pdfuploads/2019%20WASH%20NORM%20SURVEY%20FINDINGS%20-%20INFOGRAPHIC%20SUMMARY.pdf

(11) World Bank. 2022. School enrolment, second (% gross) −Nigeria. In: *The World Bank IBRD – IDA Data bank*. Washington, DC. Cited 25 March 2022. https://data.worldbank.org/indicator/SE.SEC.ENRR?locations=NG

(12) World Bank. 2022. Forest area (% of land area). In: T*he World Bank IBRD – IDA Data bank*. Washington, DC. Cited 25 March 2022. https://data.worldbank.org/indicator/AG.LND.FRST.ZS?locations=NG.

Key figures and trends in food production, consumption and trade

During the colonial era, (mid-nineteenth century until 1960), the Nigerian economy depended on three major export crops – cocoa, palm oil and groundnuts – which accounted for approximately 70 percent of the country's total exports. These crops were shipped to the United Kingdom of Great Britain and Northern Ireland under trade terms decided by the colonial authorities. The colonial policy of agriculture was based on cash crops for export and not on food production for domestic consumption. The groundnut pyramids in Northern Nigeria, the cocoa warehouses in the West and the palm produce stores of the Eastern region dominated the Nigerian economic landscape. These features were detrimental to the production of adequate quantities of rice, maize and cassava for consumption by the people as the land used for food production was converted to cash-crop production. By 2008, the country's dominance of the world trade in groundnuts fell to 0 percent from 42 percent of global trade in the 1960s because of aflatoxins. Nigeria was also the largest exporter of palm oil in the world, accounting for 27 percent of the global export volume for the crop in the 1960s. The total export volume for palm oil was 167 000 tonnes in 1961, but by 2008, it declined to 25 000 tonnes (Abdulsalami, 2019).

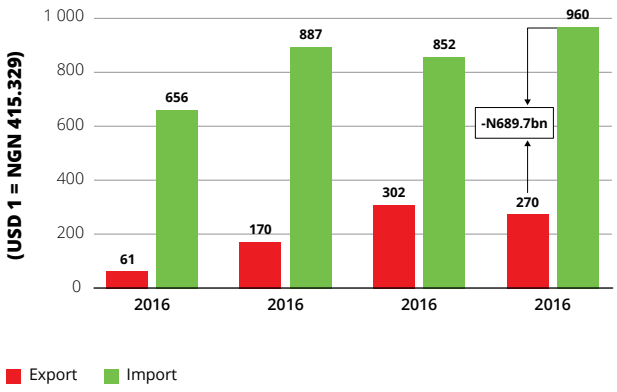
Oil was discovered in 1958 in Nigeria and since the early 1970s, it has dominated the economy. The country is the largest oil producer in sub-Saharan Africa. It became a member of Organization of the Oil Exporting Countries (OPEC) in 1971. Production volume is estimated to be 1.14 million barrels/day (January 2021), making Nigeria the world's fifteenth largest producer. Oil revenue contributes approximately 65 percent of total government revenue (Blueprint, 2022).

Nigeria has approximately 70.8 million hectares of arable land, but only 34 million ha is under cultivation (FAO, 2022). The agricultural sector accounted for 23.4 percent of GDP in 2021 (World Bank, 2021). Crop production dominates the agricultural sector, accounting for 87.6 percent of output, followed by livestock (8.1 percent), fisheries (3.2 percent) and forestry (1.1 percent) (Oyaniran, 2020).

More than 80 percent of the country's farmers are smallholders. These farmers account for approximately 90 percent of agricultural produce (Oyaniran, 2020). Slightly more than two-thirds of them grow crops and rear livestock. The crops grown are maize, cassava, beans, millet, groundnuts, pepper, sorghum and paddy rice.

The share of agriculture in total export earnings of Nigeria remains small compared to crude oil exports. For instance, in 2019, agriculture accounted for less than 2 percent of total exports, as compared to crude oil, which accounted for 76.5 percent. Nigeria remains a net food importer. The country's agricultural trade deficit has widened, imports exceeding exports by Nigerian Naira (NGN) 689.7 billion (USD 1.63 billion) in 2019, compared to NGN 549.3 billion in 2018 (USD 1.3 billion) (Figure 2). The major agricultural imports are wheat, sugar, fish and milk; the main agricultural exports are sesame seeds, cashew nuts, cocoa beans, ginger, frozen shrimp and cotton (FAO, 2022).

Figure 2. Agricultural trade in Nigeria in billions of naira

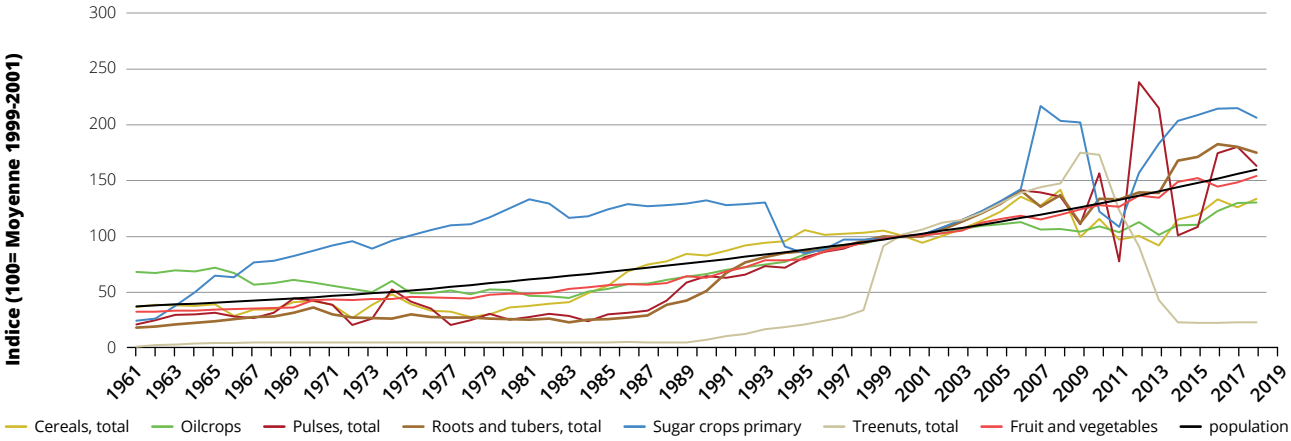


Source: Oyaniran, T. 2020. Current State of Nigeria Agriculture and Agribusiness Sector. AfCTA Workshop. PwC. https://www.pwc.com/ng/en/assets/pdf/afcfta-agribusiness-current-state-nigeria-agriculture-sector.pdf

Figures 3 and 4 show production and imports over time. Notably, demand for cereal imports tripled between 2000 and 2019 while the production in volumes for cereals, oil crops and tree nuts has been below the estimated demand if compared to the population, which explain the deficits requiring imports.

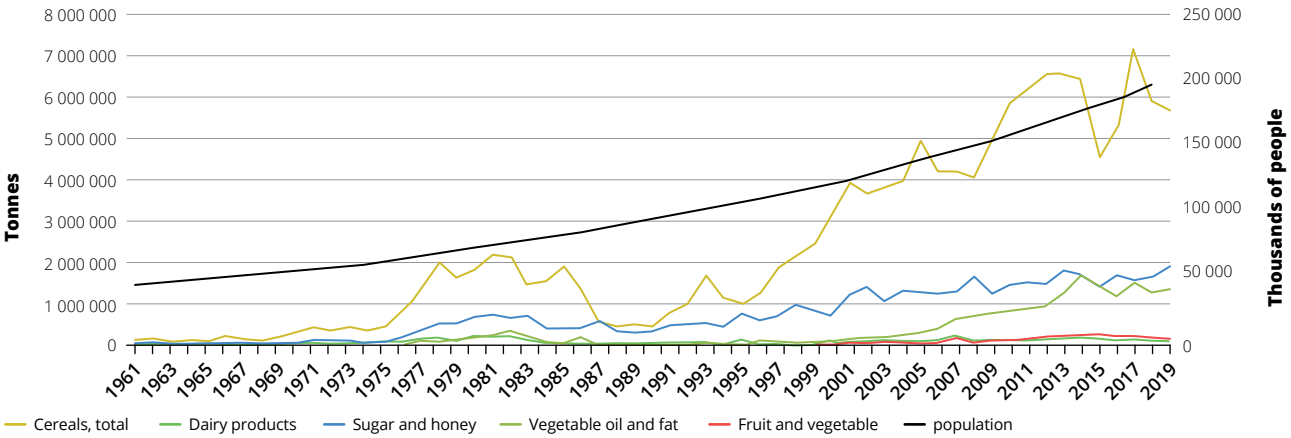
By contrast, the country's exports have decreased (Figure 5); an assessment in 2019 concluded that the food system does not provide enough to feed the country (Posthumus *et al.*, 2019). As Nigeria is a food-deficit country, demand for cheap food in urban areas is mainly met through food imports, but there is a mutually reinforcing mismatch between supply and demand at many levels and in many dimensions (Posthumus *et al.*, 2019). Food imports have more than quadrupled in the past decades, from a value of USD 964 million in 1995 to USD 4 566 million in 2016 (FAO, 2019), resulting in a substantial trade deficit for the agrifood sector. Nigeria is relatively weakly integrated into regional value chains; its exports to the ECOWAS region, which averaged approximately 7 percent of its total exports between 2001 and 2006, plummeted to 2 percent in 2010 (Chete and Adewuyi, 2016).

Figure 3. Index of production in volumes, with population



Source: FAO. 2022. FAOSTAT: Production Database. *In: Nigeria.* Rome. Cited 1 March 2022. http://www.fao.org/faostat/en/#data/QC

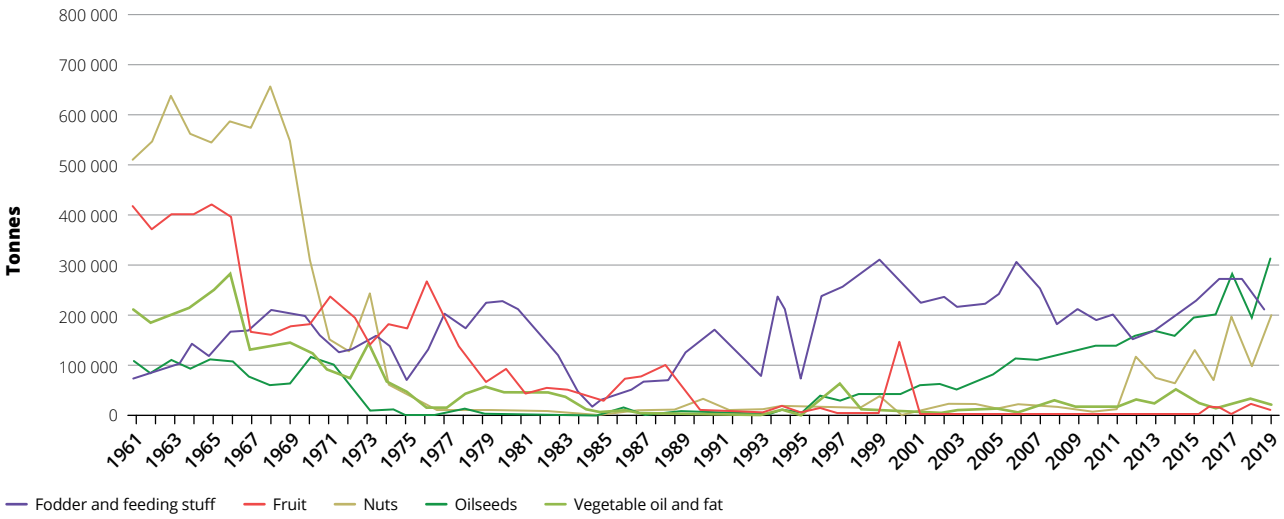
Figure 4. Main imported products in volumes, with population



Source: FAO. 2021. FAOSTAT Trade Database. *In: Nigeria.* Rome. Cited 26 February 2021. http://www.fao.org/faostat/en/#data

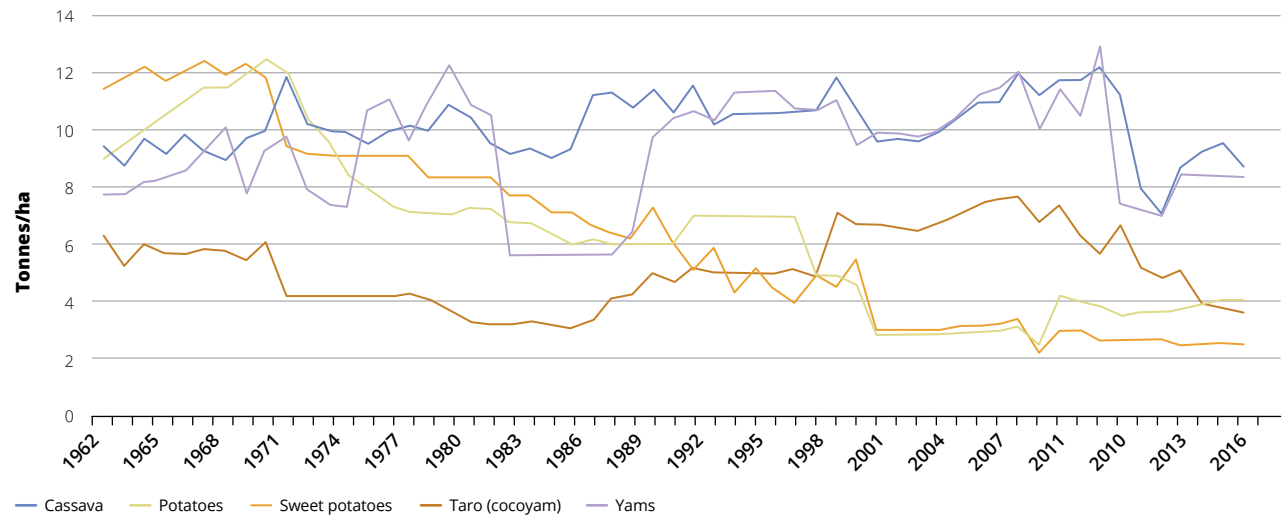
In line with gap between domestic food supply and demand widening, Nigeria has becomes more dependent on (cheap) food imports, which works as a "quick-fix" to the food deficit, but it fails to address the low agricultural productivity that keeps the deficit in place. The yields for all crops have been declining over time – or at least fluctuating – despite the large tracts of arable land and production potential (Figure 6). Moreover, yields of major crops such as yam, taro and cassava have trended lower in recent decades (Figure 6). Approximately 71 percent of the rural population was already food insecure in 2017 (Matemilola and Elegbede, 2017).

Figure 5. Main product export volumes



Source: FAO. 2021. FAOSTAT Trade Database. *In: Nigeria.* Rome. Cited 26 February 2021. http://www.fao.org/faostat/en/#data

Figure 6. Yields in tonnes/hectare

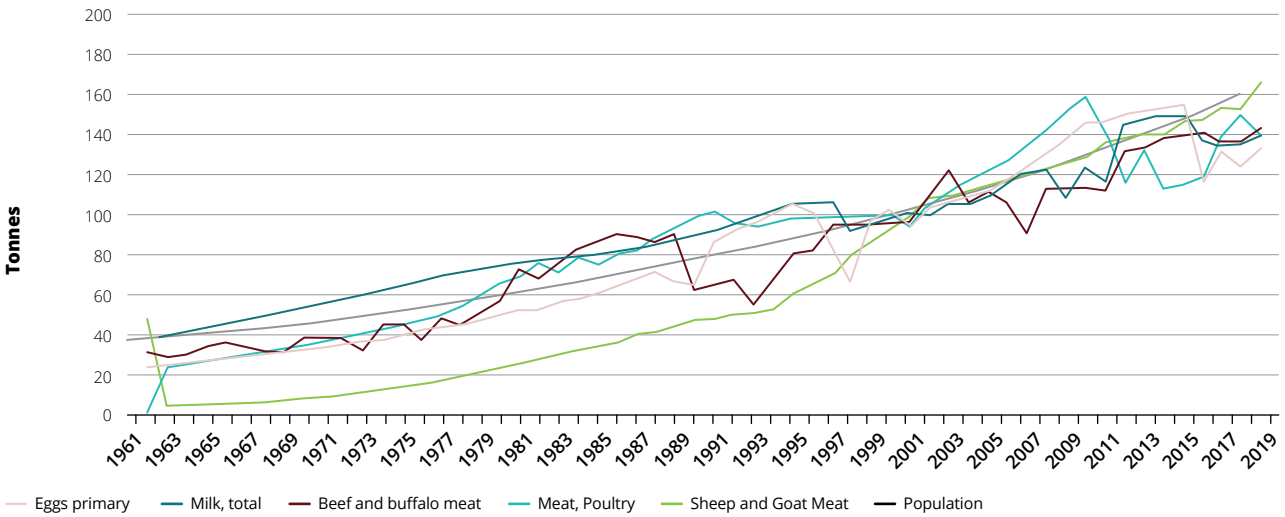


Source: FAO. 2021. FAOSTAT Production Database. *In: Nigeria.* Rome. Cited 26 February 2021. http://www.fao.org/faostat/en/#data

Approximately 60 percent of the livestock population is in the country's semi-arid zone. The environment in the northern part of the country is particularly suitable for keeping cattle, which are mostly managed in vast herds by semi-sedentary and transhumant pastoralists. The extensive pastoral system accounts for 82 percent of Nigerian cattle production, the semi-intensive or agropastoral system for 17 percent and the intensive or commercial system just 1 percent (Flanders Investment and Trade, 2020).

Livestock production has generally remained low in Nigeria. The farm animals are mostly reared by rural households. Livestock include goats (76 million), sheep (43.4 million) and cattle (18.4 million) (Nigeria, Federal Ministry of Agriculture and Rural Development, 2016). In the case of poultry, there is a large gap between poultry meat production (approximately 0.3 million tonnes) and demand (1.5 million tonnes) (Table 2). Given the country's import ban on live poultry (except for day-old chicks) and frozen poultry, which was imposed in 2003 (Ogunleye *et al.*, 2016), this deficit of approximately 1.2 million tonnes was covered by smuggled poultry meat into the country from the country's western neighbour, Benin, according to an estimate by the Central Bank of Nigeria (Awojulugbe, 2019).

Figure 7. Production index of animal products, compared to population



Source: FAO. 2021. FAOSTAT Production Database. *In: Nigeria.* Rome. Cited 2 March 2021. http://www.fao.org/faostat/en/#data

The aggregate demand for milk and dairy products is estimated at 1.3 million tonnes, out of which only 0.5 million tonnes are covered by domestic production. Consequently, USD 1.3 billion is spent annually on imported milk products. Dairy production is mainly subsistence-oriented, and annual milk production per cow is approximately 213 litres (Flanders Investment and Trade, 2020).

Nigeria is among the world's largest **fish consumers**; its annual consumption of approximately 3.2 million tonnes is more than that of any other African country (FAO, 2022). The fisheries sector is almost exclusively artisanal or small-scale, but it contributes more than 70 percent of the domestic fish production, providing livelihoods to approximately 6.4 million fishers (Akintola and Fakoya, 2017). Even though the

sector remains underdeveloped, **fisheries and aquaculture are among the most rapidly growing subsectors in the country. Notably, aquaculture is considered to be a viable way to achieve self-sufficiency in fish production and meet nutritional needs** (WorldFish, 2022).

As indicated in the 2018 World Bank data, total fish production was approximately 1.17 million tonnes (291 323 tonnes from aquaculture and 878 155 tonnes from capture fisheries) (World Bank, n.d.c) However, annual consumption is approximately 3.6 million tonnes, leaving a huge deficit of about 2.5 million tonnes (Oritse, 2021) and need for imports. In 2020, Nigeria imported fish from nine countries, namely the Russian Federation, Norway, the Netherlands, Iceland, Poland, Chile, Ireland, Mauritania and Japan (Akomolafe, 2021). Marine fishing is dominated by the coastal mechanized and canoe fisheries operating within five nautical miles of the shore. This area, which is designated as a non-trawling zone, comprises 39 644 km^2 of continental shelf area adjacent to the 853 km coastline (Akintola and Fakoya, 2017). Species-rich brackish water and estuarine canoe fisheries occupying about 12 904 km^2 exist in the creeks, estuaries, lagoons and mangrove wetlands.

Additionally, Nigeria has more than 14 million hectares of inland waters, making fishing a vital livelihood for the poor as well as an important protein source for households (WorldFish, 2022; FAO, 2022).

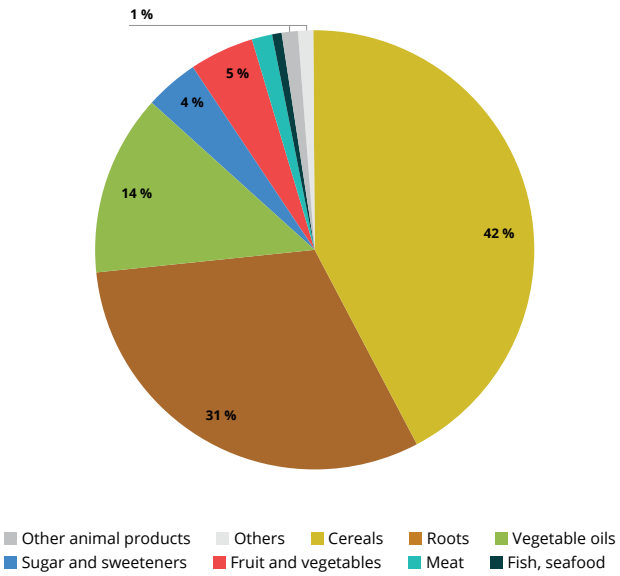
The forest ecosystems of Nigeria are being threatened by rapid population growth and extractive economic activities. The annual deforestation rates range between 0.72 percent and 2.38 percent, according to an FAO 2018 report (cited in FAO, 2022). Agricultural expansion, heavy reliance on firewood and charcoal for energy, unsustainable timber extraction, urbanization, grazing, bush fires and infrastructure development are among the contributing factors to the deforestation.

Key trends in food consumption

In Nigeria, the food availability by commodity group in terms of food energy in 2018 was dominated by cereals (42 percent), starchy roots, pulses and tree nuts (31 percent), oil crops and vegetable oils (14 percent) (Figure 8).

Corresponding to the availability, the estimated per capita intake of fruits, vegetables, legumes, nuts, seeds, and milk in Nigeria is lower than global target values (Figure 9). For instance, the country's per capita milk intake is only 6.32 g/day, as compared to the global target value of 435 g/day. A similar pattern of low supply of foods exists in the Nigerian food system. Data from 2018 show per capita supply of meat, fish, eggs and milk at 21 g/day, 24 g/day, 8.2 g/day and 3.5 g/day, respectively. While many population groups are deprived of essential nutrients, there is excessive consumption of food energy, especially in added sugar and fats (Figure 10). Per capita sodium consumption in Nigeria is higher (2.6 g/day) than the target value of 2 g/day. Similarly, per capita consumption of sugar-sweetened beverages (SSB) is 32.62 g/day compared with a target value of 2.5 g/day and has doubled in the past two decades. In comparison, red meat intake is low (6.5 g/day), compared with the target value of 22.5 g/day.

Figure 8. Food availability by commodity group in terms of food energy (2018)



Source: FAO. 2022 . FAOSTAT – New food balance. In FAOSTAT. Rome. Cited 2 March 2021. http://www.fao.org/faostat/en/#data/FBS

Additionally, with expected population growth and rapid urbanization, the current modes of fruit and vegetable production are insufficient to meet future demand (Dijkxhoorn, Talabi and Eunice, 2021).

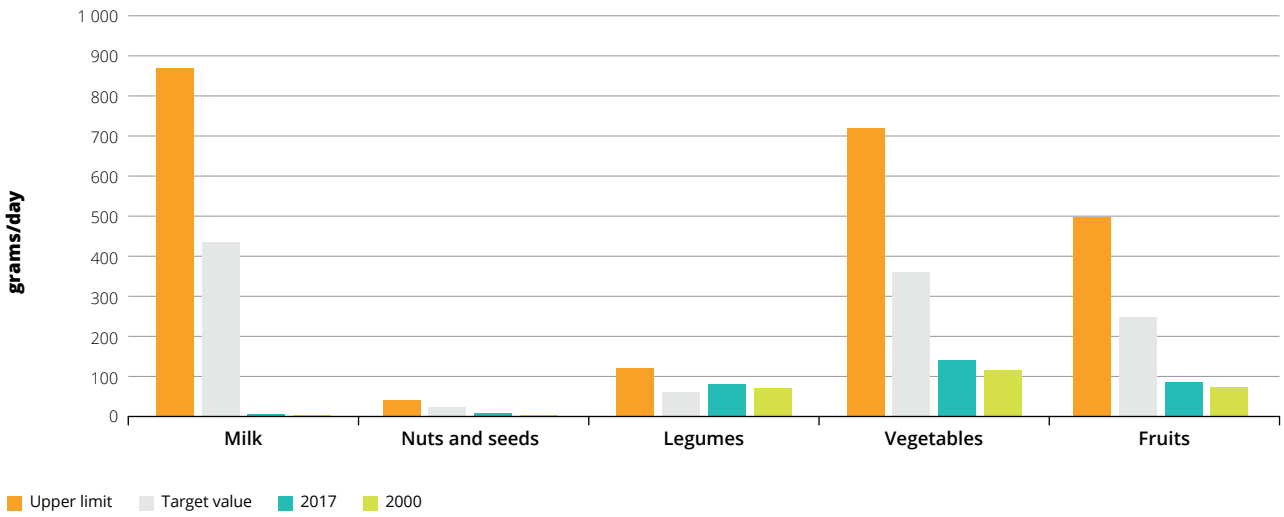
There is evidence of a "nutrition transition" in Nigeria – a shift in dietary consumption towards increased intake of food high in fats, sugar and salt, stemming from economic, demographic and epidemiological changes (Mekonnen *et al.,* 2021b). In general, the difference in the nutrition transition across the states of Nigeria may be linked to differences in prevailing food systems, including production, processing, distribution, trade, food environments, and consumer behaviour (HLPE, 2017). The food environment, which encompasses availability, affordability, convenience and desirability of various foods in markets, for example, constrains, signals and influences consumers' purchasing and tends to modify their dietary consumption preferences and patterns (Herforth and Ahmed 2015).

Those changing patterns and growing urbanization are also expected to increase demand for processed meat and seafood, which is also likely to be driven by the growth of new grocery retailing, such as supermarket chains and local shops, along with increased demand from middle-income consumers who shop in these stores. (Flanders Investment and Trade, 2020).

The issue of food insecurity and the constantly growing population has been a rising concern in Nigeria, especially in the light of the country's annual population growth rate of approximately 2.5 percent (see Table 1) and large number of unemployed young people. In most cases, the agriculture sector has been abandoned to the

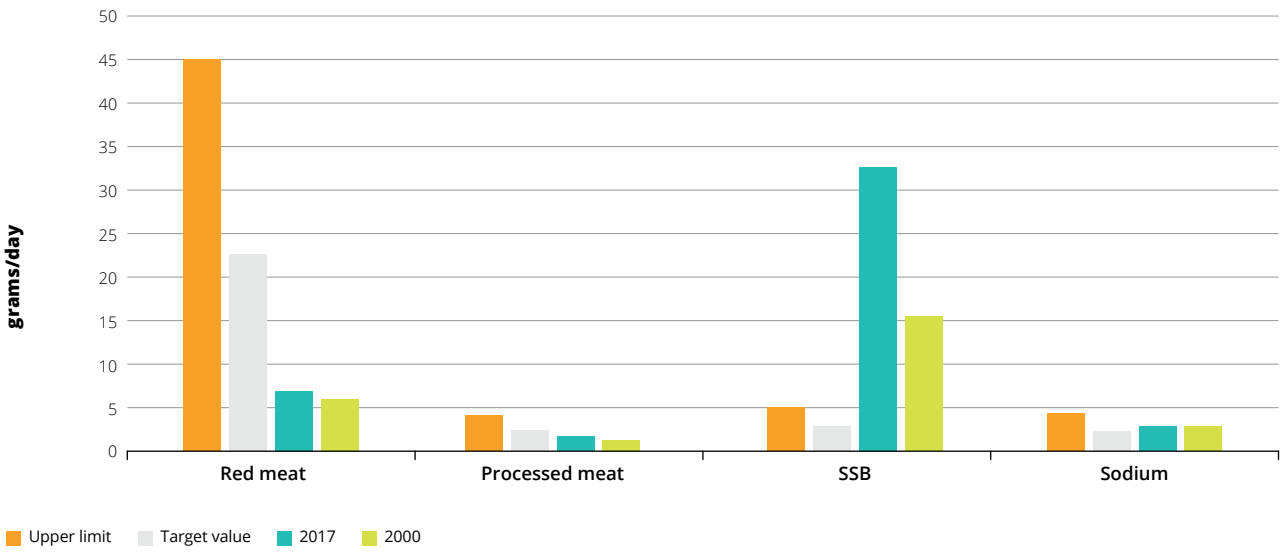
rural poor for reasons ranging from lack of social amenities in the rural communities to total loss of interest in agricultural engagement by the young people. The result is declining food production leading to high prices of agricultural products and food insecurity and reduced consumption of nutritious foods and increased malnutrition (Aiyedogbon *et al.*, 2022)

Figure 9. Estimated per capita intake of fruits, vegetables, legumes, nuts and seeds, and milk in Nigeria vs global standards (grams/day)



Source: Food Systems Dashboard. 2020. Geneva: Global Alliance for Improved Nutrition and Johns Hopkins University. Geneva. Cited 4 March 2022. https://www.foodsystemsdashboard.org

Figure 10. Estimated per capita intake of sugar sweetened beverages, red meat, processed meat, and sodium (grams/day)



Source: Global Burden of Disease, cited in Food Systems Dashboard. 2020. Geneva: Global Alliance for Improved Nutrition and Johns Hopkins University. Cited 4 March 2022. https://www.foodsystemsdashboard.org

Characteristics of the dominant actors in the food system

Smallholder producers

The bulk of agricultural crops in Nigeria are produced by smallholder farmers, many of whom also rear a few head of livestock. Most smallholders operate as a family business, with labour mostly sourced from relatives. Maize is commonly grown by both men (74 percent) and women (68 percent). Women also produce vegetables, poultry and small ruminants, counting cassava (63 percent), yams (54 percent) and pepper (43 percent). Men more often grow beans (48 percent), millet (45 percent) and cassava (42 percent) (Anderson *et al.*, 2017).

The youngest group involved in smallholder farming (15–29 years old) accounts for 36 percent of such households. While women are active producers, men dominate the leadership of smallholder households, leaving little room for women and young people to participate in making decisions about agricultural activities. Smallholder farmers in Nigeria typically own their plots of land, but only 40 percent of them possess a lease or certificate. One-quarter own farms under customary law. Lack of official documentation may mean that maintaining ownership is not guaranteed. Approximately 26 percent of smallholders have access to communal land, mainly for grazing their animals (Anderson *et al.*, 2017).

According to Oxfam, in 2017, an estimated 78 million women lived in rural areas and had no access to land. Of this total, 55 percent were female-headed households without land and approximately 29 percent own less than one hectare. Factors driving this inequality are related to gender discrimination with roots in cultural and religious practices in Nigeria (Mayah *et al.*, 2017).

Smallholders have difficulty in sustaining their livelihoods and increasing their output, and only one-quarter of the smallholders benefit from financial inclusion – i.e. they have a bank account in their own name. Among the constraints driving this are low levels of trust among smallholders in formal financial institutions and a lack of perceived need for formal financial services (Anderson *et al.*, 2017).

Pastoralists, livestock and poultry producers

Approximately 60 percent of the livestock population is in the country's semi-arid zone and is predominantly managed by pastoralists. Approximately 18.4 million head of cattle are managed in vast herds by semi-sedentary and transhumant pastoralists. The extensive pastoral system accounts for 82 percent of Nigerian cattle production, the semi-intensive or agropastoral system for 17 percent and the intensive or commercial system 1 percent.

Annual poultry production is approximately 300 000 tonnes of meat and the egg output totals 650 000 tonnes. The extensive or free-range system accounts for 46 percent of the standing population, semi-intensive production for 33 percent, and intensive systems for 21 percent (Flanders Investment and Trade, 2020).

Marketing and manufacturing

The sale of food in Nigeria is dominated by the informal sector in open-air markets; retail chains and supermarkets account for only a minor share of the market. According to Research and Markets (2020), food manufacturers and wholesalers have fared slightly better than retailers in recent years. The Government of Nigeria has instituted many policies aimed at encouraging private investment by manufacturers in an attempt to diversify the economy and reduce reliance on food imports and oil exports. Examples of such support are tax cuts and low-interest loans to local food manufacturers (Research and Markets, 2020).

Food processing

The food processing sector remains underdeveloped despite considerable market potential. The country depends on imports to meet its demand for quality processed foods. The sector is dominated by small and medium enterprises and multinational food companies, such as Nestle and Unilever (Infoguide Nigeria, 2019). Typical Nigerian crops that are processed are rice, cassava, yams, maize, oil palm, guinea corn (sorghum) and groundnuts, in addition to fruits and vegetables, such as plantains, bananas, oranges, mangoes, pawpaws and carrots. Approximately 8.9 percent of the 37 million microenterprises in Nigeria are involved in agriculture (Flanders Investment and Trade, 2020).

Dairy sector

The formal Nigerian dairy sector is dominated by multinational groups, such as the Dutch-owned Friesland Campina WAMCO, Arla Foods of Denmark and ventures, such as PZ Wilmar (Nutricima), Danone (Fan Milk) and Promasidor, that rely on milk imports as raw materials (Sahel, 2019).

Seafood sector and fish processing

The seafood industry, comprising fishing, seafood farming and processing, remains largely undeveloped as low technical know-how and weak cold-chain infrastructure hinder investments. Local businesses have, however, developed a strong distribution value chain, allowing small and medium enterprises to deliver live or frozen catfish and tilapia products to their destinations. International manufacturers and brands, however, continue to dominate processed seafood trading in Nigeria, despite import restrictions and tariffs (Flanders Investment and Trade, 2020).

Fruits and vegetables

Most fruits and vegetables are traded in the informal market, predominantly by women. However, wholesale traders have a dominant position in linking producers of fruits and vegetables to consumers. Only a minority of farmers who sell their produce actually take their fruits and vegetables to the market themselves. The sector suffers from limited availability of relevant infrastructure and facilities for aggregation, storage and processing. Women are active in the different parts of the supply chain and carry out labour-intensive activities, such as fruits and vegetable processing. While work in this sector can provide an income, women can be subjected to exploitative labour arrangements (Dijkxhoorn, Talabi and Eunice, 2021). International manufacturers and brands dominate trade in processed fruits and vegetables. As with processed meat and seafood, they are mostly imported by local distributors and manufacturers' representatives (Flanders Investment and Trade, 2020).

Consumers

At the national level, total household expenditure on food and non-food in 2019 was NGN 40.207 trillion.[1] Of this total, approximately 56 percent was spent on food, with the share higher in rural areas (61 percent) than in urban areas (52 percent) (Flanders Investment and Trade, 2020). Processed foods are more commonly consumed in Nigeria as a result of rapid urbanization and demand for convenience foods, rising incomes and spending power of a growing middle class, and the rapid population growth (McHugh and Buliameen, 2020).

The cost of fresh vegetables and fruits is relatively high; approximately 90 percent of the population cannot afford them. Fruit and vegetable consumption per day is estimated at 238 g per capita, below World Health Organization (WHO) recommendations (Dijkxhoorn, Talabi and Eunice, 2021).

[1] T100 NGN = USD 0.235.

Key challenges to the achievement of the core sustainable food system goals

Key Sustainability Question 1: Why is the food system in Nigeria vulnerable to internal and global shocks?

Internal shocks threatening the food system are events of major insecurity, such as the Boko Haram insurgency, kidnappings, banditry and conflicts between farmers and herders. These incidents are more prevalent in the northern region where the majority of the country's food products are produced. The Boko Haram insurgency accounted for 1 606 deaths in the northeast between January and November 2020 (Reliefweb, 2020). In 2020, more than 3 300 Nigerians were kidnapped (WANEP, 2021). Between January and June 2020, banditry accounted for 1 600 deaths and approximately 247 000 people displaced in the Northwest (Ademola, 2021).

Farmer/herder conflicts has become the country's gravest security concern. These conflicts combined are, six-times more deadlier than the Boko Haram insurgency, killing approximately 1 300 people in the first half of 2018 alone. These conflicts is fundamentally a land-use contest between farmers and herders across the country's Middle Belt. They have taken on dangerous religious and ethnic dimensions because most of the herders are from the traditionally nomadic and Muslim Fulani who make up approximately 90 per cent of the country's pastoralists, while most of the farmers are Christians of various ethnicities. Since the violence escalated in January 2018, an estimated 300,000 people have fled their homes (International Crisis Group, 2018) .

The incidents of insecurity and violence have greatly disrupted agrifood system activities. Insurgency and other conflicts have denied producers access to their farms or farm inputs, affected distribution by limiting the mobility of food products, limited consumption through displacement of consumers and limited access to foods markets. Food inflation continues to rise, as Nigeria produces less food in the wake of rising cases of insecurity (Ukpe, 2021).

The vulnerability to **global shocks** is caused by the country's heavy reliance on food imports for which Nigeria requires the dollars earned from crude oil sales and an enabling environment within the countries from where these food items are being imported. The threats to these two factors in recent years, which occurred when the food importation process was challenged by the drop in crude oil prices and the COVID-19 pandemic, sent shockwaves through the system. The decline in crude oil prices resulted in reduced foreign exchange earnings and the pandemic restricted movement of goods and services across countries, resulting in a significant decrease in the quantity of food products Nigeria was able to import.

The agriculture sector was allocated only 1.6 percent of the government budget in 2019 and accounted for only approximately 4 percent of Nigerian bank loans, as against 40 percent and 56 percent to industry and the service sectors, respectively (Udegbunam, 2019). These low numbers are prevalent even though more than one-third of the country's population is engaged in agriculture and the sector accounts for approximately 22 percent of GDP (UNdata, n.d.). The Government has been focusing more on improving credit facilities through programmes, such as the Agricultural Transformation Agenda, the Anchor Borrowers' Programme, the Commercial Agriculture Credit Scheme and the Agricultural Credit Guarantee Scheme Fund (ACGSF) (Osabohien *et al.,* 2020). Implementation of these programmes, however, has been weak. Because of the limited investment, government funding and low credit availability, there is not an enabling environment for Nigerian smallholder farmers to improve their production systems. The lack of an enabling environment exists even though the country has an impressive infrastructure for extension services, most of which was established with World Bank funding during the 1980s, but

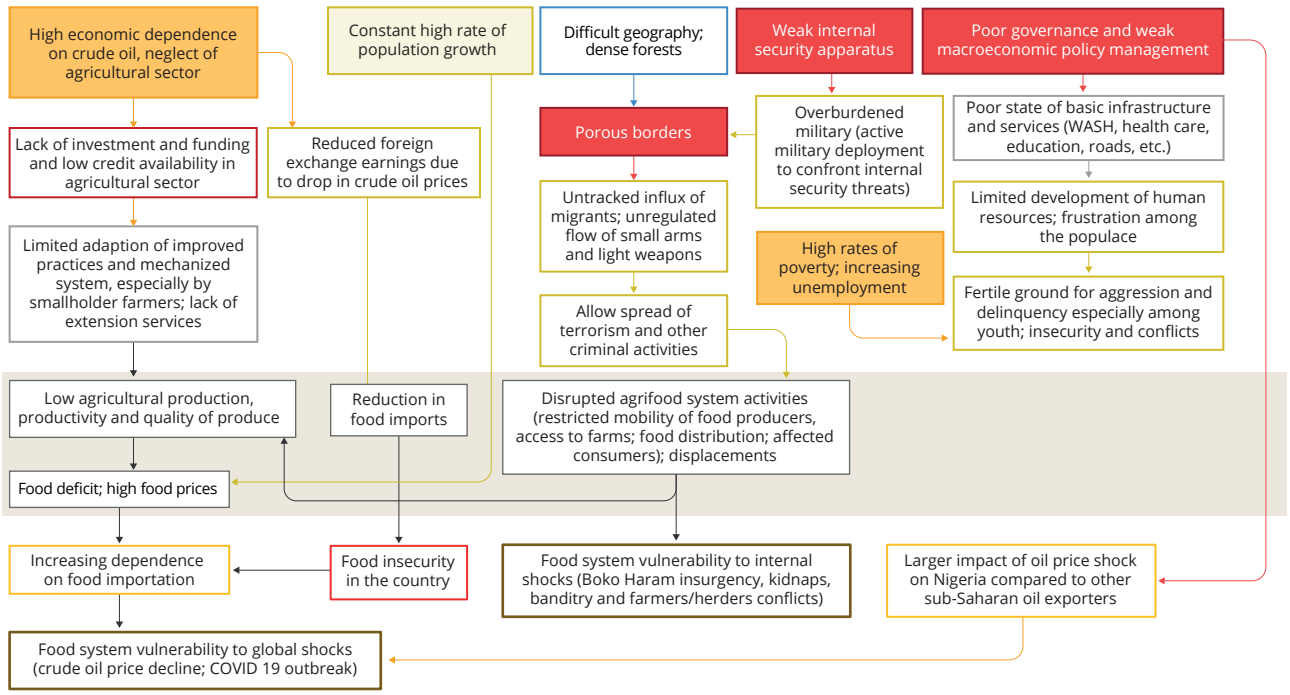
later suffered from a severe lack of funding and coordination (Huber, Davis and Lion, 2017).

Given these deficiencies and annual **population growth** of 2.5 percent for more than two decades, local food production remains inadequate to meet domestic demand (Table 2), hence the need to import more food. This exposes the country's food system to global shocks, as demonstrated in 2020 when crude oil prices fell from USD 57 per barrel in 2019 to USD 15 per barrel in 2020 (Statista, 2022) as a result of the economic slowdown related to the COVID-19 pandemic (Figure 12). This cut foreign exchange earnings from USD 2.3 billion per month to USD 1 billion by September 2020 (Andam *et al.*, 2020) and led to the reduction in the amount spent on food importation to USD 5 billion 2020 (Vanguard, 2020) from USD 22 billion in 2018 (Thibiebi, 2018). The decline in oil prices from 2014 had already reduced government revenue from 18 percent of GDP in 2011 to 11 percent in 2014 and 6 percent in 2016.

The restrictions on the mobility of goods and services and other related disruptions during the COVID-19 pandemic – globally and domestically – deepened the challenges for the country's agrifood sector, as rising food inflation and reduced access for farmers to inputs and markets adversely affected food production and distribution and resulted in a reduction in food imports, worsening the food deficit situation (PWC, 2020).

Porous borders: the country's borders are poorly policed. An influx of migrants, along with unregulated flows of small arms and light weapons, have been cited as contributing to the spread of terrorism and other criminal activities, especially in Northwest Nigeria. The vulnerability of the borders is worsened by dense forests in the region, which offer an ideal hiding place, given that the rugged terrain, sparse population and dense vegetation make surveillance a challenge (Zubairu, 2020; Ojewale, 2021).

Figure 11. Systemic view of the different drivers leading to the vulnerability of the food system of Nigeria to global and internal shocks.



Source: Authors, 2021.

Table 2: Domestic food production vs domestic consumption

Types of food products	Quantity produced per annum (tonnes)	Demand per annum (tonnes)	Deficit per annum (tonnes)
Irish potato – (2021) [1]	0.84 million	1 million	0.16 million
Wheat – (2021) [2]	63 000	5-6 million	4.9 million–5.9 million
Maize – (2019) [3]	11 million	12 million	1 million
Rice – (2019) [4]	3.8 million	6.7 million	2.9 million
Fish – (2021) [5]	1.12 million	3.6 million	2.5 million
Poultry meat – (2019) [6]	0.3 million	1.5 million	1.2 million
Eggs – (2019)	0.65 million	0.79 million	0.14 million

Sources: (1) Yahaya, A. 2022. Irish Potato Farming In *Nigeria. Nigerian Infopedia*, 9 May 2020.. Cited 12 April 2022. https://nigerianinfopedia.com.ng/irish-potato-farming-in-nigeria/

(2) Ifeanyi, U.J. 2021. CBN says wheat importation is a major factor in the exchange rate crises. *Nairametrics*. 10 November 2021. Cited 10 February 2011. https://nairametrics.com/2021/11/10/cbn-say-wheat-import-is-a-major-factor-in-the-exchange-rate-crises/

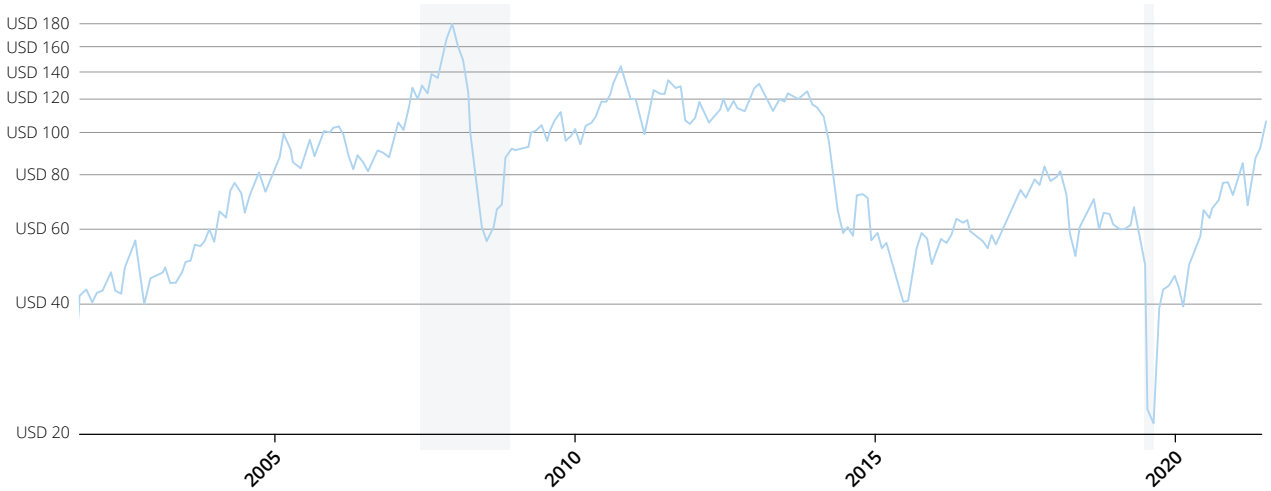
(3) ThriveAgric. 2020. Maize production in Nigeria. 23 July 2020. Cited 10 February 2022. https://medium.com/thrive-agric/heres-what-corn-production-looks-like-in-africa-and-nigeria-51de0153b8fd

(4) Obi, G. 2019. Rice Industry Review. 21 October 2019. KPMG. Cited 7 August 2022. https://home.kpmg/ng/en/home/insights/2019/10/rice-industry-review.html.

(5) Oritse, G. 2021. Nigeria has 2.5m metric tonnes of fish deficit—Minister. *Vanguard*, 3 March 2021. *Vanguard*. https://www.vanguardngr.com/2021/03/nigeria-has-2-5m-metric-tonnes-of-fish-deficit-minister/

(6) Awojulugbe, O. 2019. CBN: Nigeria's poultry industry now worth N1.6trn. The Cable. 8 July 2019. Cited 10 February 2022. https://www.thecable.ng/cbn-nigeria-poultry-industry-worth-n1-6trn

Figure 12. Crude Oil Prices – 20 Year Historical Chart



Source: Macrotrends. 2022. Crude oil prices – 70-year historical chart. Cited 18 February 2022. https://www.macrotrends.net/1369/crude-oil-price-history-chart

Weak internal security apparatus: In Nigeria, military personnel are deployed in at least 30 of the 36 states in the federation to handle internal security threats and instability, such as the decade-long war with Boko Haram in the northeast, worsening security in the Niger Delta, and farmer–herder conflicts in north-central and southern Nigeria. A report by a strategic intelligence analysis firm states that the situation weighs heavily on the overall capacity of the military being called on to manage situations that the police have been unable to handle. Clashes are common between soldiers and civilians (Ogundipe, 2016; Ojewale, 2021).

High rates of poverty and increasing unemployment: In 2020, approximately 40 percent of the population lived below the national poverty line (World Bank, 2022). The unemployment rate had risen from 4.3 percent in 2015 to 8 percent in 2020 (UNdata, n.d.). This situation creates frustration, especially among unemployed young people, and can lead to crimes, such as banditry, kidnapping for ransom, cattle raiding and militancy (Eneji and Agri, 2020).

Poor governance and weak economic policy management: Poor governance remains the fundamental cause of insecurity in Nigeria. The Government has performed poorly on all the indicators related to providing basic services, namely water, electricity, sanitation, health care, primary education and quality roads. More than 90 percent of the population do not have access to water, sanitation and hygiene (WASH) facilities; nearly half of Nigerians do not have access to electricity and the gross school primary enrolment ratio is less than 45 percent (see Table 1). In terms of quality of roads, Nigeria was rated at 2.5 points in 2019 (on a scale of 1 being low, to 7 being high), against the global average of 4.07 points (TheGlobalEconomy.com, 2019). The inadequacy of such basic amenities and services severely limits the development of human capital and hinders the effective functioning of agrifood systems. Rather than resulting from a straightforward lack of funding, the lack of services and adequate infrastructure has also been attributed to high-level corruption. Such difficulties foster demoralization and anger among the populace, and thus results in instability, insecurity and acts of violence (Zubairu, 2020). A study by Hazen and Horner (2007) captures the irony of a wealthy country with a majority of poor people. Weak institutional capacity of the security apparatus, high levels of poverty, inequality and unemployment are compounding factors, along with exploitative governance (Zubairu, 2020).

In addition, falling crude oil prices from 2014 had a notable impact on the Nigerian economy, given its weak macroeconomic fundamentals and reliance on oil receipts. The downturn was intensified by policy inconsistencies and delays. The depreciation of the country's currency, the naira, from 2014 also contributed towards staple food price inflation and disruptions in cross-border trade (FAO, African Union and ECA, 2019).

Potential impacts

The continued high vulnerability of the agrifood system to internal and global shocks is having a detrimental impact on the overall well-being, including health and food and nutrition security, of the population in Nigeria. Falling oil prices, inconsistent economic policy management and conflict and insecurity in Northeastern states were cited as the key drivers for undernutrition in the country during the period 2014−2018 (FAO, African Union and ECA, 2019). Over and above the incalculable human impacts (poverty, hunger), there are substantial setbacks for the country as a whole, in terms of economic losses, augmented risk of internal conflicts, political instability and natural resource degradation, making food system transformation a big challenge for the country.

Key systemic levers

1. **Enhance public and private investments in the agricultural sector, and improve access to financing to the smallholder farmers**

Enhancing public and private sector investments

in the agricultural sector may enable the effective implementation of relevant policies and programmes; strengthen the functioning of the already existing research and extension infrastructure and may lead to the development of an agrifood sector supportive infrastructure to build stakeholders' capacity at different levels. Together with this, improved access to credit by smallholder farmers would allow them to adopt improved agricultural practices and inputs. These developments in the agricultural sector would not only lead to increased food production and productivity, but it would also pave the way for enhanced livelihoods and inclusive development in the country. This is critical to the reduction of the country's dependence on food imports and vulnerability to global and internal shocks. As stated by the central bank governor, Nigeria needs to increase the proportion of its bank loans to the agricultural sector to 10 percent by 2024 to boost food production (Reuters, 2020).

The Government is already open to investment in some sectors, such as aquaculture and processing in the fishing industry (Oritse, 2021). The country faces huge demand in this sector, outstripping supply, despite the sector's great potential (see trends in Section 2). Fish is one of the most important animal-sourced foods in African countries, including Nigeria, and therefore crucial to meet food and nutrition requirements and also a vital source of livelihoods (Dauda, 2021).

2. **Promote good governance through transparency and accountability (thriving for peace and socioeconomic stability)**

Promoting good governance is crucial to the overall socioeconomic development of the people in the country and thus, mitigating the breeding grounds for the acts of insecurity and conflicts. It takes into account facilitating access to basic amenities to the people for strong human capital formation, providing opportunities to earn decent livelihoods, developing policy management and also, strengthening the security apparatus within the country and on borders (for peace and prosperity).

Key Sustainability Question 2: Why are agricultural-value chains underdeveloped in Nigeria, which is contributing to the unsustainability of the food system?

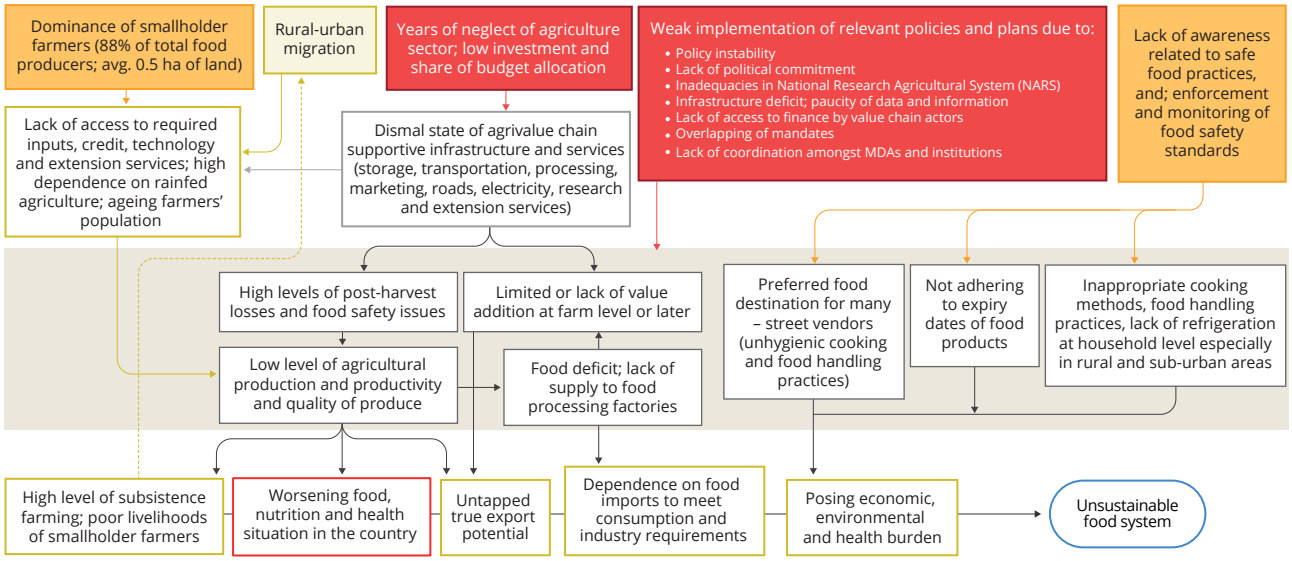
The agricultural value chains in Nigeria are highly underdeveloped in the context of the overall neglect of the sector (see KSQ1), as the country struggles with low levels of production and productivity, high levels of post-harvest losses, food safety issues, minimal processing and high dependence on food imports. The following discussion reflects upon the indicators, drivers and the impacts of the present situation.

Though Nigeria has many maize growers, the total crop harvested is limited due to low yields. The highest production rate realized was 1.69 tonnes/ha in 2019, while yield potential has been estimated at 6 tonnes/ha (IITA, 2020). Overall, the average productivity of cereals remains low, at 1.2 tonnes/ha. Furthermore, Nigeria loses an estimated USD 10 billion in annual export opportunity from groundnuts, palm oil, cocoa and cotton alone, resulting from the continuous decline in the production of these commodities. As discussed in KSQ1, food crop production has not kept pace with population growth, leading to rising dependence on food imports (ThriveAgric, 2020). **Low levels of agricultural production is accompanied by an underdeveloped food processing (and marketing) sector in Nigeria**, despite high market potential for food products. Food products, such as bread, cereals, spices, chocolate, snacks and healthy meals, take up approximately 25 percent of shelf space in supermarkets, but, despite this, the country depends on imports to meet its demand for quality processed foods (Ezeobele, 2020). The common sight of heaps of rotten fruits and vegetables, including, oranges, mangoes, pawpaws, tomatoes, bananas and plantains, especially during

the period after the harvest, suggests that the country has inadequate storage and processing capacity and logistical difficulties in assembling and transporting marketable quantities of produce (Yammama, 2021).

Post-harvest losses are high in Nigeria. In the case of fruits and vegetables, the losses are estimated to be at an alarming rate of 50 percent annually (Nigerian Stored Products Research Institute, 2022). Overall, the Government estimates post-harvest losses to be approximately USD 12 billion annually. Nigeria is the second largest producer of tomatoes in Africa and the fourteenth largest producer in the world, with an annual production of approximately 2.3 million tonnes. However, an estimated 40 to 60 percent of the tomato crop decays before it reaches the market, Consequently, Nigeria is the thirteenth largest importer of tomato products, which the country must do to meet its consumption demand (Nnachi, 2020). The situation is aggravated by the rising incidence of food safety issues resulting from

Fig 13. Systemic view of the different drivers leading to the underdeveloped value chains in Nigeria and the impacts



Source: Authors, 2022.

poisoning and infection, owing to poor food safety practices, unhygienic environments, and infectious and toxic agents. The food-borne diseases cause approximately 200 000 deaths annually in Nigeria, creating an economic burden of approximately USD 3.6 billion/annum (Onyeaka *et al.*, 2021).

Key drivers

In Nigeria, the **agricultural sector is dominated by small family farms**, comprising about 88 percent of the farmers. These farmers own, on average, 0.5 ha of land, manage and tend to mixed system of crops and livestock, and sometimes engage in fish farming. Myriad challenges, including inadequate access to inputs, credit and technology constrain smallholder agricultural production and productivity. Most smallholders depend on rainfed agriculture; only about 2 percent of them have access to irrigation. In 2018, approximately 7 percent of the smallholder farmers could access finance, 16 percent had access to motorized equipment and a meagre 6 percent benefited from public agricultural extension services. Moreover, only 26 percent of them sell their agricultural products, indicating a high level of subsistence farming. The average distance from farms to roads is 14 km, limiting participation in markets and access to processing facilities, where available (FAO, 2018).

The capacity of smallholders is further constrained by **the neglect of the agricultural sector in terms of low investments and a low share of budget allocation**, given the national dependence on crude oil, as discussed in KSQ1. Lack of financing limits research and extension services, and agrifood infrastructure, such as roads and transportation, aggregation and storage facilities, a marketing system and appropriate technologies. Given the prevailing conditions for producers, post-harvest losses are inevitable, particularly for perishables. Growers also lack the information, tools and equipment to deploy appropriate methods of harvesting, packaging and transportation and ensure products than can make it to market maintain their quality. Storage is inadequate and older facilities are not operational or suffering from lack of maintenance (Bolarin and Bosa, 2015).

Food safety is also neglected, with significant underinvestment compared to its public health and economic implications and potential impacts. Risk-based approaches to prioritization and incentive-based approaches to interventions are absent; there is a lack of evaluation of lessons learned from prior investments; and most investments have been in training and laboratory activities without being linked to a holistic strategy (Global Alliance for Improved Nutrition, 2020a).

Food processing remains basic, given a lack of modern processing machinery. Food losses and waste from poor transport and storage infrastructure also contribute to food safety challenges. Abakaliki rice from Southeastern Nigeria, for example, was declared unfit for consumption because of issues in sanitation and contamination. In the south of Nigeria, food safety and quality concerns also stemmed from the presence of contaminants, such as stones, pieces of wood and rat droppings in garri – a powdery food made from the tuberous roots of the cassava plant – rice and palm oil. Inadequate storage facilities also contribute to the risks of food poisoning and infections from bacterial and fungal contamination of produce (Onyeaka *et al.,* 2021).

Weak implementation of relevant policies and plans

After years of neglect, the Government of Nigeria began planning in 2010/11 to reform the agricultural sector with a new strategy called the Agricultural Transformation Agenda (ATA) (2011–15), focusing on how to make agriculture more productive, efficient and effective. It aimed to create 3.5 million jobs by 2015 and generate foreign exchange and reduce spending on food imports. The Agenda, however, failed to meet the targets and Nigeria continued to import USD 3 billion to 5 billion worth of food annually (2016), especially wheat, rice, fish and

fresh fruit. Wastage levels remained high in production areas, limiting the supply of produce to factories for processing. Job growth remained limited throughout agrifood value chains, from production to marketing, and foreign exchange earnings continued to be spent on importing food (Nigeria, Federal Ministry of Agriculture and Rural Development, 2016).

Several challenges within the agricultural system have been identified as limiting the success of policies such as the Agricultural Transformation Agenda. These include the following:

i. policy instability in Nigeria, driven by high turnover rates of programmes and personnel, making the application of policy instruments unstable;

ii. lack of political commitment in following international protocols or conventions, such as allocating a minimum 10 percent of the budget to agriculture, as indicated in the Maputo Declaration;

iii. persistent inadequacies of the National Agricultural Research System to generate and commercialize new agricultural technologies, such as improved varieties of seeds, breeds of livestock and aquatic species, and failure to deliver already proven and available technology to farmers' fields;

iv. an infrastructure deficit, in terms of either unavailable or cost ineffective roads, railroads or irrigation dams, preventing scale-driven agriculture, which impose an added cost (up to 100 percent) on agricultural produce delivery in Nigeria, making it uncompetitive compared to global prices;

v. lack of access to financial services that could enable different value chain actors, including, input suppliers, processors, traders and others in agribusiness to address liquidity and encourage targeted private sector engagement in agriculture; and

vi. issues related to institutional reform and realignment, as many of the federal and state agricultural institutions do not function and exist only on paper. Sometimes the system even ignores local government areas, which are actually the focus of most activities (Nigeria, Federal Ministry of Agriculture and Rural Development, 2016).

In an effort to address these constraints, the Agriculture Promotion Policy (APP), (2016–2020), was aimed at enhancing productivity, upgrading value chains, encouraging private sector participation, improving infrastructure and access to finance, and supporting innovation (Odunze, 2019). Implementation of this policy was weak, as the country's food systems continued to face global and domestic shocks (see KSQ1). The next iteration was the National Agricultural Technology and Innovation Policy (NATIP) (2021–2025), the current policy intended to provide an integrated

approach in the provision of inputs to farmers, enhance agricultural mechanization, improve linkages between agricultural research and training institutions, facilitate rural infrastructure and improve access to affordable funding (Falaju, 2021). The success of this policy depends on its implementation to overcome the problems discussed above.

Food safety in Nigeria faces difficulties related to scope, coordination, funding, communication and implementation, with responsibilities spread among several federal entities, as well as state and local governments. The effectiveness of implementation of initiatives to promote food safety depends on the competency of the agencies responsible at each level, which means that the results differ around the country (Global Alliance for Improved Nutrition, 2020b).

Other key challenges are lack of awareness regarding the socioeconomic importance of food safety; a paucity of data and information on health burdens; lack of understanding of food safety and quality standards outlined in international agreements; inability to enforce compliance with local, regional, international standards and global best practices; a lack of infrastructure and resources to support scientific risk analysis and advancing the food regulatory system; and inefficient food supply chains and traceability systems (Global Alliance for Improved Nutrition, 2020b).

Lack of awareness related to safe food practice and enforcement and monitoring of food safety standards exacerbates the situation. In Nigeria, many consumers focus more on convenience and on saving their meagre resources, while satisfying their hunger, than on food safety, nutritional quality and hygiene. People with low incomes, travellers and schoolchildren are often inclined to buy from informal street food vendors, where unhygienic food-handling practices are common and food may be cooked or processed in highly unsanitary environments. These conditions may lack adequate means to wash, dry and store utensils and equipment; clean facilities for food storage, ingredients and non-food chemicals; hygienic lavatories; adequate drainage and waste-disposal; and consistent power supply (Onyeaka *et al.,* 2021).

Food safety issues for consumers were highlighted in 2021 when 10 people died and approximately 400 were hospitalized in Kano state after drinking fruit juice that had apparently expired a year earlier. In another incident, 25 people were reported to have died after consuming meat at a bar in Ogun state. While the cause of death was not confirmed, the incident illustrated the lack of an organized mechanism for regulating and monitoring food safety issues. At the household level, especially in rural and suburban areas, factors identified as contributing to food-related disease outbreaks include cooking methods, inadequate refrigeration, prolonged handling, improper reheating of cooked food and contamination by food handlers (Onyeaka *et al.,* 2021).

The rate of urbanization in Nigeria has constantly been about 4 percent for more than two decades (Table 1), with **rural-urban migration** being a major contributor. Nearly half of the Nigerian population lives in rural areas, which rely largely on farming for food and livelihoods. The underdevelopment of agriculture has become a significant "push factor" in rural-urban migration. In parallel, young people in rural areas are attracted by potential employment and higher income opportunities in urban areas (Oginni, 2019).

The Nigerian agricultural sector is characterized by an ageing farming population – mainly smallholders, without enough seeds, fertilizers, irrigation facilities, crop protection, access to credit or even support and knowledge, such as through agricultural extension services. Their situations – and livelihoods – are also hampered by poor or non-existent post-harvest handling, storage and processing infrastructure, limited markets and access, and inefficient systems for setting and enforcing food quality standards. These factors contribute to underdevelopment of agrifood value chains in Nigeria

Potential impacts

In the view of the constant high rate of population growth and low production volumes, underdeveloped value chains exacerbates the food and nutrition security challenges and are equally detrimental to the livelihoods of smallholders. More than 72 percent of smallholders in the country live below the poverty line of USD 1.9 a day (FAO, 2018). Underdeveloped value chains also prevent Nigeria from realizing the true export potential of its agricultural products. This together with high dependency on food imports severely restricts the overall economic growth of the country and thus, causing the food system to be unsustainable."

Proposed systemic levers

1. Strengthen implementation of the relevant policies

The Government of Nigeria acknowledges the importance of developing the agricultural sector for economic diversification, better livelihoods and achieving food and nutrition security targets, through its various policies and strategies. However, the poor implementation of related initiatives hinders the attainment of desired results. Thus, it is crucial that policies are adequately implemented. If approaches, such as the Agriculture Promotion Policy and the National Policy on Food Safety and its implementation strategy were implemented properly, more investments would be directed to the sector and avenues for entrepreneurship in agrifood value chains would open up. Prerequisites for meeting policy aims, however, are sustained political commitment, enabling infrastructure, strong leadership, and timely deployment of the necessary funds and other resources. An improved decision-making process and coordination are necessary. Attracting investment and ensuring commitments also requires transparency and accountability to stakeholders, among other steps (Odunze, 2019). These efforts also need to take into account the first lever proposed in KSQ1 – to enhance investments in the agricultural sector and improve agrifood value chains to the benefit of the Nigerian population.

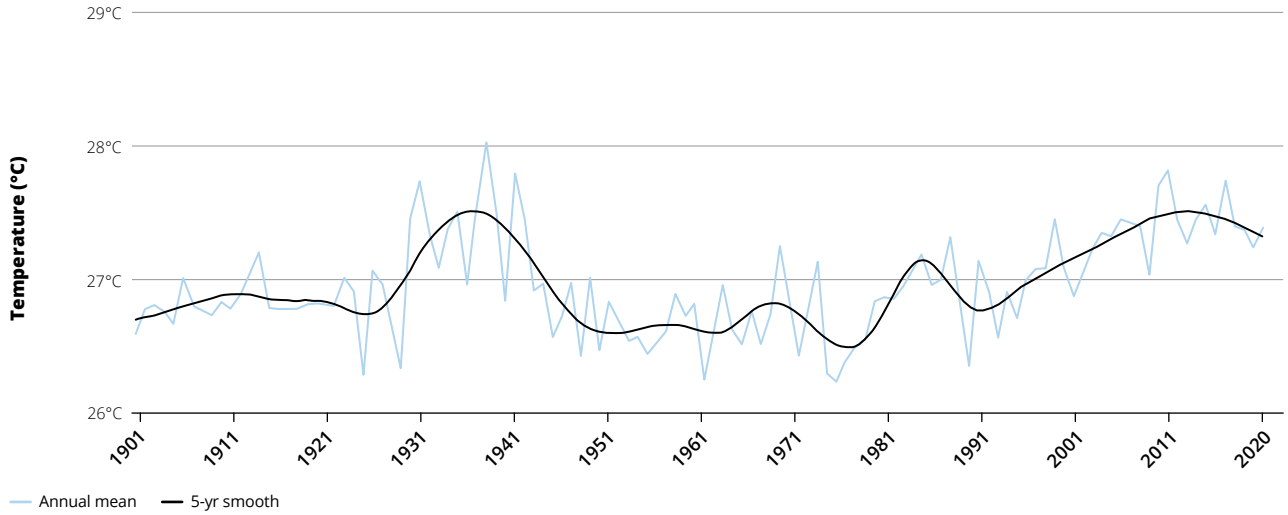
2. **Increase awareness among food system actors along with developing a strong regulatory and monitoring mechanism to promote safe food practices**

Because of the high incidences of food-borne diseases, it is crucial to bring about a change in the food safety culture in Nigeria through wider communication and better management. The focus needs to expand beyond the knowledge, attitude and food safety practices only among food businesses. Current perspectives, knowledge and demand for food safety among consumers (rural/urban; high-income/low-income earners; in different regions) needs to be understood, with encouragement of awareness on safe food handling practices and consumption. It is also important to develop a strong regulatory and monitoring mechanism to ensure food safety throughout supply chains. This may entail certification, mandating licences for food vendors, creating a body to address consumer grievances and management of the relevant information and data.

Key Sustainability Question 3: Why is the food system in Nigeria vulnerable to climate change and natural resources degradation ?

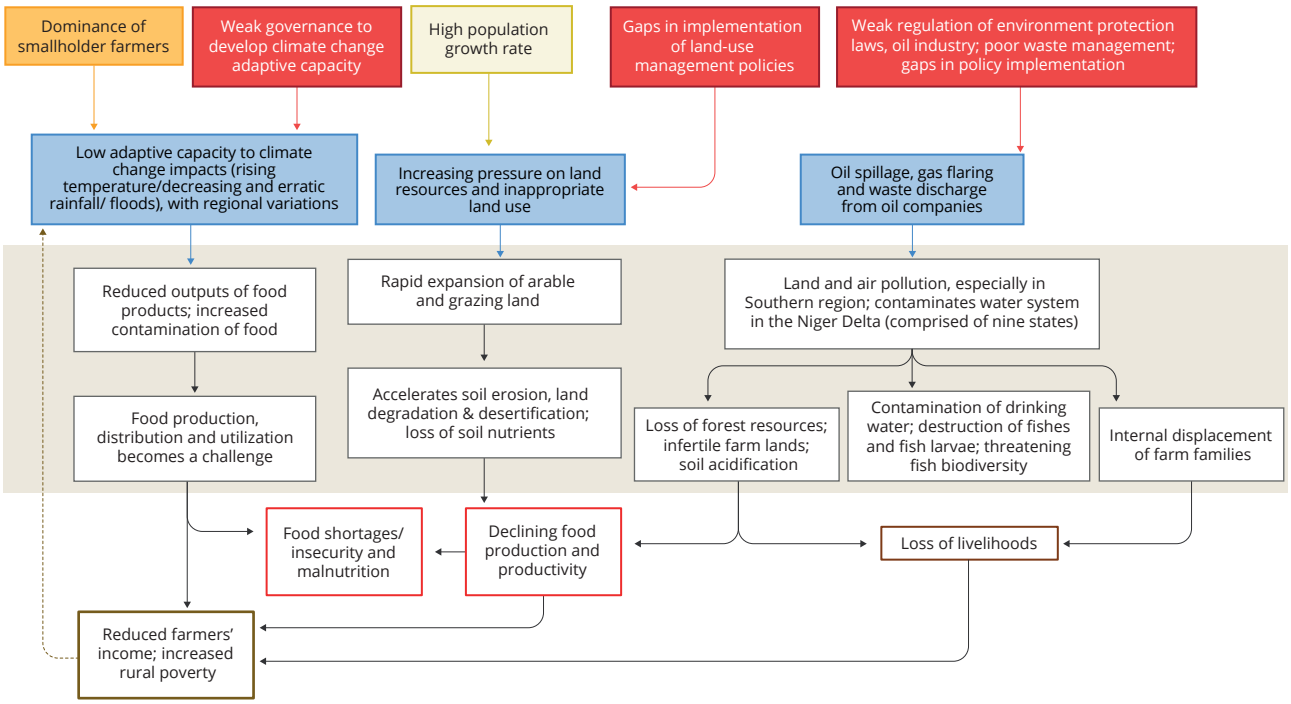
The natural resource base in Nigeria is critical for the food system, which encompasses crops, livestock, fishery and forestry. Increasing threats from human activities and natural disasters are impeding the capacity of these resources to support food production adequately. One of the environmental challenges aggravating food insecurity in the country is climate change. Over the years, average maximum temperatures and average number of hot days (Figure 14) have increased, while rainfall has decreased in the country. Temperature increases of 0.03°C per decade were observed between 1901 and 2016, with greater increases occurring over the past 30 years of 0.19°C per decade. Precipitation trends have a high degree of variability. Over the past several decades, predicting seasonal rains across the country has become more difficult. Overall, rainfall has decreased incrementally across the country since the 1960s. There is erratic rainfall with

Figure 14. Observed average annual mean temperature in Nigeria (1901–2020)



Source: World Bank Climate Change Knowledge Portal. 2021. Nigeria. World Bank Group. Washington, DC Cited 9 August 2022. https://climateknowledgeportal.worldbank.org/country/nigeria/

Figure 15. provides a systemic view of the key drivers and elements in the food system of Nigeria, relating to its vulnerability to climate change and natural resource degradation.



Source: World Bank Climate Change Knowledge Portal. 2021. Nigeria. World Bank Group. Washington, DC Cited 9 August 2022. https://climateknowledgeportal.worldbank.org/country/nigeria/

drought in the north and excessive rainfall leading to flooding in the south (World Bank, 2021). Besides climate change, the country's food system is also vulnerable to its natural resource degradation in terms of deforestation, land, water and air pollution.

Key drivers

Smallholder farmers who produce the bulk of food products in Nigeria have **low adaptive capacity** and are unable to cope adequately with environmental changes. The major effects of these challenges include reduced food output, increased contamination, food shortages and lower farmers' incomes (Morgan and Fenzo, 2020). This situation makes food production, distribution, and consumption more precarious, with farmers losing income and becoming impoverished. In recognition of the serious threat climate change poses to economic growth, the government **policy instruments** are intended to curtail the impacts, including the National Climate Change Policy Response and Strategy and the National Policy on Climate Change. To make an impact on the field, however, smallholder farmers, who are directly affected by climate change, require assistance in efforts and appropriate skills and knowledge in climate-smart food production, to improve their adaptation capacity

High population growth puts pressure on land resources and causes inappropriate land use. According to the Census Bureau of the United States of America, the population of Nigeria will surpass that of the United States of America in 2047, when it is projected to reach 379 million. Nigeria would then be the third most populous country in the world. Population growth has increased demand for food products associated with rapid expansion of land for food crops and for grazing. The resulting loss of vegetation cover accelerates erosion and desertification, leading to reduced soil nutrients and degradation of land.

The deterioration of the resource base for food production and its associated **decline in soil fertility** is the basis for low agricultural productivity, which leads to a shortage of food, loss of income and poverty among smallholder farmers (Wendling *et al.*, 2020). According to the 2022 Global Environmental Performance Index (EPI),[2] Nigeria ranks at 162 out of 180 countries, with a score of 28.30. Within the last 10 years, this score has deteriorated by 6.10 points given losses of tree cover and wetlands, soil acidification and worsening air quality. Within sub-Saharan Africa, Nigeria ranks the sixth-lowest in EPI (Global Environmental Performance Index, 2022). It is estimated that about 90 percent of the land under cultivation has experienced some form of soil erosion, while up to 6 000 km^2 (about 6 percent of the country's land mass) is severely degraded (Nigeria, Federal Ministry of Environment, 2016). A total of 15 states constituting about 63 percent of the total land area are affected by severe to moderate rate of desertification (Figure 16) (Olagunju, 2015).

Figure 16. Map of Nigeria showing 15 desertification frontline states

Source: Adapted from National Population Commission (NPC) [Nigeria] and ICF. 2019. Nigeria Demographic and Health Survey 2018. Abuja, Nigeria, and Rockville, Maryland, USA: NPC and ICF. Available at: https://pdf.usaid.gov/pdf_docs/PBAAK326.pdf

Gaps in implementation of land-use management policies: Several government policies and regulations are relevant to land-use management, including economic growth, environment, forestry, drought, erosion and desertification, but implementation of them is lacking. Reasons for the implementation gaps include poor land reform processes, uncoordinated land degradation interventions, limited capacity among responsible agencies and inadequate funding. These reasons have also been articulated in the United Nations Framework Convention on Climate Change (UNFCC) 2021 report (Nigeria, 2021) which concludes that Nigeria needs support in funding, capacity-building, technology transfer, tools and

[2] Using 40 performance indicators across 11 issue categories, the EPI ranks 180 countries on climate change performance, environmental health and ecosystem vitality.

technical skills to improve adaptation. It is seen as necessary to keep a database of all stakeholders, with a monitoring and evaluation mechanism to ensure actions, achievements and challenges and support are documented and tracked in real time.

Weak governance to develop climate change adaptive capacity: As per the ranking of the Notre Dame - Global Alliance for Improved Nutrition (ND-GAIN Index,[3] 2019, the overall rank of Nigeria is 161 out of 192 countries. In terms of vulnerability (measuring a country's exposure, sensitivity and ability to adapt to negative impact of climate change), Nigeria ranks 129. In terms of readiness, however, (measuring a country's ability to leverage investments and convert them to adaptation actions) Nigeria falls to 185.[4] As the leader in ECOWAS and being the country with the largest GDP in Africa in 2022, as estimated by the International Monetary Fund (IMF, 2021), the ranking shows that Nigeria has not invested sufficiently in the climate agenda.

Weak regulation of environmental protection laws: The food insecurity situation in Nigeria is also exacerbated by land and air pollution. A typical example is the harmful effects of oil spillage and gas flaring on food production and livelihoods in the southern part of the country, leading to contamination of the environment. This phenomenon is driven by weak regulation of environmental protection laws, weak regulation of the oil industry, poor waste management and an increases in atmospheric contaminants (UNDP, 2006). According to the United Nations Development Programme (UNDP), between 1976 and 2001, more than 6 800 oil spills were recorded in the Niger Delta land and approximately three million barrels of oil were spilled, of which more than 70 percent was not recovered. Spills and contamination continue, reflecting ongoing difficulties in monitoring and responses, as well as managing ageing infrastructure and assessing the causes of spills and the consequent environmental damage (Mongabay, 2022).

Water systems in the Niger Delta, including rivers streams and ponds, have been contaminated with oil spills and waste discharges from oil companies (Amnesty International, 2018). The Niger Delta straddles nine states with more than 37 million people – approximately 22 percent of the country's population (Ike and Emaziye, 2012). The effects on the food system are contamination of water bodies and drinking water, destruction of fish and fish larvae, with the disappearance of some fish species and concentrations of toxic hydrocarbons in others, destruction of farmland and soil quality, with reduced food crop yields, loss of livelihoods and internal displacement of farming families. The Government has developed several policy documents to address the situation,[5] however, gaps in implementation have been observed, along with weak monitoring and surveillance and lack of coordination among relevant ministries and agencies.

Potential impacts

The country's environmental health and ecosystem services have been degrading over the years, and its food system lacks adaptive capacity to handle these threats and climate change impacts. The potential effects are severe, given the country's existing food deficit and high levels of poverty among small-scale producers. The situation also poses the risk of further conflicts between food system actors (see KSQ1).

[3] The ND-GAIN Country Index summarizes a country's vulnerability to climate change and other global challenges, in combination with its readiness to improve resilience.

[4] Notre Dame Research. ND-GAIN Country Index. https://gain.nd.edu/our-work/country-index/rankings/.

[5] These include the Flare Gas (Prevention of Waste and Pollution) Regulations (2018), National Gas Policy (2017), National Petroleum Policy (2017), Associated Gas Reinjection Acts (1979), Federal Environmental Protection Agency Act (1988), Oil Pollution Act (1990) and Oil Spill and Oil Waste Management Regulation (2011).

Proposed systemic levers

1. **Promote good governance and stakeholder engagement to limit natural resource degradation and develop climate resilience**

Promoting good governance by adequately implementing the relevant policies, strengthening environment protection legislations and enhancing investments in climate agenda is a prerequisite to limit natural resource degradation and building climate resilience in the country. Furthermore, multi-stakeholder engagement is an essential element in promoting good governance. For instance, the participation of food system actors in decision-making and increasing their awareness of environmentally friendly and climate-smart practices would provide a sense of ownership, which could surely go a long way in promoting efficient utilization of natural resources. Facilitating basic infrastructure and services to the country's population is another critical component of good governance and for strengthening climate resilience.

2. **Strengthen smallholder farmers' adaptive capacity to climate change**

Smallholder farmers comprise a significant proportion of food system actors in the country and are the primary food producers. Accordingly, measures aimed at building their climate change adaptive capacity can have a multidimensional impact on improving the socioeconomic and food and nutrition situation in the country. To build their capacity, it would be important to organize them in farmers' groups or cooperatives, provide them with access to agricultural supportive infrastructure, improve their access to credit, enhance inputs and most importantly and provide adequate research and extension support with the intention to enable them to adapt to improved and climate smart agricultural practices.

Key Sustainability Question 4: What factors limit food and nutrition security and contribute towards the poor diet quality and high prevalence of malnutrition in Nigeria?

In Nigeria, more than one-fifth (21.4 percent) of the population was estimated to be severely food insecure in 2019; this figure increased significantly from 6.6 percent in 2015 (World Bank, n.d. a). **This is accompanied by the prevalence of the triple burden of malnutrition in the country**. Nigeria is challenged by the co-existence of undernutrition, micronutrient deficiencies, and growing rates

of overweight and obesity in the population (Mekonnen et al., 2021b).

Chronic childhood undernutrition remains persistently high. Figure 17 depicts the trends in the nutritional status of children (under the age of five) in Nigeria by comparing the figures for the Nigeria Demographic and Health Survey 2008 and 2018. Though there has been a close to a 50 percent decline in wasting, the figures for stunting and underweight have shown negligible improvement. However, it is important to note here, based on the recent figures available on stunting, it has declined considerably to 31.5 percent in 2020 from 37 percent in 2008 after a steep increase to 43.2 percent in 2016 (World Bank, n.d. b).

Second, micronutrient deficiencies, including iron causing anaemia, are extremely widespread among young children and women of reproductive age: 68 percent of children between the ages of 6 and 59 months, were found to have some degree of anaemia in 2018. This percentage was higher in rural areas (73 percent), as compared to urban areas (62 percent) (National Population Commission and ICF, 2019). However, as compared to 2010 figures, the prevalence of anaemia in rural children declined moderately from 75.1 percent in 2010 to 73 percent in 2018, whereas it increased for children in urban areas, from 55.2 percent in 2010 to 62 percent in 2018 (Ecker *et al.* 2020). In the case of women (aged 15-49 years), approximately 58 percent have some degree of anaemia; the percentage being comparatively higher in rural areas (62 percent) than in urban areas (54 percent) (National Population Commission and ICF, 2019).

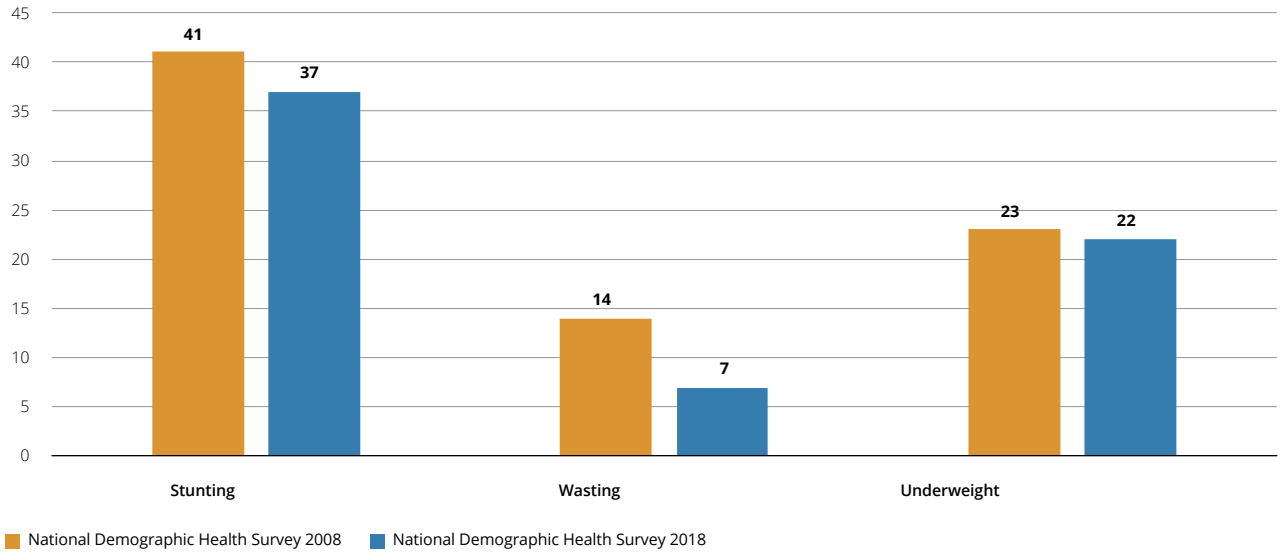
Third, there is an increasing prevalence of overweight and obesity in the Nigerian population, especially among adults. Research in 2020 indicated that among people aged 15 years or more, 20.3 percent were overweight and 11.6 percent were obese. The prevalence rates were higher in urban areas (27.2 percent overweight and 14.4 percent obese), as compared to rural areas (16.4 percent and 12.1 percent, respectively), respectively (Adeloye *et al.*, 2021). This is a significant concern, as a high body mass index as a risk factor is driving death and disability in Nigeria, which combined increased by 55.8 percent from 2009 to 2019 (Institute for Health Metrics and Evaluation, 2022).

The situation of malnutrition is also closely related with the level of dietary diversity of the population. As per a study in North Central Nigeria, the rural households consumed an average of four to five food groups the previous day. However, the diet consumed is low in variety as the commonly consumed food groups were spices and condiments, oil and fat, roots and tubers, cereals and fish. Eggs, milk, meat, fruits, and vegetables were the least consumed. The share of dietary energy supply derived from cereals, roots and tubers is about two-thirds (67 percent) (Agada and Igbokwe, 2015). Overall, in Nigeria, in 2018, 22.6 percent of children 6 to 23 months of age received an appropriate diverse diet, and only 10.6 percent were fed a minimum acceptable diet (MAD).[6] About one in two (55.6 percent) of women aged 15 to 49 achieved minimum dietary diversity (MDD)[7] (National Population Commission and ICF, 2019). A higher proportion of women in urban residents (61 percent) achieved MDD than their rural counterparts (51.1 percent). Almost 67 percent of those in the highest wealth quintile compared to those in the lowest quintile (49 percent) achieved MDD-W (FAO *et al.*, 2019). There is low consumption of fruits, vegetables and animal source foods (Maziya-Dixon. 2021). Only a few proportions are consuming fruits once or twice per week (17.9 percent), leafy vegetables (12.4 percent) and non-leafy vegetables (16.3 percent) in Nigeria. However, 72.7 percent of women reported consumption of dark green leafy vegetables in 2018 (FAO *et al.,* 2019).

[6] MAD considers both diversity and frequency of feeding.

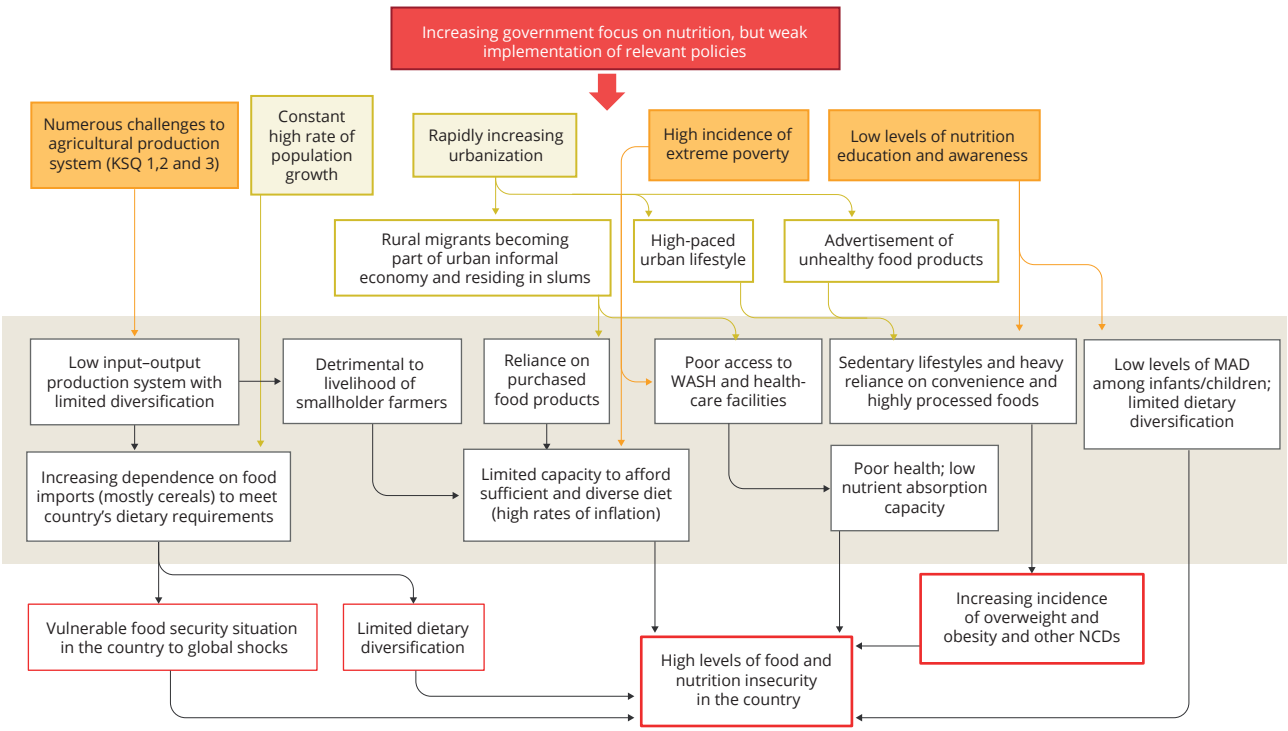
[7] MDD of at least five out of ten food groups.

Figure 17. Trends in nutritional status of children under 5 years of age (%)



Source: National Population Commission [Nigeria] and ICF Macro. 2009. Nigeria Demographic and Health Survey (2008). https://dhsprogram.com/pubs/pdf/fr222/fr222.pdf

Figure 18. Systemic view of the key elements and the drivers leading to food and nutrition insecurity and limited dietary diversity in Nigeria



Source: Authors compilation, 2022.

Key drivers

The drivers leading to the food and nutrition insecurity situation in the country are multidimensional. First, as discussed in KSQs 1, 2 and 3, **the agricultural production system in Nigeria faces numerous challenges and constraints**, including, dominance of smallholder farmers – especially women farmers with limited access to resources − credit, improved inputs, lack of capacity to adapt technology and high dependence on rainfed irrigation. These combined with neglect of the agricultural sector in the view of scant public and private sector investment, weak institutions and poor intersectoral coordination has resulted in inadequate implementation of relevant policies and programmes; weak research and extension services and poor agrifood supportive infrastructure. Furthermore, there are high vulnerabilities to different kinds of shocks, which affect production, distribution and access to food products. The result is a production system with limited output and diversification, which cannot meet the dietary requirements of Nigerian population, forcing the country to be increasingly dependent on food imports and further intensifying its vulnerability to global shocks. As 88 percent of farmers are smallholders, low levels of agricultural production and productivity also adversely affects the livelihoods for the majority of food producers, further limiting their access to sufficient and diverse food.

Second, the **constant high rate of population growth** (2.5 percent annual growth in 2020), with an average fertility rate of 5.4 live births per woman (2015–2020) (UNdata, n.d.), worsens the impacts of the inefficient agricultural production system, resulting in increased food deficits in the country (Figure 3). The gap between domestic food supply and demand is primarily met by importing cereals, which may reduce hunger but it fails to satisfy nutritional diversity requirements. As mentioned earlier, more than one-fifth of the Nigerian population was severely food insecure in 2019, with highly acute indicators for malnutrition. It is important also to note that given population growth, a marginal improvement in malnutrition rates (Figure 17) may not necessarily translate into fewer children being affected.

Third, **rapidly increasing urbanization** contributes to food insecurity and malnutrition of the population. Increasing rural-urban migration means that economically disadvantaged people with limited skills and education often join the informal urban economy and reside in slums that lack basic infrastructure and services. Given their reliance on purchased food, these migrants may be acutely vulnerable to food and nutrition insecurity. Inadequate access to health care and to WASH facilities also makes them prone to diseases, which may worsen their nutrition (Ekpenyong, 2015; Bassey, 2021).

High-paced urban lifestyles can also lead to **heavy consumer reliance on convenience and highly processed foods** purchased from street vendors and fast-food chains. Promotional campaigns and advertising of unhealthy food products, primarily through non-traditional means, such as social media and direct email messages, further encourage the consumption of poor diets. Consumption of unhealthy diets, including highly processed foods, has increased in Nigeria. For instance, as per the 2018 Nigeria Demographic and Health Survey 19 percent of women consumed savoury and fried snacks, 16 percent consumed sugary foods, and 22 percent consumed sugar-sweetened beverages in the day or night preceding the interview (National Population Commission and ICF, 2019). Additionally, living in an urban environment may demand less physical activity than in a rural setting, which leads to sedentary lifestyles. Issues, such as air pollution, traffic congestion and crime, can also be factors that discourage urban residents from partaking in exercise as part of maintaining a healthy lifestyle. The outcome of all these factors is higher levels of overweight and obesity and other non-communicable diseases (NCDs), such as diabetes and hypertension (Ekpenyong, 2015).

Fourth, the **incidence of extreme poverty** is a critical driver to the food and nutrition insecurity situation in the country. As estimated by the National Bureau of Statistics (2020a), approximately 40 percent, 83 million, of the Nigerians lived in poverty in 2019. This figure was expected to rise due to the phenomena of a rapidly increasing population and urbanization, together with the subsistence nature of agriculture. The rising poverty, coupled with high rates of inflation (11.4 percent in 2019), (World Bank, 2022) is decreasing the purchasing power of households and pushing the population to consume a narrow range of staples rather than keeping healthy diets and eating a variety of nutritious foods. Based on the findings from 2015/16 and 2018/19 Nigeria Household Surveys (National Bureau of Statistics, 2020b), a study suggested that the people of Nigeria are struggling to meet dietary recommendations for vegetables, dairy and protein-rich foods, as they have become more expensive compared to other food groups. Even though there have been improvements in the affordability of diets over the years, the challenge is more pronounced in rural than in urban areas and in Northern Nigeria than in Southern Nigeria (Mekonnen *et al.*, 2021a).

High rates of poverty also mark a lack of access to basic infrastructure and services, including WASH and health services, reinforcing the vulnerability of much of the population to poor health and malnutrition. Figure 18 shows the Multi-Dimensional Poverty Index (MPI) in different states of Nigeria,[8] according to which, the poorest states are Sokoto, Jigawe and Yobe in the North, with MPI scores between 0.35 and 0.45. The least poor states are in the southwestern part of the country where the MPI scores range from 0.06 to 0.12. These differences shows in regional data for malnutrition (comparing va and Figure 19b), with the highest prevalence of malnutrition in Northern Nigeria (57 percent stunting in the Northwest) and lowest in Southern Nigeria (18 percent stunting in the Southeast) (National Population Commission and ICF, 2019).

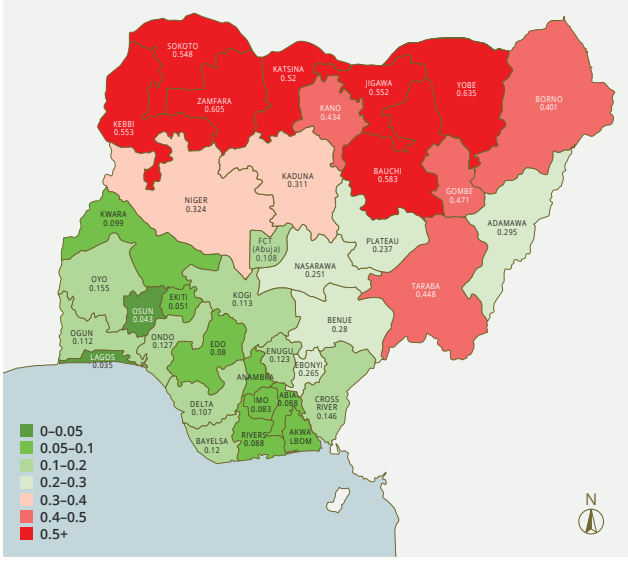
Another critical driver to the state of undernutrition and low dietary diversity in the country is **low levels of nutrition education and awareness**. Research conducted in Ondo state on the effectiveness of nutrition education indicated that infant nutrition improved after caregivers of infants (6–11 months) were given nutrition education on MAD, which included recommendations on feeding frequency and dietary diversity. The research also indicated that 70 percent of the infants in the study area were receiving pap (a sorghum-based fluid diet), without any additional food varieties, which contributed to the state of malnutrition (Akinrinmade, Njogu and Ogada, 2019).

Finally, **weak implementation of relevant policies** is a major stumbling block in meeting food security and nutrition goal. While there has been an increasing focus on nutrition in Nigeria over the past 10 years through policies and strategies drawn up to tackle undernutrition and improve food security, the overall policy environment scores were worse than the regional average in terms of corruption, political stability, and the rule of law, undermined by insurgencies and militancy, and looting of public funds (Olomola, 2017).

There is also a substantial gap between needs and the low resource flows from domestic and external sources in addressing food and nutrition security. Resource flows are below the regional average, even though domestic public investment in food and nutrition security is higher than external flows, including official development assistance (ODA) and private external investment (Olomola, 2017).

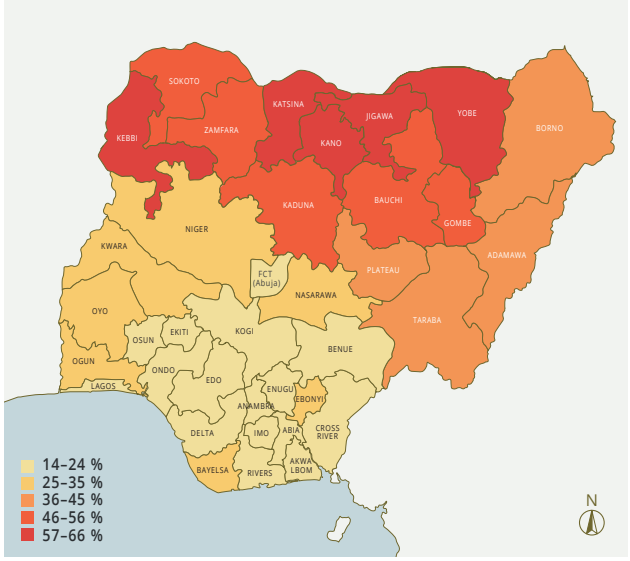
[8] The Multidimensional Poverty Index (MPI) accounts for the incidence and intensity of poverty. Its value ranges from zero to one. The MPI score shows the proportion of deprivation people in a given country experience out of the total possible deprivations where everyone was poor and deprived in all indicators.

Figure 19a. Multidimensional Poverty Index, 2017.



Source: Adapted from Multidimensional Poverty Peer Network. 2018. National Multidimensional Poverty Index for Nigeria. Cited 6 April 2022, https://mppn.org/nigeria-national-mpi/

Figure 19b. Stunting in children by state – Nigeria Demographic and Health Survey, 2018



Source: Adapted from National Population Commission (NPC) [Nigeria] and ICF. 2019. Nigeria Demographic and Health Survey 2018. Abuja, Nigeria, and Rockville, Maryland, USA: NPC and ICF. Cited 6 April 2022. https://pdf.usaid.gov/pdf_docs/PBAAK326.pdf

Potential impacts

A prolonged high prevalence of malnutrition increases the burden of protein and micronutrient deficiencies and results in metabolic syndrome, leading to increased diet-related NCDs, such as hypertension and diabetes (Soliman *et al.*, 2021). Malnutrition can increase the risk of infections, especially among those with poor access to water and sanitation. Beyond the food system, weaknesses in other systems and limited integration of services contribute to the high prevalence of malnutrition. For instance, there is inadequate access to health services: skilled antenatal care; skilled delivery at birth; and childhood immunization remains very low. If the current malnutrition situation persists, Nigeria is likely to face increased health-care costs associated with malnutrition-related impacts. Malnourished populations are also less able to contribute to farming and other economic activities in the future, creating cyclical dysfunctional systems and intergenerational malnutrition.

Proposed systemic levers

1. **Strengthen policy and institutional frameworks to implement food and nutrition security policies and programmes**

It is important to strengthen the policy and multisectoral institutional framework through a common platform to accommodate federal, state and local government, ministries, development partners, non-governmental organizations (NGOs) and civil society organizations, and other actors. This would help in the collaboration and coordination of the implementation of food and nutrition security programmes with a focused approach and investment planning. It would also help to reduce overlapping efforts at various platforms and attain efficient utilization of

monetary as well as human resources, to achieve desired results.

2. Strengthen subregional level platforms to promote behavioural change in dietary practices

It is critical to strive for subregional platforms to promote behavioural change in the current dietary practices through increasing nutrition education and awareness among caregivers, the wider adult population and young children. Desired changes include meeting the standards of minimum acceptable diets for infants, dietary diversification to ensure a wide range of nutrients, limiting consumption of highly processed foods and making informed choices for daily meals. Even in cases in which other socioeconomic factors are unchanged, promoting behavioural changes can play a vital role in achieving nutrition targets.

As reflected in the previous three KSQs, food and nutrition security is a multidimensional, cross-cutting issue. Levers suggested earlier can, therefore, also have an impact on efforts to meet food and nutrition security targets, such as increasing investment in agrifood value chains, promoting good governance to enhance access to basic services and infrastructure facilities, limiting natural resource degradation, developing climate resilience and capacity-building for smallholders.

Transition to sustainable food systems

Nigeria faces formidable challenges in achieving sustainable food systems. Action is needed in many dimensions to achieve this transformation. Essential aspects include food safety, rescuing food wastage and losses, promotion of value-adding activities, stimulating financial investment in the agricultural sector, encouraging a focus on malnutrition and capacity-building for all sector stakeholders. The issue of food insecurity and the growing population is a major concern, given the lagging increases in food production.

A food systems transition requires a robust engagement and partnerships between public and private sectors specifically to create the enabling environment that fosters sustainable transformation.

Among the prospects offered by such changes would be for Nigeria to benefit from the great potential market that ECOWAS offers, making it possible to work towards achieving the commitment of the African Union to boost intra-African trade in agricultural commodities and services, set in the Malabo Declaration of 2014 (African Union, 2014).

The findings of the food systems assessment serve as a first step for planning programmes and projects for sustainable food systems transformation. Further research would help to gain a deeper understanding of the challenges and potential impacts associated with food systems sustainability. The specific levers and action areas can be focused and combined with best practices from Nigeria and further afield to bring about the desired impact. Institutional innovations must be examined and tested for effective multistakeholder platforms to ensure that the voices of all stakeholders – especially the most vulnerable sections of society – are reflected in the planning and actions.

The Government of Nigeria has ratified many international protocols for the four critical areas discussed in this policy brief, and has introduced a range of policies to address key challenges in the food sector. A next step would be to harmonize policies in order to eliminate competing or contradictory aims, objectives and approaches. Increased stakeholder education and substantive engagement is needed to ensure that policymakers are pushed to deliver the necessary infrastructure (including physical, financial and communications) to ensure that Nigeria makes progress in addressing the challenges detailed in this study.

An entry point for transformation would be to create an enabling environment for the private sector to help in driving the economy forward. So, creating opportunities for increased financing, infrastructural development and domestic agricultural production would allow for a more vibrant economy. Another essential approach would be to develop smallholder farmers' capacity through increased investment to improve irrigation infrastructure, soil management and erosion control measures, which would help facilitate healthier farming ecosystems. The sustainability aspect of food systems transformation also demands raising awareness among all stakeholders on the importance of environmental protection and of adhering to and ensuring implementation of relevant policies and agreements.

Given the crucial role of diet in health, it is also critical that all stakeholders involved in agrifood – from producers to markets to regulators and consumers – understand the importance of consuming a nourishing range of safe, nutritious foods as part of their daily meals.

The vast scope of food systems offers many potential entry points for sustainable transformation. Consumer education, agricultural research and development, pasture land improvement, support for protected vegetable production, implementation of food safety norms, and strengthening value chains all offer prospects for effective action and impact in transforming food systems. For project implementation, it is important to coordinate the sources of finance of various international finance institutions, with the specific areas of work, the mandates and objectives of the organizations to ensure synergies and high impact outcomes.

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