



NIGERIAN INDIGENOUS FOODS

AND EMERGING THREATS



**HEALTH OF MOTHER
EARTH FOUNDATION**

Nigerian Indigenous Foods
And Emerging Threats

My Food is Nigerian Participatory
Action Research and Consumer Survey

By
Health of Mother Earth Foundation
(HOMEF)



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ACRONYMS

AE	Agroecology
APPEALS	Agro Processing, Productivity Enhancement and Livelihood Improvement Support
FGD	Focus Group Discussion
GMOs	Genetically Modified Organisms
IFPRI	International Food Policy Research Institute
KII	Key Informant Interview
LAP	Lagos Agriculture Programme
OA	Organic Agriculture
PAR	Participatory Action Research
RAAMP	Rural Access and Agricultural Marketing Project
RTEP	Root Tuber Expansion Programme
RUAF	Urban and Peri urban program
RUFIN	Rural Finance Institution Building Programme
SPFS	Special Program for Food Security
SPSS	Statistical Package for the Social Sciences
VC	Value Chain

EXECUTIVE SUMMARY

There are several issues today exerting pressure on the food system in Nigeria and in Africa at large. These issues range from wars to inflation, biodiversity loss, climate change, industrialization, and colonialism. These issues, now more than ever, call for a favourable and coherent food policy that provides consumers the right to good food in Nigeria; farmers the right to a healthy and sustainable farming system, and to a great extent, the framework on how our food systems can be more resilient, healthy, economically and culturally viable. Achieving a society with informed citizens who choose local and healthy food is imperative. This research was undertaken in order to gather data and reorient citizens of Africa, including Nigeria, on the importance of appropriate food production and consumption systems.

The study adopted the participatory action research method and consumer survey to gain first-hand insights into local experiences, using qualitative and quantitative tools (a mixed-method approach). Stakeholders in the six geopolitical zones (North-central, North-east, North-west, South-east, South-south, and South-west) in Nigeria were targeted in the study. A total of two hundred and forty (240) participants were sampled for the study, across the six geo-political zones. The stakeholders, forming the participants of the study, comprised representatives of farmers, consumers, policymakers, journalists, business people, and human rights advocates in the country. The study utilized a structured electronic questionnaire, open to as many consumers as possible in the country, and Key Informant Interview (KII) as a means of (Participatory Action Research) with strategic stakeholders in each of the geopolitical zones in the country.

The structured questionnaire was the quantitative tool used to elicit information from the participants. It was administered to one hundred and eighty (180) consumers of indigenous foods from different localities across the six geo-political zones, including different stakeholders like farmers, agro-processors, government workers, traders, and students. The KII served as the qualitative tool for data collection from some key stakeholders. The sample for the Key Informant Interview comprised sixty (60) participants, including stakeholders involved in the indigenous food production value chain (input supply, production, processing, marketing, and consumption) across the six geo-political zones.

The questionnaire and interviews elicited information about the habits, preferences, consumption patterns, and culture of the people. First-hand experiences were collected from the responses of culturally different farmers and consumers concerning locally produced food, challenges encountered when choosing preferred healthy foods and seeds, and other related issues. Data collected through the e-questionnaire were sorted, coded and analysed using the statistical package for the social sciences (SPSS) software. Descriptive analysis of the data was done, including frequency, percentages, mean and weighted scores, to draw conclusions and recommendations for the study.

The study established that the most consumed available indigenous foods across the zones were fruits and leafy vegetables, cereals/grains, roots and tubers, and spices. It was deduced that despite the differences in the types and varieties of indigenous foods found in different localities or cultures in Nigeria, citizens have good attitude and behavioural patterns on consumption of their local foods. Almost all the participants preferred their local or indigenous foods. Participants' preference for local food consumption was influenced by availability, taste and aroma, affordability, preservation, culture and tradition, and ease of cooking. The benefits of producing and consuming indigenous foods as highlighted by the participants included health benefits, high nutrition of foods, medicinal value, availability of seeds, affordability, and better shelf life.

However some of these local foods are getting eroded due to various challenges. The main reasons highlighted by the study participants for the unavailability of some indigenous foods in the local areas included urbanisation, extinction of seeds to plant, lack of access to storage facilities, poor weather conditions, and unavailable markets for products.

It was established from the study that the majority of the participants are not familiar with food rights. Also, the majority of the study participants were not aware of GMO foods, while a few opined that food items containing GMOs are mostly foreign foods or processed products.

Based on the information gathered in the study, the following are recommended for policy action for the sustainability of the Nigerian indigenous food system:

- Government especially at the local government levels should ensure preservation of indigenous food and seeds for example through set up and management of seed banks
- The government, CSOs and other concerned food system actors should increase awareness on agro-ecological and organic production systems
- Efficient infrastructural facilities including storage amenities for the production/storage of local and indigenous foods should be made available to food producers
- Government should establish and promote markets for indigenous foods
- The government of Nigeria should hold the breaks on GMOs and ensure adequate, long term, independent human and environmental health impact assessment are done.
- CSOs and other concerned stakeholders should intensify training for citizens on health, economic and environmental implication of GMO products
- The government should intensify training of farmers on climate change adaptation strategies
- Government should promote sustainability in production (ecological agriculture), post-harvest and value addition in Organic Agriculture
- Government, CSOs and other concerned stakeholders should increase awareness of Nigerian citizens on their right to food.
- The Nigerian indigenous food system should be protected from growing threats including climate change, introduction of risky/unproven technologies in Agriculture and laws/policies which do not serve the interest of our people or strengthen the local economy but champion the profiteering agenda of foreign corporations.



1.0 INTRODUCTION

Food security and climate change are two major development challenges of our time. In Africa, the food system is off track, and the climate is changing profoundly. Despite Africa's richness in land, fisheries, natural resources and bio-cultural diversity, all of which are critical assets for a well-functioning food system, she remains the most food-insecure continent. In 2020, more than one in five people in Africa faced hunger, more than double the proportion of hungry people in any other region and about 282 million of Africa's population are undernourished (Holger *et al.*, 2022). In West Africa alone, more than 27 million people needed immediate food assistance in 2021 due to a combination of drought, poverty, high food import prices, environmental degradation, displacement, poor trade integration, and conflict (Holger *et al.*, 2022).

The food economy is the largest economic sector, both in terms of employment and value creation in Africa. It generates 35% of regional GDP and almost 100 million West Africans, or 2 out of 3 people employed, depend on it for their livelihoods (Allen, *et al.* (2018). Adapting Africa's food system to climate change is imperative. Food systems are not only dependent on natural resources, they also have a considerable adverse impact on the environment, including on climate change. In West Africa, 23% of greenhouse gas emissions come from agriculture, with much of the damage to the environment occurring at the agricultural production stage (USAID, 2019). Food systems are the largest driver of environmental degradation, biodiversity loss, water pollution and deforestation (OECD, 2020). Differences in food systems lead to variations in nutrition, health, and sustainability outcomes (International Food Policy Research Institute (IFPRI), 2015). Climate change mitigation and adaptation actions will be an important component of creating equitable and sustainable food systems. Major transformations are required to create sustainable food systems. Demographic (population growth and urbanization); economic; socio-cultural factors; policies, regulations & governance; innovation, technology & infrastructure; biophysical & environmental factors are six major drivers for food system transformation. They define food production, trade and consumption and are highly interrelated.

Nigeria is the most populous country in Africa and the fourteenth largest country in the world. 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 rain-fed agriculture. Investment in agriculture by the government has not significantly contributed to reduction of undernutrition at the rate needed to meet the national development goals. The economic consequence of this state of food insecurity in terms of productivity loss is huge and requires urgent attention. The food distribution system in Nigeria remains largely inefficient due to factors such as crop seasonality, inadequate storage technology and facilities, inadequate transport and distribution systems, as well as market information. This has caused a very large deficit between local food production and food demand causing an urgent attention on the food system of the country. There are four key challenges that need to be addressed for the country to transition towards a sustainable food system:

- (a) Food system vulnerability to internal and global shocks
- (b) Underdeveloped agricultural food value chains
- (c) Food system vulnerability to climate change and contribution to natural resource degradation
- (d) Poor diet quality and high prevalence of food and nutrition insecurity.

One of the key actions in food system security is the production of indigenous food. Indigenous Peoples' food systems contain treasures of knowledge from long-evolved cultures and patterns of living in local ecosystems (Harriet *et al.*, 2015). Indigenous foods include wild plants, animals and insects that are not cultivated or reared in captivity and are sometimes considered minor or underutilized species. Indigenous food also include roots and tubers, vegetables and fruits, insects, amphibians, reptiles, birds and mammals gathered for food (FAO and Biodiversity International, 2017). These foods are culturally acceptable products that are obtained from local, natural environments (Steinbach, 2021). Indigenous foods are very important to human life because they contain all the nutrients that are responsible for human health, accelerated healing, which may eventually lead to longevity in life (Adebisi, 2013).

Indigenous foods were a main source of food for communities, but a post-colonial displacement of these foods and their food ways occurred, as they were portrayed as poor man's food by colonizers (Demi, 2014). This transition has swept across the world so much that indigenous foods that were widely used have been replaced with lower nutrient foods, with an increase in health-related problems (Turner *et al.*, 2007). Indigenous food knowledge systems contribute significantly to increased food availability, sustainability and security. Indigenous foods are strategically placed to provide food options that have potential to improve nutrition, increase dietary diversity and that are adapted to climate change (Pitso *et al.*, 2014). The benefits of indigenous foods in enabling more sustainable and equitable food systems can be classified into four main categories: nutritional benefits- nutrient density can be higher than in other foods (Penafiel *et al.*, 2011); environmental benefits- indigenous foods can be drought tolerant in the face of climate change (Cloete *et al.*, 2013); social-cultural benefits- it involves the interaction between local knowledge and nutritional value of indigenous foods (Lara *et al.*, 2019); and economic benefits -the sales of indigenous food increase the livelihood of the populace (Bharucha *et al.*, 2010).

Indigenous foods in Nigeria have an important role in the existence of the populace. Onimawo, 2010 reported that in Nigeria, the indigenous foods with potential are available and are many, that communities have evolved their own preferences and food habits overtime and will rather stick to what is familiar. Nigerian indigenous foods have great nutritional and therapeutic potentials. The advantages of using Nigerian indigenous foods for humanitarian interventions are many; indigenous foods can be used in solving diet related problems, such as in combating hunger and starvation, malnutrition and non-communicable diseases. There are also many of these foods with the potential of improving the human defense mechanisms (Cox, 2013; McDonald 2011). Those consuming indigenous foods have minor issues about the fear of the unknown (Bristone *et al.*, 2021). Another advantage of indigenous food is that many food crops grown in Nigeria, use limited chemicals and sometimes there is no available chemical fertilizer to be applied on farms except manure (Bristone *et al.*, 2021). Indigenous foods are prompt and affordable

compared with those shipped from elsewhere. These foods are also simple to prepare. It has been confirmed that production and utilization of indigenous food is declining due to lack of documentation and knowledge sharing which brings about a negative attitude of people towards the consumption of the foods and the shift of attention to fast food (Adebisi, 2013). Balinga (2005) stated that indigenous foods have been marginalized, owing to the lack of information on the extent of their use and importance in rural economies; their economic value; reliable methods for measuring their contribution to farm households and the rural economy; lack of world market, irregularities in supply; quality standards; storage and processing technology.

The abandonment of knowledge on indigenous food production and sustainability is one of the drivers of food insecurity in Africa (Kamwendo *et al.*, 2014). Accordingly, many scholars call for the revival of indigenous food management methods to mitigate food insecurity in Sub-Saharan Africa (Cloete *et al.*, 2013; Cousins *et al.*, 2015). The need to simultaneously provide sufficient food for all, improve incomes and productivity for small-scale producers, make diets healthier and more affordable, reduce greenhouse gas (GHG) emissions, and build capacities needed to adapt to climate change is becoming unattainable causing increase in the hunger and poverty level of Nigerians. As the population and incomes grow in Nigeria, so too will demand for food and more diversity in food choices, which will exacerbate environmental challenges (Laborde *et al.*, 2020). There is a need to promote policies and strategies that support smallholder farmers. Sustainable and resilient food systems are key to improving access to nutritious and healthy food and to providing livelihoods for millions of vulnerable people. Transforming food systems to deliver on hunger, poverty, healthy diets, and climate change will require significant efforts and resources (Laborde *et al.*, 2020).

There is now increasing interest to examine the role of indigenous food knowledge in adapting food systems to the effects of climate change (Ebhuoma *et al.*, 2017; Makondo *et al.*, 2018). The acknowledgement of the critical role of indigenous knowledge in the food system is vital (Mubaiwa *et al.*, 2017; Krause *et al.*, 2019a). Food system transformation toward healthier diets will not be possible without improving agricultural productivity. Focus on production of indigenous food which is adaptable to the environment could be used as a tool to meet the nutrition and food security needs of a growing population in a way that does not increase vulnerability to climate change and environmental degradation. There is a scarcity of data on indigenous food, and the demand for indigenous food cannot be properly realized or investigated without this crucial data (Mbhenyane *et al.*, 2017). Work done by researchers such as Mbhenyane (2017) suggested that there may be great potential for African food systems and its food security if indigenous plants were studied more extensively and included more often as mainstream foods.

It is clear that further research on indigenous food is imperative, hence increasing awareness on traditional uses and management of indigenous food for food security and sustainability is important (Pitso *et al.*, 2014). This study therefore aimed at collecting data on available indigenous foods in Nigeria, citizen's preference for local foods and factors influencing the production and consumption of local/healthy food.

Study Objectives

1. Determine citizen's knowledge on local food production and consumption
2. Identify citizen's behavioral changes and responses to good local food over the past years.
3. Ascertain citizens' level of awareness of the nutritional values and health benefits of foods.
4. Discover citizens' level of awareness of GMOs and their health, economic and environmental impacts.

2.0 LITERATURE REVIEW

2.1. Food Systems in Nigeria and Africa

Food is any substance that is edible, safe and adds nutritional value to the body. It is one of the most important factors that sustain life. The connection between food and human life is so important that it impacts health, environment, economies and culture. Food systems contributes significantly to the national economy and influence many developmental issues, including hunger, malnutrition, disease, poverty, livelihoods, unemployment, conflict, violence, and climate change. Improving food systems can therefore initiate positive change for multiple challenges. It has also been observed that none of the 17 Sustainable Development Goals (SDGs) will be achieved without improving food systems (Nigeria National Pathways to Food Systems Transformation, 2021).

Africa is a continent endowed with land, fisheries, natural resources and bicultural diversity, all of which are essential assets for a well-functioning food system. Despite this, Africa remains the most food insecure continent. Africa as a continent has huge arable land with small plots per household, but still experiences high rates of malnutrition and deaths especially in cases of conflicts caused by the control of resources or political power. The International Fund for Agriculture Development (IFAD) believes that small-scale farmers can proffer solutions to these problems. But in order to succeed, they need the right tools and that requires a re-orientation of the food systems so that those farmers are given opportunities to thrive, and to be fairly rewarded for the work they do. Small-scale farmers at their core could help build a sustainable food system in the future.

Nigeria, which has over 200 million people is Africa's most populous country as well as its largest national economy, leading oil exporter, and largest food producer, but it is also a major net food importer (World Bank 2021; FAO 2021). It has recently been discovered that 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 behavior (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 *et al.*, 2015).

2.2. Consumers' Right to Food

Food should be safe for human consumption and free from diverse substances, such as contaminants from pesticides, hormones or veterinary drugs. Food should also be culturally acceptable. Some factors that influence acceptability of food by consumers are religious, cultural taboo, ethnic group, family belief, health reasons, physiological acceptability. The right to food is when every individual in a population that makes up a country has physical and economic access at all times to adequate food or means for its procurement. Right to food is to have regular, permanent and free access, either directly or by means of financial purchases, to quantitatively

and qualitatively adequate and sufficient food corresponding to the culture and traditions of the people to which the consumer belongs, and which ensures a physical and mental, individual and collective, fulfilling and dignified life free of fear. FAO, 2006, reported that food must be available, accessible and adequate to ensure that every individual is well fed.

Availability: food should be available from natural sources either through the production of food by cultivating land or by animal husbandry, or through other ways of obtaining food such as: fishing, hunting or gathering. On the other hand, it means that food should be available for sale in markets and shops.

Accessibility: economic and physical access to food must be guaranteed. Economic accessibility means that food must be affordable. Individuals should be able to afford food for an adequate diet without compromising on any other basic needs, such as school fees, medicines, rents. For example, the affordability of food can be guaranteed by ensuring that the minimum wage or social security benefit is sufficient to meet the cost of nutritious food and other basic needs. Physical accessibility means that food should be accessible to all including to the physically vulnerable, such as children, the sick, persons with disability or the elderly, for whom it may be difficult to go out to get food. Access to food must also be guaranteed to people in remote areas, victims of armed conflicts or natural disasters and prisoners.

Adequacy of food: food must satisfy dietary needs, taking into considerations the individual age, living conditions, health, occupation, sex, etc. Six food groups are available in Nigeria, namely staples, animal protein, fats, fruits, vegetables and other foods such as sweets, condiments, spices, beverages etc. The data density which shows the proportion of the total population that consumes a particular food group revealed that staples recorded the highest density of 92.3% while fruits recorded the least density of 26.7%. Furthermore, staples have the highest yearly food expenditure share (35.92%) of all food groups consumed in the country followed by animal protein having yearly expenditure share of 26.46%. Yearly expenditure on vegetables takes 13.18% of all food expenditure and fruits have the lowest food expenditure share of all food groups, taking 0.89%. This implies that staples were the most consumed food group in Nigeria. Households also spent their highest food expenditure on staples. This is not surprising as staples are a main dietary source of food nutrients to households in Nigeria and the country budgeted more than 50% of her food budget on staples annually (Musa *et al.*, 2012; NBS, 2012).

2.3. Determinants of the Food System in Nigeria

Food systems are shaped by the interactions of food supply chains, food environments, and consumer behavior. Many factors are involved along the supply chains, and their involvement may improve nutritional value of food and in some cases reduce nutritional value of food due to losses or contamination (HLPE, 2017). These factors may also affect the food environment; which comprises availability and physical as well as economic access to food, promotion, advertising and information, and food quality and safety (HLPE, 2017). The food environment in turn affects consumer choices and decisions including what food to acquire, store, prepare, cook, and eat. Determinants of food choices include; personal preferences, food prices, income, knowledge and skills, time and equipment, and social cultural norms (HLPE, 2017). Interactions between components of the food systems determine diets quantity, quality, diversity, and safety (Adegboye *et al.*, 2016).

In another way round, the food system operated within is influenced by social, political, economic, and environmental contexts. The economic strength of a household determines the kind of food that would be available to them (Blum *et al.* 2023). Data on food access and

affordability, often measured by macroeconomic indicators of household purchasing power, can mask underlying variations in food allocation within households, stratified by gender, age and social status (Jones *et al.*, 2013; Owoo, 2018 and Fadare *et al.*, 2019). Gender has also been identified as a determinant of food systems in some households. According to Blum *et al.* (2023), men generally focus more on costs and their personal preferences, and less on variety and quality of foods. They also reported that women are more knowledgeable about children's dietary needs and concerned about improving the quality of foods eaten by children. Socio-economic trends are key drivers of the Nigerian food system. Nigeria is facing major challenges with a high population growth, a high number of people living in extreme poverty, rapid urbanization, and stagnating agricultural productivity (Posthumus, 2019). Cultural and other non-economic factors influencing diets are important considerations for intervention design. To transition to healthier diets requires a higher calorie intake, increased consumption of fruits and vegetables (400g per day, according to the World Health Organization, and a higher share of calories from animal-source foods, including dairy (for calcium and B12) (Bizikova *et al.*, 2022).

Culture also determines the type of food systems. What is grown mainly in a particular environment is influenced by the type of food the indigenes are used to. Most of the foods in northern Nigeria are cereal based while those in southern Nigeria are mostly based on roots and tubers (Sibal, 2018). The effects of climate change characterized by long-term drought has a great influence on the food systems. This becomes prominent in Nigeria because most farming activities are rain fed. (Bolarinwa *et al.*, 2021). Food policy is another factor that readily affects the availability and accessibility of food to consumers. It is important to ensure that food policies do not tamper with the consumer's right to food. The effect of policies and regulations on ultimate dietary choices depends on how the policy affects the cost of producing commodities, how those costs relate to final retail prices, how responsive consumers are to price changes, and how the policy directly influences the consumers preference for the product (Mozaffarian *et al.*, 2018).

Urbanization plays a major role in local food consumption. The urban poor are more dependent on food purchases, and the diet of urban people are likely to be more diverse than that of the rural people (Mohiddin *et al.*, 2012). In contrast, urban households tend to consume food away from home and more processed foods than rural households (de Brauw *et al.*, 2018) and hence are more vulnerable to health risks related to consumption of foods high in fats, sugar, and salts (Kengne *et al.*, 2017). The availability of some amenities has also been discovered to influence food consumption. For instance, mobile phone ownership by household heads was associated with a 2.3 -- 2.6% increase in HDDS in contrast to those who did not own one, given other factors according to a research conducted by (Agriculture for Nutrition and Health, 2021). This is because having a mobile phone possibly enhances access to nutrition and other information which may help shape consumer behavior (Barnett *et al.* 2016).

Another factor is electricity. Electricity has multiple uses in homes. In the context of food, it provides energy for cooking and refrigeration facilities that may help increase food shelf life, including cooked and uncooked perishable products. This in turn may help increase food availability at home and hence household dietary diversity. Similarly, having access to improved sources of water and improved sanitation may lead to a better food environment, both at home and outside of home. For example, water can be used for cleaning and keeping food safe and for food preparation, among others. This is likely to improve consumption behavior (e.g. cleanliness

of home food environment may incentivize keeping food stocks and food preparation at home) which in turn may improve household dietary diversity (Spears, 2013).

2.4 Indigenous Food Production and Consumption in Nigeria

Indigenous farming is not just farming practiced by indigenous people; it is the product of indigenous cultures that are deeply connected to particular places. This connection between culture and land shapes indigenous agriculture by creating food growing practices that are adapted to specific, local environments and that work with as opposed to against natural processes (Pace, 2015). In Nigeria there are various traditional foods available depending on the climate or agro-ecological zone. Cereals, starchy roots and tubers are important food groups for the majority of Nigerians because they are rich in energy and carbohydrate and they are available all year. There are over 4,600 plant species identified in Nigeria, 205 of which are endemic (FAO, 1996). People use their own locally generated knowledge to change and improve, for example, natural resource management. The agricultural sector provides a prime example. Farmers adopt a wide range of indigenous agricultural practices based on generations of experience, informal experiments and intimate understanding of their environments. The application of indigenous agricultural farming has reflected in the following: indigenous soil preparation and planting materials, indigenous methods of controlling pests and diseases, indigenous methods of maintaining soil fertility, indigenous methods of controlling weeds, indigenous methods of harvesting and storage (Abioye, 2011).

The lack of engagement with indigenous farmers has been identified as plaguing the country's food security policies (Iwuchukwu *et al.*, 2012). Disregarding indigenous knowledge, existing community food system and local capacity is a major factor of food insecurity in Nigeria (Opata, 2014). Empowering indigenous farmers, who currently account for the production of most of the food in the country, could potentially help in enhancing the nation's food security status. Scholars have argued that Nigeria's food security challenges can be tackled by utilizing indigenous foods (Effiong *et al.*, 2010; Adeolu *et al.*, 2014). The rationale is that indigenous farmers who are responsible for producing most of the food within the country, possess the knowledge needed for the production and harvesting of these foods (Nnamani *et al.*, 2007). Although they do so under challenging circumstances such as uneven rainfall, and difficult security situations, they have been doing so for many generations and there is room for improvement. Most indigenous foods require little input, and adapt favorably in tough conditions (Onyango, *et al.* 2009).

2.5 Types of Local Foods in Different Agro ecological Zones of Nigeria

The country has six distinct agro-ecological zones transiting in south-north direction from the Atlantic coast to the arid savanna of Sahel. These are the Mangrove Swamp, Rainforest, Derived savanna, Guinea savanna, Sudan savanna and Sahel savanna zones. Rainfall is bimodal in the Mangrove and Rainforest and parts of the Derived savanna zones and uni-modal in the Guinea, Sudan and Sahel savannas. Annual rainfall varies from as low as 500 mm per year in the Sahel savanna zone to about 3000 mm in the Mangrove Swamp zone (Tilakasiri, 2017).

Cereals (maize and millet) and legumes (cowpea and groundnut) are often grown in annual double-cropping systems in the Sudan and Guinea savanna zones, whereas sorghum is mainly

grown in single-cropping systems. Typical double cropping systems in these zones include maize-cowpea, millet-maize, millet-cowpea and groundnut-maize. In the wetter regions in the South, maize may be grown in double cropping systems as maize-maize. Intercropping is widely practiced in different parts of Nigeria. In the North, cereals are often intercropped with legumes or with other cereals, whereas maize is usually intercropped with root and tuber crops in the South.

The salt water swamp are areas near the coast which are under the influence of brackish water. They support fishing and the cultivation of swamp rice. Maize and cassava are also grown in drained areas (Tilakasiri, 2017). The freshwater swamp zone is located north of the salt water swamp. The crops supported by the drained areas are maize, cassava, yam and swamp rice (Tilakasiri, 2017). The tropical rain forest region of Nigeria supports staple crops such as millet, cassava, yam, rice as well as highly valued agroforestry trees such as *Adansonia Digitata* (baobab tree), *Parkia clappertoniana* (West African locust bean), *Danielliaoliveri* (African copaiba balsam), and *Vitellaria Paradoxa* (shea butter tree) (Olajuyigbe, 2018),

The rain forests and derived savanna benefit from abundant precipitation and relatively short dry seasons. The staples are root crops, including cassava, yams, taro (*cocoyams*), and sweet potatoes. Tree crops (cacao, oil palm, and rubber) constitutes the area's main commercial produce. Cacao, from which cocoa is made, grows mostly in the southwest. Oil palms (whose kernels can be made into palm wine) predominate in the southeast and are numerous in the south-central area. Rubber stands are common in south-central and southeastern Nigeria (Metz, 1991). Guinea savanna produces staples such as yams, sorghum, millet, cassava, cowpeas, and corn, with rice as an important crop in some places. The middle belt's southern edge represents the lower limits of the northern grain-dominated economy. The most significant commercial crop of the middle belt is sesame (or benniseed) (Metz, 1991) comprising the Sudan savanna and the arid Sahel zone. There, the staples are millet, cowpeas, and a drought-resistant variety of sorghum known as guinea corn. Corn is also cultivated, as well as rice in suitable lowland areas. The north's principal commercial crops are cotton and groundnuts (Metz, 1991).

2.6 Benefits of Local Food Consumption in Nigeria

The term "Local Food" has multiple and sometimes conflicting definitions. In most cases it means that the food was grown in close physical proximity to the consumer (e.g., a few miles from the point of sale, was produced in the same city, or in the same state) (Martinez *et al.*, 2010). The consumption of local foods, produced in ways adapted to the local environment using technologies with an ecological basis, is something beneficial and salutary for the environment, economy and society in general (Coelho *et al.*, 2018)

Freshness: locally grown produce is much fresher than produce that has been shipped in from far away. Fresher produce means it is more flavorful and more nutritious than produce from other countries or states. Local farms allow their fruits and vegetables to ripen fully without having to use chemicals or gas to speed along this process. Eating produce in peak season means you are enjoying these foods when they are the most abundant, which in turn makes them more affordable. Purchasing locally grown vegetables and fruits helps maintain and preserve the green space and farmland in your local community (Lea, 2005). The fewer processes between your producers' source and your plate, the fewer the chances are of

contamination. Farmers who participate in local markets and supply to local restaurants have the demand to be able to grow more food.

Building local economy: buying produce from local farmers and restaurants keeps your money close to home. This works to build the economy in the community instead of a corporation in another state or country. Since the produce travels through fewer hands, more of the money spent actually gets back to those who grew it.

Unity among the locality: Buying locally grown produce and knowing where your food is from unites you to those who grow and raise it. Instead of having a relationship with a corporate supermarket, you develop smaller relationships to multiple food sources. Developing these personal relationships with growers at local farmer's markets can be beneficial. For example, they can personally let you know when your favorite variety of food is available.

Economic growth: Empirical studies suggest that local foods can have a positive impact on local economic activity through import substitution and localization of processing activities. Using an input-output model (Swenson, 2008 and 2009). The expansion of local food markets implies that consumers in a particular area are purchasing more of their food from nearby sources, and that more of the money they spend remains in their local community. Hence, local food systems have the potential to positively impact the local economy.

Healthy food intake: claims of economic development impacts on the form of income and employment growth are common in local foods research. The relationship between local foods and healthy food items, such as fresh fruits and vegetables, has led to claims that local food systems may provide health benefits from improved nutrition, obesity prevention, and a reduced risk of chronic diet-related disease (Martinez, 2010).

Food security: local food characteristics have commonly been associated with efforts to improve food security, particularly at the community level. Food security means that all people at all times have access “to enough food for an active, healthy life,” and is a necessary condition for a nourished and healthy population (Nord *et al.*, 2009).

Cleaner ecosystem: localization of the food system has the potential to reduce transport distances for food, or food miles, reduce fossil fuel energy use, pollution, and GHG emissions (Thompson *et al.*, 2008; Anderson, 2007).

2.7 Hazardous Effects of GMOs

“GMO,” which stands for genetically modified organism, refers to any organism whose DNA has been modified using genetic engineering technology. In the food industry, GM crops have had genes added to them for various reasons, such as improving their growth, nutritional content, sustainability, pest resistance, and ease of farming (Raman, 2020). Scientists can alter the genetic makeup of crops so that they need fewer harmful chemicals and thereby decrease their carbon footprint, to improve taste, nutritional content, and resilience (Barell, 2023). GMOs have serious harmful effects on both humans and the environments (Myers, 2019), few of which are listed below:

Allergic Reactions: There is a risk that GMO foods can trigger allergic reactions, and this happens if the genetic change triggers the production of an allergen. For instance, if scientists

combine a gene from a Brazil nut with a soybean, there is a slight chance that a person with a nut allergy could have an allergic reaction to products made with the soybean. The World Health Organization (WHO) discourages genetic engineers from using DNA from allergens unless they can prove that the gene itself does not cause the problem.

Cancer: there have been concerns that eating GMO foods can contribute to the development of cancer by raising levels of potentially carcinogenic substances in the body. Also, many of the herbicides that some GMOs are designed to withstand have active ingredients which have been linked to hundreds of cancer cases especially in the US.

Antibacterial Resistance: some GMOs contain changes that make them resistant to certain antibiotics. The genes from these plants could enter humans or animals when they eat them. As a result, the person or animal could also develop antibiotic resistance.

Biodiversity Erosion: GMOs thrive in monocultures owing to the specific genetic modification in the plants. This has serious implication on both biological and nutritional diversity. Further, herbicides used along with herbicide tolerant varieties kill not just the target weeds but destroy other beneficial organisms including soil microbes and bees.

2.8 Food Policy in Nigeria

Food security and health monitoring mechanisms need to evolve and adapt, integrating more direct metrics and in more settings, to accurately identify “nutrition hot spots” where policy interventions, including crisis prevention and emergency aid, are most required. In particular, greater monitoring efforts of long-term nutritional trends and food security issues in rapidly growing urban agglomerations are needed. New forms of malnutrition and related health impacts also call for a greater attention to nutrition literacy in the region: public information, education campaigns in favor of greater nutrition awareness and appropriate standards for food packaging are required (OECD, 2021).

According to Okoruwa *et al.* (2021), there should be a national pesticide policy in Nigeria to prohibit the use of banned chemicals and specify approved chemicals and limits of use for the production and storage of food products, especially legume and cereal grains. In addition, the policy should also prohibit the use of hazardous chemicals to harvest and preserve fish as practiced by some artisanal fish farmers and aquaculture farmers.

Food safety remains a major issue in Nigeria and is worsened by lack of public unawareness, lack of adequate food safety training throughout the food supply chain, poor coordination of the food control system, lack of technical expertise, inadequate analytical laboratories, poor enforcement of food safety legislation by regulatory agencies, and an inadequate inspection and surveillance system that too often fails to prevent adulterated food from reaching the marketplace (Ezirigwe 2018; Olalekan *et al.*, 2019; Ukwueze, 2019). Thus, the need to redouble efforts to implement the National Policy on Food Safety and Its Implementation Strategy (NPFSIS) 2014 facilitated in accordance with 2005 FAO/WHO recommendations.

All levels of government should pursue their mandates holistically through the coordinated implementation of food safety policies (especially at the local government level where compliance and monitoring of food safety practices at the grassroot level is key (Okoruwa *et al.*, 2021). The National Assembly should enact into law (Act) the Food Safety and Quality Bill. Without enacting the Bill, the Food Safety Policy itself is a lone document without legal backing for its implementation. The Bill would give legal, budget and enforcement authority to the policy

3.0 METHODS

3.1. Study Location and Population

The study location comprised all the geo-political zones of Nigeria namely, South-east, South-south, Southwest, North-central, North-east and Northwest.

3.1.1. North-central geopolitical zone

This region is also known as the middle belt. The North-central geopolitical zone in Nigeria is a group of states occupying a land area stretching across central Nigeria longitudinally and forming a transition zone between Northern and Southern Nigeria. This region is the seat of Nigeria's Federal capital territory, Abuja, as well as being home to Benue, Kogi, Nassarawa, Kwara, Niger, and Plateau states. Agriculture is the main economic activity in this region, especially in states like Benue, popularly known as the food basket of the nation, Kwara, Nassarawa, and Kogi.

3.1.2. North-east geopolitical zone

The North-east geopolitical zone of Nigeria or the North Eastern part of Nigeria comprises six states, namely, Adamawa, Bauchi, Borno, Gombe, Taraba, and Yobe. Economically, the ethnic/religious centrality also affects the region, as its people are actively involved in livestock and crop production. Member states like Adamawa, Gombe, Yobe, and Bauchi who are abundant producers of guinea corn, rice, millet, asha, beans, maize, etcetera, continuously showcase the agricultural prowess of the people in this region.

3.1.3 North-west geopolitical zone

This region was formed from parts of the old Northern region, and comprises 7 states; Jigawa, Kano, Katsina, Kebbi, Kaduna, Sokoto, and Zamfara. It is the native homeland of the Hausa. The region is also predominantly economically active in agriculture, despite it being quite dry and arid. Zamfara, one of the major agriculturally active states in the region, has the slogan "farming is our pride." There is also an oil refinery in the region of Kaduna.

3.1.4. South-East geopolitical zone

Initially one of the 12 states created during the civil war, South Eastern Nigeria would later break into present day Akwa Ibom and Cross river states. It would eventually become one of the six geopolitical zones in Nigeria comprising 5 States; Anambra, Enugu, Imo, Abia, and Ebonyi. Economically, the region is quite diverse, with crude oil production and agriculture being its major economic activities. Abia, Ebonyi and Imo states are the oil-producing states in the region, but they are also actively involved in agriculture, contributing agricultural products like yam, maize, beans, rice, potatoes, etcetera, to the food barn of the nation.

3.1.5. South-South geopolitical zone

The zone comprises six States – Edo, Delta, Akwa Ibom, Rivers, Bayelsa, Cross River. South-South Nigeria is located strategically at the point where the Y tail of the river Niger joins the Atlantic Ocean through the Gulf of Guinea. It is the economic mainstream of the country, as it is the seat of the country's crude oil deposit. As such, crude oil production is the major economic activity of the region. Akwa Ibom is said to be the highest producer of crude oil in the country with Delta and Rivers States as the major players in crude oil production in the country. Aside from crude oil, there is also a rich mineral deposit in the region, and some states in the region are also actively involved in agriculture.

3.1.6. South-West geopolitical zone

This geopolitical zone comprises six States – Ekiti, Oyo, Osun, Ogun, Lagos, Ondo. South Western Nigeria is the home of the Yoruba speaking people in the country and the region is special for a number of reasons. First, it is the home of the commercial nerve centre of the nation – Lagos state. And also, it is the academic hub of the country. Ekiti state alone is said to have produced the highest number of academicians in the country, while the University of Ibadan, the oldest university in Nigeria – and the University of Lagos are seated in this region. Economically, crude oil production, agriculture, and tourism are the major economic activities in the region. Lagos and Ondo are the crude oil producers in South Western Nigeria, and the former is also actively involved in tourism. Ekiti, Oyo, and Ogun are actively involved in agriculture. when passed into law (Eat Safe, 2022)

The following were highlighted by Nigeria's president at the UNFSS in 2021;

- Supporting private sector investments in food storage and transportation.
- Investment in food security and nutrition knowledge dissemination and information management systems to enhance agricultural productivity.
- Strengthening climate mitigation strategies and early warning systems that will reduce the many stresses and shocks to our food systems.
- Enhancing productivity of smallholder farmers and empowering women and youth for greater access to food production and processing assets and resources.
- Addressing the drivers of food insecurity like food inflation and changing consumption patterns to increase the consumption of nutritious and healthy foods including in humanitarian context.
- Developing a sub-national food systems dashboard, to link research, innovation, and extension for a sustainable food system.

Source: Akpata, *et al.*, 2022.

Nigeria needs to also develop a cohesive food policy that which will bring together the sectoral policies and realign them to build a healthy food environment, promote healthy diets for all, re-balance power in the food system, and to involve a wider range of stakeholders in its design and assessment.

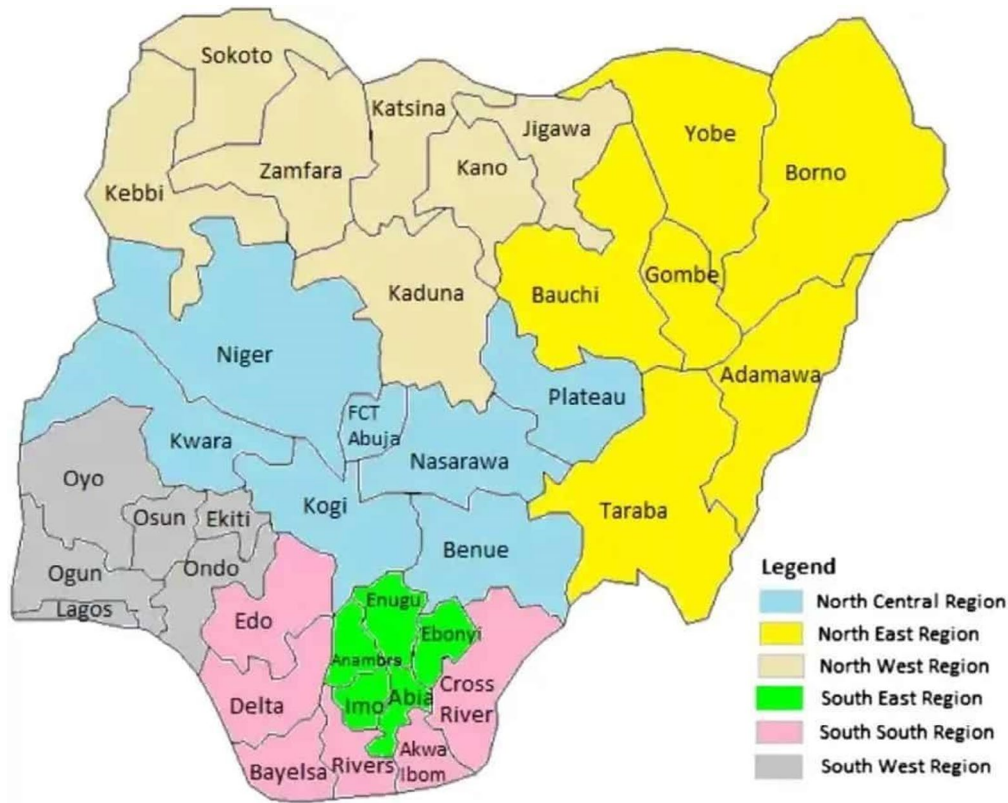


Fig. 1: Map of Nigeria showing different geo-political zones

Study Population: The participants for the study comprised representatives of farmers, consumers, policymakers, journalists, business people and human rights people in the country.

3.2. Research Approach

The study adopted the consumer survey and participatory action research methods to gain first-hand insights into local experiences, using qualitative and quantitative tools (a mixed-method approach). Stakeholders in the six geopolitical zones (North-central, North-east, North-west, South-east, South-south, and South-west) in Nigeria were targeted in the study. A total of two hundred and forty (240) participants were sampled for the study, across the six geo-political zones of Nigeria. The stakeholders, forming the participants of the study, comprised representatives of farmers, consumers, policymakers, journalists, business people, and human rights advocates in the country. The study utilized a structured electronic questionnaire, open to as many consumers as possible in the country, and Key Informant Interview (KII) with strategic stakeholders in each of the geopolitical zones in the country.

The structured questionnaire was the quantitative tool used to elicit information from the participants. It was administered to one hundred and eighty (180) consumers of indigenous foods from different localities across the six geo-political zones, including different stakeholders like farmers, agro-processors, government workers, traders, and students. The KII served as the qualitative tool for data collection from some key stakeholders. The sample for the Key Informant Interview comprised sixty (60) participants, including stakeholders involved in the indigenous food production value chain (input supply, production, processing, marketing, and consumption) across the six geo-political zones.

The questionnaire and interviews elicited information about the habits, preferences, consumption patterns, and culture of the people. First-hand experiences were gathered from the responses of culturally different farmers and consumers concerning locally produced food, challenges encountered when choosing preferred healthy foods and seeds, and other related issues. Data collected through the e-questionnaire were sorted, coded and analysed using the statistical package for the social sciences (SPSS) software. Descriptive analysis of the data was done, including frequency, percentages, mean and weighted scores, to draw conclusions and recommendations for the study.

3.3. Data Collection Technique

Data for the survey were collected on participants' socio-economic characteristics (including their location, sex, religious affiliation, educational background, age range, etc.), knowledge of available indigenous food in their locality, benefits and challenges of consuming indigenous foods, awareness of food rights issues and impact of GMO foods on human health. Suggestions on how to improve production and consumption of indigenous food in Nigeria was also made by participants. Due to movement constraints in Nigeria during the period of the study (February 2023), data collection was done electronically with kobotoolbox for the online questionnaire and Group WhatsApp on a regional basis for the KII.

3.4. Data Analysis

Data collected through e-questionnaire were sorted, coded and analysed using the statistical package for the social sciences (SPSS) software. Descriptive analysis was done including charts, frequency, percentages, means and weighted scores to draw conclusions and recommendations for the study.

4.0 RESULTS AND DISCUSSION

4.1. Socio-Economic Characteristics of Participants

A total of two hundred and forty (participants) were sampled for the study across the six geo political zones of Nigeria. The structured questionnaire sampled 180 consumers of indigenous foods from different localities across the six geo-political zones of Nigeria including different stakeholders like farmers, agro-processors, government workers, traders and students. The Key Informant Interview sampled sixty (60) participants including stakeholders involved in indigenous food production value chain (input supply, production, processing, marketing and consumption) across the six geo political zones of Nigeria.

4.2. Participants' Age

Results from the study as indicated in Fig. 2 revealed that the majority (51%) of the sampled participants were within the age range of 18-40, 39% of them were within the age range of 41-60 while few (10%) of them were above the age of 60. This indicated that most of the sampled participants were youths that could have been more disposed to responding to this kind of structured questionnaire and internet communication responsiveness. This result is in tandem with Ajani (2013) that despite the poor dietary diversity of Nigerians, youths between the age of 30 and 40 years still have better dietary intake.

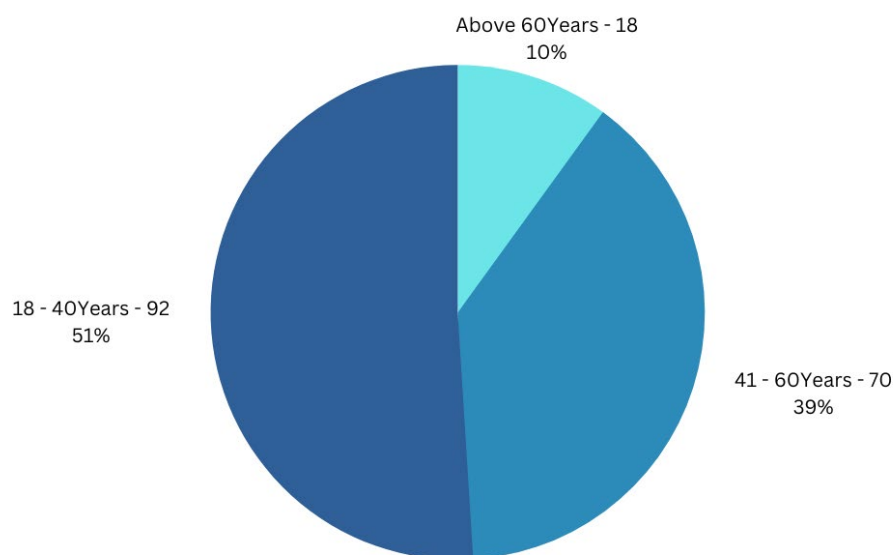


Fig. 2: Participants' Age Category

4.3. Participants' Sex

Results as indicated in Fig. 3 revealed that the majority (52%) of the participants were male while 48% were female. Although the difference is little, this could have resulted from more time available for the male participants to respond to online questionnaires or more exposure or interest of the gender in responding to such issues. Gender has also been identified as a determinant of food systems in some households. According to Blum *et al.* (2023), men generally focus more on costs and their personal preferences, and less on variety and quality of foods. They also reported that women are more knowledgeable about children's dietary needs and concerned about improving the quality of foods eaten by children.

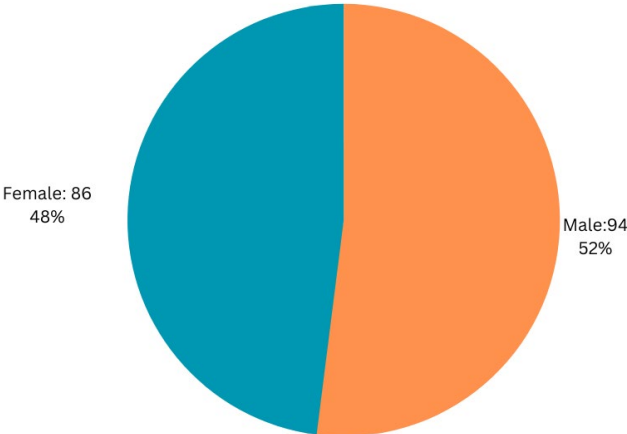


Fig. 3: Participants Sex

4.4. Religion of Participants

The study as revealed in Fig. 4 revealed that the majority (67%) of the sampled participants were Christians, while 33% of them practiced Islamic religion. This may be due to the fact that more participants were from the Southern part of the country with more Christians.

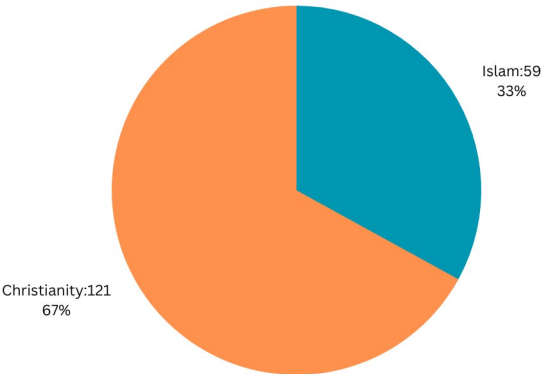


Fig. 4: Religious Affiliation of Participants

4.5. Participants' Marital Status

Results shown in Fig. 5 explains that the majority (71%) of the sampled participants were married, few (27%) of them were single, very few (1.6%) of them were widows, while the minority (0.4%) of the participants were separated. This implied that the majority of the sampled participants had family support which should aid consumption of indigenous foods.

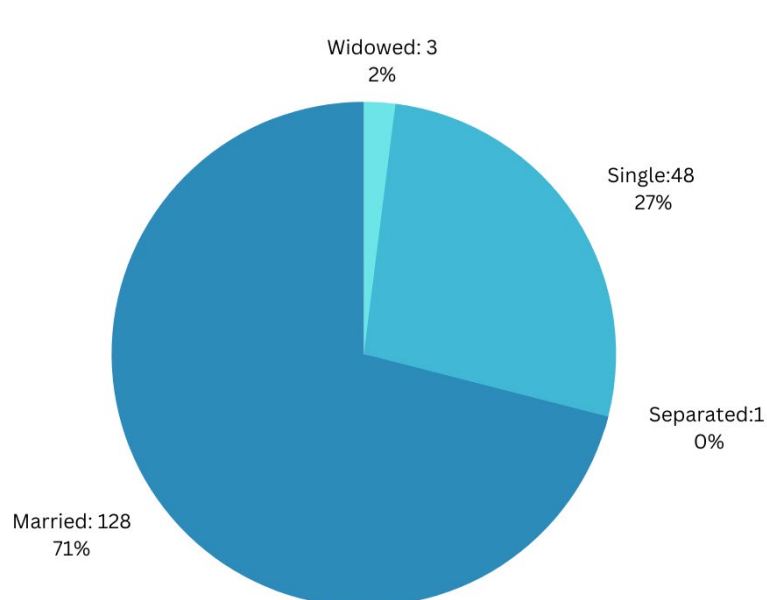


Fig. 5:

Marital Status of Participants

4.6. Participants' Educational Qualification

Results as revealed in Fig. 6 explain that majority (89%) of the sampled participants had tertiary education; few (8%) had secondary education while minority (1%) had primary, vocational and no formal education respectively. This is an indication that most of the participants were learned which should inform their knowledge of indigenous food consumption and the benefits.

4.7. Family Size of Participants

Results indicated that the mean family size of participants was 6.5 which is an indication that the majority of the participants had dependents that could be affected by working decisions on indigenous food in their different localities.

Table 1: Participants' Family Size

Mean	Min.	Max.	Median	Mode	Standard deviation
6.49	1	8	6.00	6.00	4.03

Source: Questionnaire survey, 2023

4.8. Participants' Source of Income

Study revealed that the majority (45.6%) of the sampled participants were involved in other undisclosed businesses, 15.6% of them were government workers, 11.7% were in private organizations while 6.7% of them were self-employed and involved in farming respectively. The study also revealed that some of the participants combined their primary sources of income with farming which is an indication that many of the participants were not just consumers of indigenous foods but also producers. Results from another similar study by Allen et al, 2018 also revealed that farming generates 35% of regional GDP and almost 100 million West Africans, or 2 out of 3 people employed, depend on it for their livelihoods.

Table 2: Participants' Sources of income

Source of income	Frequency	Percentage
Artisan	2	1.2
Farming	12	6.7
Government worker	28	15.6
Government worker +Farming	6	3.3
Others	82	45.6
Private Organization	21	11.7
Private Organization + Farming	2	1.2
Self Employed	12	6.7
Self Employed + Farming	4	2.2
Trading/Business	5	2.8
Trading/Business + Farming	4	2.3
Private Organization + Farming	2	1.2
Total	180	100.0

Source: Questionnaire Survey, 2023

4.9. Participants' Farm Size (in acres)

The study identified that the average farm size of farmer participants was 1.67 acres. This indicates that the majority of those involved in production of indigenous foods are smallholder farmers.

Table 3: Participants Farm Size in Acres

Mean	Min.	Max.	Median	Mode	Standard deviation
1.67	0.5	3	2.00	2.00	0.58

4.10. Participants' Average Monthly Income

It was also revealed from the study that the average monthly income of participants was N128,809.86. This implies that the majority of the participants had high purchasing power for consuming indigenous foods in their localities, if cost was the limiting factor to others.

Table 4: Average Monthly Income of Participants

Mean	Min.	Max.	Median	Mode	Standard deviation
128809.86	23	1,000,000	77500.00	150000.00	152133.84

Source: Questionnaire Survey, 2023

4.11. Types of Indigenous Foods Found in Different Regions of Nigeria

4.11.1 Fruits and Leafy Vegetables

Results from the Questionnaire survey (Table 5) shows the various indigenous foods found in the different geo-political zones of Nigeria according to different classes of food (Fruits and leafy vegetables, Grains and Cereals, Roots and Tubers, Insects/Wild collections, Animals/Livestock, Sea foods/Aquaculture and Spices). The summary of the total number of indigenous food types indicated by participants in Tables 6 and 7 shows that 31 fruits and leafy vegetables were indicated from the South-West region (25 from questionnaire survey, additional 6 from Key Informant investigation (KII), 23 from the South-South region (9 from questionnaire, 14 from KII), 11 from the South-Eastern region (9 from questionnaire, additional 2 from KII), 6 from the North Central region (5 from questionnaire, additional 1 from KII), 13 from the North-East (5 from questionnaire survey, additional 8 from KII) while 12 fruits and leafy vegetables were indicated from the North-West region (6 from questionnaire survey, additional 6 from KII).

This is an indication that participants had more knowledge of indigenous fruits and leafy vegetables than other food classes probably because they were more readily available and affordable in their different localities. It was also discovered that some vegetable types could be found in different zones of the country with similar or varying climatic conditions. This implies that staples were the most consumed food group in Nigeria. Musa *et al.*, 2012 also confirmed that households spend their highest food expenditure on staples; they are a main dietary source of food nutrients to households in Nigeria and the country budgeted more than 50% of her food budget on staples annually.

The available indigenous fruits and leafy vegetables found in the different geo-political zones of Nigeria as revealed from Table 5 indicated that those found in the SouthWestern region included; African Mango (*Irvingiaga bonensis*), Water leaf (*Talinum fruticosum*), Pawpaw (*Carica papaya*), Oranges (*Citrus sinensis*), Yanrin (Wild lettuce), Gbagba (garden egg leaf soup), Isin (ackee apple fruit), Jute

leaf (*corchorusolitorus*), Moringa leaf (*Moringa oleifera*), *Ebolo* (Fire weed), Spinach (*Basella alba* L.), *EfoOdu* (*Solanum nigrum*), Garden eggs (*Solanum melongena*), *Ube* (African Pear), *Elegede* (Snake Tomatoes), Water leaf (*Talinum Fruticosum*), *Worowo* (*Senecio biafrae*), *Efo Osun* (*Solanum sp*), African Cherry/African Star apple (*chrysophyllumalbidium*), *Feregede*(African yam bean), *Tete abalaye* (*Amaranthus viridis*), *Iyana ipaja* (Tree spinach) (*jatropha tanjorensis*) and *Iyeye*(hog plums)

Some other fruits and leafy vegetables available in the SouthWestern region of Nigeria as indicated by Key Informant Investigation (Table 7) included; African eggplant leaf (*efoigbo*), okra (*abelmoschus esculentus*), Black nightshade (*Odu*), lime, tangerine, *efoolowonjeja* among others.

Fruits and leafy vegetables available in the South South region of the country as revealed in Table 5 included;*Udara* (African star apple), Pumpkin leaf (*Telfairia occidentalis*), Bitter leaf (*Veronia amygdalina*), Sorrel leaf (*Rumex acetosa*), Water leaf (*Talinum Fruticosum*), *Editan soup* (Bush apple soup), *OfeNsala* (White soup), *Ukwa* (Breadfruit) and Mushrooms (*Agaricus bisporus*).

Some other fruits and leafy vegetables available in the South-South region of Nigeria as identified by Key Informant Investigation (Table 7) included; Basil. *Okapi*. *Uzizya*(West African Black pepper) Green, *kerekere*(Beef Trachea) *Utazi*(*Gongronema Latifolium*), Capricot, black pear, *ékóm* (*Coula edulis*) ,star apple, red apple, *átam*leaf (*bush apples*), *édítan* leaf (*Lasiantheraaficana*)

Available fruits and leafy vegetables from the South Eastern region of Nigeria as indicated in Table 5 included Afang soup (wild spinach soup), Pumpkin leaf (*Telfairia occidentalis*), *Edikaikong soup*(ugwu and Water leaf soup), *Ogbono soup* (African Mango seed soup), *Onugbu* (Bitterleaf soup), *Utazi*(*Gongronema Latifolium*) *Atama soup* (Bush Apple leaf soup) , Oha leaf (*pterocarpus mildbraedii*) and *Afia eferebot* (white soup).

Other fruits and leafy vegetables revealed from the KII included *Ugbogwuru*(fluted pumpkin) and Ariria.

From the North Central region, available fruits and leafy vegetables as shown in Table 5 were GUAVA (*Psidium guajava*), Date Palm (*Phoenix dactylifera*), Moringa leaf (*Moringa oleifera*), Mint leaves (*Na'a Naa*) and Cucumber (*cucumis sativus*). Other vegetables found in the region as revealed in Table 7 included; African Mango, Cashew, pawpaw, *Ugwu* (pumpkin leaves), Waterleaf and bitter leaf.

From the North –Eastern region of Nigeria, available indigenous fruits and leafy vegetables as indicated on Table 5 included; Dates (*Phoenix dactylifera*), *Ndiya* (*Cola lepidota k. schum*), Melon (*cucumis melo*), Sorrel leaf (*Yakwa*) and Carrot (*D. carota*) while other vegetables in the region as revealed from the KII (Table 7) included; Dates (*Dabino or Dabinu*), Fluted Pumpkin Leaves (kabewa), Bell pepper (Barkono) and Moringa (*Zogale*).

Indigenous fruits and leafy vegetables available in the North West as indicated in Table 5 included; Carrot (*Daucus carota*), Dates (*Phoenix dactylifera*), Parsley (*Lansil*), Cabbage (*Brassica oleracea*), African Spinach and Carrot (*D. carota*). Other vegetables in the region as indicated on Table 7 included; Mango, banana, guava, and pawpaw (*carica papaya*), tomato, onion, carrot, *hibiscus sabdariffa* (sobo).

4.11.2. Grains and Cereals

As indicated in Tables 6 and 7, sixteen (16) types of grains and cereals were indicated from the South-West region (11 from questionnaire survey, additional 5 from Key Informant investigation (KII), 6 from the South-South region (5 from questionnaire, 1 from KII), 5 from the South-Eastern region (3 from questionnaire, additional 2 from KII), 13 from the North Central region (11 from questionnaire, additional 2 from KII), 11 from the North-East (10 from questionnaire survey, additional 1 from KII) while 12 were indicated from the North-West region (11 from questionnaire survey, additional 1 from KII).

Available indigenous grains and cereals from the South-West zone of Nigeria included *Ofada* rice (Unpolished rice), Maize (*Zea mays*), soybeans (*Glycine max*), *Otili* (Pigeon peas), *Ekuru* (beans pudding), *Gbegiri* (beans soup), Eko/Ogi (Pap), *Moinmoin* (steamed beans pudding), akara (bean cake), *Fiofio* (Cowpeas) and Cocoa (*theobroma cacao*). Some other indigenous grains and cereals indicated on Table 7 included: Sorghum, Millet, Wheat, Corn and local beans (*feregede*).

Participants from the South-South region indicated that *kulikuli* (groundnut cake), Maize (*Zea mays*), *Icheku* (Black velvet tamarind), Roasted groundnut and Roasted ukwa were the indigenous grains and cereals available in the region. Some other ones available as indicated in Table 7 included Corn.

In the South-East, available indigenous grains and cereals included Garri (Cassava grain), Millet and *Ukwa* (African breadfruit). Other cereals that could be found in the region (Table 7) included; *fiofio* (Pigeon beans) and *odudu* (black cowpea).

From the North Central region, available grains and cereals as shown in Table 5 were *Hatsi* (Millet), *Sorghum bicolor*, *Masa* (maize dough), *Tuwon* (cooked cornmeal), Yan caca, Wheat (*Triticumaestivum*), *Kununtsamiya* (Tamarind Pap), *Gyada* (Ground nut), *Gurjiya* (Bambara nut), Guinea corn and *Dan nake* (bean flour dumplings). Other grains and cereals found in the region as revealed in Table 7 included; Maize, Rice and Millet.

From the North –Eastern region of Nigeria, available grains and cereals as indicated on Table 5 included; *Durra* (*Sorghum bicolor*), *Dambu* (Couscous), *Alkubus* (steam bread), *Burabusko* (Couscous), *Wake da shinkafa* (Rice and beans), *Tubani* (steamed black-eyed peas' pudding), *Gurasa* (Bread), *Acha* (Fonio Millet), *Pakala* (Wild beans) and *sinasir* (Rice pancake). Other available grains and cereals in the region as revealed from the KII (Table 7) included; Guinea Corn.

Grains and cereals available in the North West region as indicated in Table 5 included; *Yar tsala* (Millet cake), *Gyada* (Ground nut), *Tamba* (Finger millet) and Sesame. Other cereals in the region as indicated on Table 7 included Sorghum.

4.11.3 Roots and Tubers

As indicated in Tables 6 and 7, nine (9) types of roots and tubers were indicated from the South-West region (8 from questionnaire survey, additional 1 from Key Informant investigation (KII), 8 from the South-South region (3 from questionnaire, 5 from KII), 6 from the South-Eastern region (4 from questionnaire, additional 2 from KII), 9 from the North Central region (6 from

questionnaire, additional 3 from KII), 6 from the North-East (5 from questionnaire survey, additional 1 from KII) while 6 were indicated from the North-West region (5 from questionnaire survey, additional 1 from KII).

Available roots and tubers from the South-West zone of Nigeria included *Amala* (Yam flour swallow), Cassava (*Manihot esculenta*), Sweet Potato (*Anamo*), *Iyan* (Pounded yam), cocoyam (*Xanthosoma sagittifolium*), Esuru (bitter yam), Edible cassava (*Manihot esculenta*) and Water yam (*Dioscorea alata*). Some other indigenous roots and tubers indicated on Table 7 included Yellow yam (*Dioscorea cayenensis*).

Participants from the South-South region indicated that Garri (Cassava granule), *Ekpang Nkukwo* (Coco-yam pottage) and Akpu (cassava flour swallow) were the indigenous roots and tubers available in the region. Some other ones available as indicated in Table 7 included Cocoyam (*Xanthosoma sagittifolium*), cassava (*Manihot esculenta*), Yam (*Dioscorea polystachya*), water yam (*Dioscorea alata*).

In the South-East, available indigenous roots and tubers included; *Cassava flour* (Starch), *Tofu* (bean curd), *Abacha* (African Salad) and tapioca (fermented cassava starch). Other indigenous roots and tubers that could be found in the region (Table 7) included; *Ji* (yam pepper soup), *akpu* (pounded fermented cassava), *adu* (Ginger), *ona* (bitter yam) and Potatoes (*Solanum tuberosum*).

From the North Central region, available roots and tubers as shown in Table 5 were sweetpotato, mandako, fate fate, arrow roots (*Maranta arundinacea*), beetroot and yam (*Dioscorea polystachya*). Other roots and tubers found in the region as revealed in Table 7 included Cassava (*Manihot esculenta*).

From the North –Eastern region of Nigeria, available roots and tubers as shown on Table 5 included; *Gwate* (porridge), makani or gwaz (coco-yam), asa iya, Irish potato (*Solanum tuberosum*) and *adu* (Aerial yam). Other available roots and tubers in the region as revealed from the KII (Table 7) included sweetpotato (*Ipomoea batatas*).

Roots and Tubers available in the North West region as indicated in Table 5 included; *funkaso* (savory fried dumpling), doya (yam), *dankalin turawa* (potato), mandako and *sakwara* (pounded yam). Other roots and tubers in the region as indicated on Table 7 included Irish potato.

4.11.4. Insects and Wild Collections

A total of nineteen (19) types of indigenous insects and wild collections were listed from the South-West region (13 from questionnaire survey, additional 6 from Key Informant investigation (KII), 14 from the South-South region (11 from questionnaire, 3 from KII), 13 from the South-Eastern region (9 from questionnaire, additional 4 from KII), 10 from the North Central region (5 from questionnaire, additional 5 from KII), 4 from the North-East (3 from questionnaire survey, additional 1 from KII) while 8 were indicated from the North-West region (3 from questionnaire survey, additional 5 from KII).

Available indigenous insects and wild collections from the South-West zone of Nigeria are Grasshoppers, *Esunsun* (winged termite), Bees, Butterfly, Edible maggots, Aphids, *Agidimo* (Rhinoceros Beetles), Edible Ants, *Kòkòròṣẹṣẹ* {caterpillar}, Army worms, Snail, House fly and *Monimoni* (Rhino beetle). Some other indigenous insects and wild collections indicated on Table 7 included; Edible millipede (*moni-moni*), Maggot (*ogongo*), *Ire* (cricket), Rhino beetle (*Ògídímò*), Weevils and Stem borers.

Participants from the South-South region indicated that Black velvet, Rhino beetle, Crab, Edible maggots, Sunfly, Bug, Rodents aphid, Mutton, Moths, Ladybugs and Red ants were the indigenous insects and wild collections available in the region. Some other ones available as indicated in Table 7 included Beetle, grasshopper and honey bees.

In the South-East, available indigenous insects and wild collections included; Bees, Crickets, Giant grasshopper, Weevils, praying mantis, butterfly, Cockroach and *Erurungwo* (Edible maggots). Other indigenous insects and wild collections that could be found in the region (Table 7) included; *wiwi*, *ikpukpeaku* (edible winged termite).

From the North Central region, available indigenous insects and wild collections as shown in Table 5 were Winged Termite, Spiders, Blow flies, Edible Maggot and *Isha*. Other indigenous insects and wild collections found in the region as revealed in Table 7 included cricket and grasshoppers .

From the North –Eastern region of Nigeria, available indigenous insects and wild collections as shown on Table 5 included; Kuda, Caterpillar and Scorpion. Other available indigenous insects and wild collections in the region as revealed from the KII (Table 7) included Blattodea, Cockroach, *diplura diplurans*, *collembola*, springtails e.t.c.

Indigenous insects and wild collections available in the North West region as indicated in Table 5 included; Grasshoppers, *Tsanya* (Crickets) and Earthworms. Other indigenous insects and wild collections in the region as indicated on Table 7 included Cricket, Grasshopper, Millipede, Centipede and Bees.

4.11.5 Animals and Livestock

Participants from the South West region identified ten (10) types of indigenous animals and livestock (7 from questionnaire survey, additional 1 from Key Informant investigation (KII), 13 from the South-South region (2 from questionnaire, 11 from KII), 5 from the South-Eastern region (4 from questionnaire, additional 1 from KII), 9 from the North Central region (3 from questionnaire, additional 6 from KII), 3 from the North-East (2 from questionnaire survey, additional 1 from KII) while 7 were indicated from the North-West region (3 from questionnaire survey, additional 4 from KII).

Available indigenous animals and livestock from the South-West zone of Nigeria included local Goat, Local Chicken, Rabbit, *Ekun* (Tiger), *Amotekun* (Cheetah), Grass cutter, Beetle, Birds and Pig. Some other indigenous animals and livestock as revealed on Table 7 included; Squirrel, Goat (West African Dwarf) and Sheep (West African Dwarf).

Participants from the South-South region indicated that Monkeys and Squirrels were the indigenous animals and livestock available in the region. Some other available animals and

livestock as indicated in Table 7 included Poultry, Goats, Sheep, Dogs, Grass cutter, Bush Pig, Guinea Fowl, Dove, Antelope, Rabbits, Deer and Snail.

In the South-East, available indigenous animals and livestock included; Snake, Grasscutters, Dogs and rats. Other indigenous animals and livestock that could be found in the region (Table 7) included; *okukoigbo* (native chicken).

From the North Central region, available animals and livestock as shown in Table 5 were Elephant, Frog and Lizards. Other animals and livestock found in the region as revealed in Table 7 included Goat, Sheep, Dog, Cow and Local chicken.

Animals and livestock available in the North–Eastern region of Nigeria (Table 5) included; Cow and rabbits. Other available animals and livestock in the region as revealed from the KII (Table 7) included cow and horse.

Indigenous animals and livestock available in the North West region as indicated in Table 5 included; *Burabusko*, zebra and gorilla. Other animals and livestock in the region as indicated on Table 7 included reindeer, horses and bison.

4.11.6 Sea Foods and Aquaculture

Fifteen (15) examples of indigenous sea foods were identified from the South-West region (6 from questionnaire survey, additional 9 from Key Informant investigation (KII), 14 from the South-South region (5 from questionnaire, 9 from KII), 11 from the South-Eastern region (6 from questionnaire, additional 5 from KII), 5 from the North Central region (3 from questionnaire, additional 2 from KII), 4 from the North-East (3 from questionnaire survey, additional 1 from KII) while 4 were indicated from the North-West region (2 from questionnaire survey, additional 2 from KII).

Available indigenous sea foods from the South-West zone of Nigeria are Fish, Frog, Crab, Snails and Toad. Some other indigenous sea foods indicated on Table 7 included; *Clearaspp. niloticus*, *heterobrochus*, Tilapia spp, catfish (*Ejaaro*), crayfish, caranx (*Owere*), mullet (*Atoko*), *Ethmalosa (Efolo)*, *wesafu*.

Sea foods available in the South-South region as shown in Table 5 included sardines, crayfish, catfish and Periwinkle. Some other ones available as indicated in Table 7 are oyster, crabs, tilapia, eel electric fish, alligator, crocodile and python.

In the South-East, available indigenous sea foods include; prawns, lobster, crab, catfish, molusca and stock fish. Other indigenous sea foods that could be found in the region (Table 7) includes; *azu* (Fresh African knife fish), *nsiko* (crab), *apupa*, *okpo* (stock fish) and catfish

From the North Central region, available indigenous sea foods as shown in Table 5 were fish, water snails and Mackerel. Other indigenous sea foods found in the region as revealed in Table 7 include crab.

From the North –Eastern region of Nigeria, available sea foods as shown on Table 5 included; Catfish, Toad and Tortoise.

Indigenous sea foods available in the North West region as indicated in Table 5 included; crayfish and catfish. Other indigenous sea foods in the region as indicated on Table 7 included Fish, crabs.

4.11.7 Spices and Tree barks

About sixteen (16) types of spices and tree barks were identified by participants from the South-West region (9 from questionnaire survey, additional 7 from Key Informant investigation (KII), 10 from the South-South region (5 from questionnaire, 4 from KII), 7 from the South-Eastern region (4 from questionnaire, additional 3 from KII), 8 from the North Central region (5 from questionnaire, additional 3 from KII), 5 from the North-East (4 from questionnaire survey, additional 1 from KII) while 8 were indicated from the North-West region (5 from questionnaire survey, additional 3 from KII).

Available indigenous spices and tree barks from the South-West zone of Nigeria are curry, ginger, pepper, turmeric, locust beans, thyme, garlic, scent leaf and cinnamon. Some other indigenous spices and tree barks indicated on Table 7 included; spring onion, onion, mango bark, cashew bark, kolanut and bitter gourd leaf (*ejirin*).

Spices and tree barks available in the South-South region as shown in Table 5 included *ogiri*(Locust beans), ehuru, scent leaf, curry and thyme. Some other spices available as indicated in Table 7 are *uda*(*Negro pepper*), *uzi*(*West African Black pepper*) *Utazi*(*Gongronema latifolium*) and pawpaw root.

In the South-East, available indigenous spices and tree barks included; Cinnamon, Cloves, Rosemary, curry and Bay leaf. Other indigenous spices that could be found in the region (Table 7) included; *uzi* (West African black pepper), *Ehuru*(African nut meg) and *uda* (*Negro pepper*).

From the North Central region, available indigenous spices and tree barks as shown in Table 5 were *Beletete* (Bush apple leaf), kolanut barks, *tibini*, garlic and ginger. Other indigenous spices and tree barks found in the region as revealed in Table 7 included; Chilly pepper, Ginger and Turmeric.

From the North –Eastern region of Nigeria, available indigenous spices and tree barks as shown on Table 5 included; *kanya* (Jackal berry), *dorama*(West African locust bean tree), *kurna* (*Ziziphus*) and *goruba* (Doum palm). Other available spices in the region as revealed from the KII (Table 7) included ginger and spring onion.

Indigenous spices and tree barks available in the North West region as indicated in Table 5 included; tobacco, kolanut, turmeric, spring onion and baobab. Other spices in the region as indicated on Table 7 included *tuwondawa* (Ground guinea corn), (baobab leaf soup) and locally made couscous.

Table 5: Indigenous Food Types Found in Different Regions of Nigeria

S/N	List of available Indigenous food(s)	Southwest	South-south	South-East	North Central	North East	North West
1	Fruit and Leafy Vegetables	African Mango (<i>Iringia gabonensis</i>)	<i>Udara</i> (African star apple)	Afang soup (wild spinach soup)	GUAVA (<i>Psidium guajava</i>)	Dates (<i>Phoenix dactylifera</i>)	Carrot (<i>Daucus carota</i>)
		Water leaf (<i>Talinum fruticosum</i>)	Pumpkin leaf (<i>Telfairia occidentalis</i>)	Pumpkin leaf (<i>Telfairia occidentalis</i>)	Date Palm (<i>Phoenix dactylifera</i>)	<i>Ndya</i> (<i>Cola lepidota</i> & <i>schum</i>)	Dates (<i>Phoenix dactylifera</i>)
		Pawpaw (<i>Carica papaya</i>)	Bitter leaf (<i>Veronia amygdalina</i>)	<i>Edikaikong soup</i> (ugwu and Water leaf soup)	Moringa leaf (<i>Moringa oleifera</i>)	Melon (<i>cucumis melo</i>)	Parsley (<i>Lansil</i>)
		Oranges (<i>Citrus sinensis</i>)	Sorrel leaf (<i>Rumex acetosa</i>)	<i>Ogbono soup</i> (African Mango seed soup)	Mint leaves (<i>Na'a Na'a</i>)	Sorrel leaf (<i>Yakwa</i>)	Cabbage (<i>Brassica oleracea</i>)
		<i>Yanrin</i> (Wild lettuce)	Water leaf (<i>Talinum Fruticosum</i>)	<i>Omugbu</i> (Bitterleaf soup)	Cucumber (<i>cucumis sativus</i>)	Carrot (<i>D. carota</i>)	African Spinach
		<i>Ghagha</i> (garden egg leaf soup)	<i>Editan soup</i> (Bush apple soup)	<i>Utazi</i> (<i>Gongronema Latifolium</i>)			Carrot (<i>D. carota</i>)
		<i>Isin</i> (ackee apple fruit)	<i>OjeNsala</i> (White soup)	<i>Atama soup</i> (Bush Apple leaf soup)			
		Jute leaf (<i>corchorusolitorius</i>)	<i>Ukwa</i> (Breadfruit)	<i>Oha leaf</i> (<i>pterocarpus mildbraedii</i>)			
		Moringa leaf (<i>Moringa oleifera</i>)	Mushrooms (<i>Agaricus bisporus</i>)	<i>Afia ejerebot</i> (white soup)			
		<i>Ebobo</i> (Fire weed)					

Source: Questionnaire Survey, 2023

Table 5: Indigenous Food Types Found in Different Regions of Nigeria Cont.

S/N	List of available Indigenous food(s)	Southwest	South-south	South-East	North Central	North East	North West
		Spinach ((<i>Basella alba L.</i>)					
		<i>Odu</i> (<i>Solanum nigrum</i>)					
		Garden eggs (<i>Solanum melongena</i>)					
		<i>Ube</i> (African Pear)					
		<i>Elegede</i> (Snake Tomatoes)					
		Water leaf (<i>Talinum Fruticosum</i>)					
		<i>Worowo</i> (<i>Senecio biafrae</i>)					
		<i>Efo Osun</i> (<i>Solanum sp</i>)					
		African Cherry/ African Star apple (<i>chrysophyllum albidium</i>)					
		<i>Feregede</i> (African yam bean)					
		<i>Tete abalaye</i> (<i>Amaranthus viridis</i>)					
		<i>Iyana ipaja</i> (Tree spinach) (<i>Jatropha tanjorensis</i>)					
		<i>Iyeye</i> (hog plums)					
		Shea butter					
		Mushrooms					

Source: Questionnaire Survey, 2023

Table 5: Indigenous Food Types Found in Different Regions of Nigeria Cont.

S/N	List of available Indigenous food(s)	Southwest	South-south	South-East	North Central	North East	North West
2	Grains and Cereals	<i>Ojada</i> rice Unpolished rice)	<i>Ichekeu</i> (Black velvet tamarind)	Garri (Cassava grain)	<i>Hatsi</i> (Millet)	<i>Durra</i> (<i>Sorghum bicolor</i>)	<i>onalkama</i> (wheat swallow)
	Maize (<i>Zea mays</i>)	<i>Kulikalii</i> (groundnut cake)	Millet	<i>Sorghum bicolor</i>	<i>Dambu</i> (Couscous)	<i>Gurasa</i> (local bread)	
	soybeans (<i>Glycine max</i>)	Maize (<i>Zea mays</i>)	<i>Ukwa</i> (African breadfruit)	<i>Masa</i> (maize dough)	<i>Alkubus</i> (steam bread)	<i>Masa</i> (maize dough)	
	<i>Otili</i> (Pigeon peas)	Roasted groundnut		<i>Timvon</i> (cooked cornmeal)	<i>Burabusko</i> (Couscous)	<i>Damwake</i> (bean flour Dumplings)	
	<i>Ekuru</i> (beans pudding)	Roasted ukwa		Yan caca	<i>Wake da shinkafa</i> (Rice and beans)	<i>Wainarshinkeafa</i> (Rice dough)	
	<i>Gbegiri</i> (beans soup)			Wheat (<i>Triticum aestivum</i>)	<i>Tubani</i> (steamed black-eyed peas' pudding)	<i>Yar tsala</i> (Millet cake)	
	Eko/Ogi (Pap)			<i>Kmuntsamiya</i> (Tamarind Pap)	Gurasa (Bread)	<i>Gyada</i> (Ground nut)	
	<i>Moinmoin</i> (steamed beans pudding)			<i>Gyada</i> (Ground nut)	<i>Acha</i> (Fonio Millet)	<i>Tamba</i> (Finger millet)	
	akara (bean cake)			<i>Gurjiya</i> (Bambara nut)	<i>Pakala</i> (Wild beans)	Sesame	
	<i>Fiofio</i> (Cowpeas)			Guinea corn	<i>sinasir</i> (Rice pancake)	<i>Pate</i> (Pie)	
	Cocoa (<i>theobroma cacao</i>)			<i>Dan wake</i> (bean flour dumplings)		<i>Pakala</i> (Wild beans)	

Source: Questionnaire survey, 2023

Table 5: Indigenous Food Types Found in Different Regions of Nigeria Cont.

S/N	List of available Indigenous food(s)	Southwest	South-south	South-East	North Central	North East	North West
3	Roots and Tubers	<i>Amala</i> (Yam flour swallow)	Garri(Cassava granule)	<i>fufu</i> (Starch)	Sweet potato	<i>Gwate</i> (porridge)	Mandako
		Cassava,	Akpu (cassava flour swallow)	<i>Tofu</i> (bean curd)	Mandako	Makani or Gwaz (coco-yam)	<i>funkaso</i> (savoury fried dumpling)
		Sweet Potato	<i>Ekpang/Nkukwo</i> (Coco-yam pottage)	<i>Abacha</i> (African Salad)	Fate fate	Asa iya	<i>Danalin Turawa</i> (Potato)
		<i>Iyan</i> (Pounded yam)		tapioca (extracted cassava starch)	Arrow roots (<i>Maranta arundinacea</i>)	Irish potato	Doya (Yam)
		Cocoyam			Beet root	<i>Adu</i> (Aerial yam)	<i>Sakwura</i> (pounded yam)
		Esuru (bitter yam)			Yam		
		Edible cassava					
		Water yam					

Source: Questionnaire Survey, 2023

Table 5: Indigenous Food Types Found in Different Regions of Nigeria Cont.

S/N	List of available Indigenous food(s)	Southwest	South-south	South-East	North Central	North East	North West
4	Insects/ Wild collections	Grasshopper	Black velvet	Bee	Winged Termite	Kuda	Grasshoppers
		<i>Esmusun</i> (winged termite)	Rhino beetle	Crickets	Spiders	Caterpillar	<i>Tsanya</i> (Crickets)
		<i>Monimoni</i> (Rhino beetle)	Crab	Giant grasshopper	Blow flies	Scorpion	Earthworms
		Bees	Edible maggots	Weevils	Edible Maggot		
		Butterfly	Sunfly	praying mantis,	<i>Isha</i>		
		Edible maggots	Bug	Butterfly			
		Aphids	Rodents aphid	Cockroach			
		<i>Agidimo</i> (Rhinoceros Beetles)	Mutton	<i>Erurungwa</i> (Edible maggots)			
		Edible Ants	Moths	Blow flies			
		<i>Kokoripelepe</i> {caterpillar}	Ladybugs				
		Army worms	Red ants				
		House fly					
		Snail					

Source: Questionnaire Survey, 2023

Table 5: Indigenous Food Types Found in Different Regions of Nigeria Cont.

S/N	List of available Indigenous food(s)	Southwest	South-south	South-East	North Central	North East	North West
5	Animals/ Livestock	Goat	Squirrels	Snake	Elephant	<i>Fura de nono</i> (fermented from cow)	<i>Burabusko</i>
		Local Chicken	Monkeys	Rats	Frog	<i>Zomo</i> (rabbit)	Zebra
		Rabbit		Grasscutters	Lizards		Gorilla
		<i>Ekun</i> (Tiger), <i>Amotekun</i> (Cheetah)		Dogs			
		Grass cutter					
		Beetle, birds					
		Pig					

Source: Questionnaire Survey, 2023

Table 5: Indigenous Food Types Found in Different Regions of Nigeria Cont.

S/N	List of available Indigenous food(s)	Southwest	South-south	South-East	North Central	North East	North West
6	Sea Foods/ Aquaculture	Fish	Saldines	Prawns	Fish	Catfish	Crayfish
		Frog	Crayfish	Lobster	Water snails	Toad	Catfish
		Crab	Catfish	Crab	Mackerel	Tortoise	
		Snails	Oyster	Catfish			
		Toad	Periwinkle	Mollusca			
		Crayfish		Stock fish			
7	Spices and Tree barks	Curry	<i>Ogiri</i> (Locust beans)	Cinnamon	<i>Beletete</i> (Bush Apple leaf)	<i>Kanya</i> (Jackalberry)	Tobacco
		Ginger	Ehuru	Cloves	Kolanut barks	<i>Dorawa</i> (West African locust bean tree)	Kolanut
		Pepper	Scent leaf	Rosemary	<i>Tibini</i>	<i>Kurna</i> (<i>Zziphus</i>)	Turmeric
		Turmeric	Curry	Bay leaf	Garlic	<i>Goruba</i> (Doum Palm)	Spring onion
		Locust beans	Thyme		Ginger		Baobab
		Thyme					
		Garlic					
		Scent leaf					
		Cinnamon					

Source: Questionnaire Survey, 2023

Table 6: Summary of Listed Indigenous Foods in Different Geo-Political Zones of Nigeria

S/N	List of available Indigenous food(s)	Southwest	South-south	South-East	North Central	North East	North West
A	Fruit and Leafy Vegetables	25	9	9	5	5	6
B	Grains and Cereals	11	5	3	11	10	11
C	Roots and Tubers	8	3	4	6	5	5
D	Insects/Wild collections	13	11	9	5	3	3
E	Animals/Livestock	7	2	4	3	2	3
F	Sea Foods/Aquaculture	6	5	6	3	3	2
G	Spices and Tree barks	9	5	4	5	4	5

Source: Questionnaire survey, 2023

Table 7: Other Available Indigenous Foods in Different Zones of Nigeria

Indigenous food category	South West	South South	South East	North East	North West	North Central
Fruits and Leafy Vegetables	African eggplant leaf (<i>efoigbo</i>) okra (<i>Ila</i>) Tree spinach (Worowo) Black nightshade (Odu) Lime, sweet orange	Basil. <i>Okapi</i> . <i>Uziza</i> (West African Black pepper) Green, <i>kerekere</i> (Beef Trachea) <i>Utazi</i> (<i>Gongrone malatijolium</i>), Capricot, black pear, <i>ekóm</i> (<i>Coula edulis</i>) ,star apple, red apple, <i>damaleaf</i> (<i>bush apples</i>), <i>éditan</i> leaf(<i>Lasianthera africana</i>)	<i>Ugbowuru</i> (fluted pumpkin), Ariria,	Dates	Mango, banana, guava, and pawpaw, tomato, onion, carrot, <i>hibiscus sabdariffa</i> (Roselle)	Mangos, Cashew, pawpaw & <i>Ugwu</i> (pumpkin leaves), Waterleaf, bitter leaf.
Total Number of Fruit and Leafy Vegetable	6	14	2	1	8	6

Source: Key Informant Investigation, 2023

Indigenous food category	South West	South South	South East	North East	North West	North Central
Grains and Cereals	Sorghum, Millet, Wheat Corn , Beans (<i>feregade</i>)	Corn	<i>fiyio</i> (Pigeon beans) <i>odudu</i> (black cowpea)			Maize, Rice, Millet.
Total number of Grains and cereals	5	1	2			3
Roots and Tubers	Yellow yam (<i>Dioscorea cayenensis</i>),	Coco yam(<i>Xanthosoma sagittifolium</i>),cassava (<i>Manihot esculenta</i>), yam (<i>Dioscorea polystachya</i>), water yam (<i>Dioscorea alata</i>)	<i>Ji</i> (yam pepper soup), <i>akpu</i> (pounded fermented cassava) <i>adu</i> (Ginger) <i>ona</i> (bitter yam) Potatoes			Cassava (<i>Manihot esculenta</i>), Yam(<i>Dioscorea polystachya</i>), Sweet potatoes (<i>Ipomoea batatas</i>)
Total Number of Roots and Tubers	1	4	5			3

Source: Key Informant Investigation, 2023

Table 7: Other Available Indigenous Foods in Different Zones of Nigeria Cont.

Indigenous food category	South West	South South	South East	North East	North West	North Central
Insects/Wild collections	Edible millipede (<i>moni-moni</i>), Maggot (<i>agogo</i>), <i>Ire</i> (cricket), Rhino beetle (<i>Ogidimo</i>), Weevils and Stem borers	Beetle, grasshopper, bee	wiwii() <i>ugwu</i> (pumpkin leaves), <i>ikpukpe</i> <i>ake</i> (edible winged termite)		Blattodea, Cockroach, <i>diplara diplurans</i> , <i>collembola</i> , springtails e.t.c	Cricket, Grasshopper, Millipede, Centipede, Bees
Total Number of Insect/Wild collections	6	3	4		5	5
Animals and Livestock	Squirrel, Goat (West African Dwarf), Sheep (West African Dwarf),	Poultry, Goats, Sheep, Dogs, Grass cutter, Bush Pig, Guinea Fowl, Dove, Antelope, Rabbits, Deer, Snail	<i>Okenkoigbo</i> (native chicken)		Rein, deer, horses, Bison	Goat, Sheep, Dog, Cow, Local chicken, pig
Total Number of Animals and Livestock	3	12	1		4	6

Source: Key Informant Investigation, 2023

Table 7: Other Available Indigenous Foods in Different Zones of Nigeria Cont.

Indigenous food category	South West	South South	South East	North East	North West	North Central
Sea foods/ Aquaculture	<i>Cleaspp.niloticus</i> , <i>heterobranchus</i> , Tilapia spp, Catfish (<i>Ejaaro</i>), Crayfish, Caranx(<i>Owere</i>), Mullet (<i>Atoko</i>), Ethmalosa(<i>Ejolo</i>), <i>Wesaju</i> .	Periwinkle, oyster, catfish, crabs, Tilapia, Eel electric fish, Crayfish, Sardine fish, . Alligator, crocodile, python	<i>Azu</i> (Fresh African Knife fish) <i>Nikeo</i> (crab) apupa, <i>okpo</i> (stock fish) catfish		Fish, crabs	Crab, Fish
Total Number of Seafood/ Aquaculture	9	11	5		2	2
Spices and Tree Back	Locust bean tree, Spring onion, Onion TREE BARKS: Mango, Cashew, Kolanut, Bitter gourd leaf (<i>ejirin</i>)	<i>Uda</i> (Negro Pepper), <i>Uzizu</i> (West African Black Pepper) <i>utazu</i> (Gongron emalatifolium) Pawpaw root	<i>Uzizu</i> (West African Black Pepper), <i>Ehuru</i> (African nut meg), <i>uda</i> (Negro Pepper)		Ground guinea),(baobab leaf p),locally made couscous	Chillpepper ,Ginger,turmeric
Total Number of Spices and Tree Back	7	4	3		3	3

Source: Key Informant Investigation, 2023

4.12. Indigenous Foods Going Extinct

The study revealed some of the local foods are no longer available in localities of the participants due to various reasons. As discovered from the questionnaire survey (Table 8), more of the participants (21%) identified that urbanization/civilization was the major reason for non-availability of indigenous foods in their localities (Table 8) while other identified reasons included extinction of seed to produce indigenous food (16%), lack of access to storage facilities (12%), poor weather conditions (12%). Unavailable markets for the sale of indigenous food products (7%), price of food item (7%), poor infrastructural facilities (5%), illiteracy (4%), cultural/religious belief/practices (4%) and poor nutritional value (2%) were other identified reasons for unavailability of indigenous foods in some localities in Nigeria.

Key Informant Investigation revealed that foods going into extinction in the South West included Wild lettuce, agbagba (*Solanum macrocarpon*), worowo (*Solanecioibiafrae*), tilapia, winged termites, rhino beetle (ògìdímò), moni moni, African yam beans, pigeon peas & edible maggots (Table 9). The indicated reasons that these food items are going into extinction included improper storage of indigenous seeds and non interest of youths in the farming profession.

In the South South, food items going into extinction included; electric fish, anakor leaf, pumpkin, ebintath, akambo. Anakor leaf and pumpkin are going into extinction because few people are now planting and also high rate of migration. The electric fish is going out of existence due to excessive use of chemicals in fishing. For livestock and animals, most of them are being shot by hunters for food like ebintath and some like akambo with spikes to defend themselves are no longer in the bushes and farmlands.

Participants from the South Eastern region of the country identified that Odudu local beans are going into extinction because they are always attracted to pests. Adu (*dioscorea bulbifera*) is also now scarce because people are no longer eating it. It is no longer preferred by younger generations because of its bitter taste. Ehiri and uda can only be found in a few markets probably due to lack of interest to cultivate them. Most animals are no longer in the bushes because hunters and civilization have chased Grass cutters away as most bushes and farmlands are now destroyed to build structures. *Aku* as a seasonal food can only be seen during the rainy season as irrigation farming is only practiced by few.

Indigenous food already going into extinction in the North Western region included Livingston potato and Crab. Livingston potato (*Coleus esculentus*) is fast disappearing as an under-utilized tuber whose production technology is not well known to most of the present day farmers. Crabs are no longer found in most areas probably due to over application of herbicides which drift and drain into water bodies (streams, rivers and ponds) and kill them. Okoruwa *et al.* (2021), however suggested that there should be a national pesticide policy in Nigeria to prohibit the use of banned chemicals globally and such policy should also prohibit the use of hazardous chemicals to harvest and preserve fish as practiced by some artisanal fish farmers and aquaculture farmers.

From the North Central region of Nigeria, identified indigenous foods include tibini and mandako. They are no longer available because most of the younger generation of women do not know how to prepare them.

Table 8: Reasons for unavailability of indigenous foods

Reasons	Frequency	Percentage
Urbanisation	37	20.56
Extinction of seed to produce	28	15.56
Lack of access to storage facilities	21	11.67
Poor weather condition	21	11.67
Unavailable market for products	13	7.22
High/Low price of food item	12	6.67
Poor infrastructural facilities	9	5.0
Others (pls specify)	8	4.44
Illiteracy	8	4.44
Cultural/Religious belief/practices	7	3.89
Poor nutritional value	3	1.67

Source: Questionnaire Survey, 2023

Table 9: Reasons for Extinction of Indigenous Food in Localities and Zones of Nigeria

South West	South South	South East	North East	North West	North Central
Wild lettuce vegetables Tilapia. Esunsun Rhino beetle (Ògidimò) Monimoni African yam beans pigeon peas & edible maggots. agbagba, worowo	The electric fish is going out of existence due to excessive use of chemicals in fishing Anakor leaves used to be planted around the homes but they are no longer there. Only one home still has it. Pumpkin used to be a popular meal eaten with yam.but that practice is dying off In the animal kingdom we had Ebintath at shot spikes to defend itself and Akambo both are no longer in our farmlands.	Odudu local bean. It is attacked by pests. Adu (dioscorea bulbifera). People are no longer eating it. No longer preferred because of taste and scarcity Ehuru(African nutmeg) and Uda(Negro Pepper). It is only seen in the market. Maybe there is a lack of interest in cultivating them. Grass cutter. Hunters and civilization have chased them away. Aku(edible winged Termite). Seasonal, only seen during rainy season		Livingston potato and F. Crab Livingston potato is fast disappearing as an underutilized tuber whose production technology is not well known to most of the present day farmers. F. Crabs are no longer found in my area probably due abundant application of herbicides	Tibini, mandako they are no longer available bcoz the young ladies didn't know how to prepare them.

Source: Key Informant Investigation, 2023

4.13. Preference for Local Food Production/Consumption

Results from the study indicated that indigenous foods were preferred by most participants due to various reasons. Availability of indigenous food (38.3%) was the most preferred reason for producing or consuming indigenous foods as identified by participants on Table 10. Taste/aroma (29.4%), Affordability (27%), preservation/increased shelf life (9.4%), culture/tradition (9%), ease of cooking (6%), social status/class (4%), location (4%) were other identified preferences for local food production/consumption in different localities of Nigeria (Table 10). Key Informant Investigation however revealed that preference for indigenous foods in different regions of Nigeria included high nutrition and health benefits, contribution to growth of local industries and safe and chemical free according to South-Western participants. South Eastern participants preferred indigenous food consumption due to better taste, longer shelf life, better nutrients and health because they are free of contamination and chemical residues (Table 11).

Participants from the North West indicated preference for local foods because they are locally grown with good and natural flavor, contain more nutrients, promote a safer food supply and also support the local economy (Table 12). From the North Central region, indigenous food is preferred because they are cheap, easy to make or prepare, taste nice and contain natural nutrients. Other identified preferences for local foods included that they are readily available and accessible with high nutritive value (Table 12). Adegboye *et al.*, 2016 also affirmed in a similar study that determinants of food choices include; personal preferences, food prices, income, knowledge and skills, time and equipment, social and cultural norms.

Table 10: Preference for Local Food Production/Consumption

Preferences	Frequency	Percentage
Availability	69	38.33
Taste and odour	53	29.44
Affordability	48	26.67
Preservation	17	9.44
Culture/Tradition	16	8.89
Ease/ Challenges in cooking	11	6.11
Social class	7	3.89
Location	7	3.89
Others	4	2.22

Source: Questionnaire Survey, 2023

Table 11: Preference for Local Food Consumption and Their Benefits

South West	South South	South East	North East	North West	North Central
Health benefits It can contribute to growth of Local Industry Preservatives and food additives free	Nil	1. Local food tastes better 2) have longer shelf life 3) contains higher nutrients 4) free of contamination and chemical residues	Nil	* locally grown food is full of flavor. * local food has more nutrients. * local food promotes a safer food supply. * local food supports the local economy.	The reasons are that they are cheap, easy to make, taste nice and contain natural nutrients. They are cheap Readily available Tasty & has high nutritive value.

Source: Key Informant Investigation, 2023

4.14. Benefits of Consuming Local Foods

It was revealed from the study that preference for indigenous foods was due to benefits derived from the consumption of local foods available in their various regions. Majority (47%) of the sampled participants indicated that benefits derived from consuming indigenous foods was due to high health and nutritional benefits, 12.8% of the participants indicated natural and freshness as benefits derived from consumption of indigenous foods, 10.6% of participants derived from consuming indigenous foods to supporting local trade and the economy at large. Other benefits derived from the production and consumption of indigenous foods are affordability (8.3%), accessibility (7.2%), easy preparation (5.6%), retaining cultural and traditional value (4.4%) as well as high/great satisfaction derived from its consumption (3.9%). This is an indication that despite the difference in the types and varieties of indigenous foods found in different localities or cultures in Nigeria, citizens derive similar benefits from their consumption which confirms homogeneity of the food system/pattern (Table 12).

The KII participants from the Southwest region identified benefits of consuming indigenous foods as tasty and nutritious, environment-friendly, accessible and available and also serves as

a source of income. Benefits derived from consuming indigenous food from the South East region included that they are less costly, readily available, rich in nutrients and easy to produce by local farmers.

Participants from the North West region affirmed that benefits derived from consuming indigenous foods ranged from better taste, to preservation of open space. Other benefits derived from local food consumption were highlighted to include that they encourage sustainable agricultural production, facilitate tracking the supply chain back to the point of origin to evaluate ecological practices and ensure food safety (Table 13). Hollinger (2016) also agreed that indigenous foods are more convenient to buy, prepare and consume. Other attributes such as shelf-life, freshness, nutritional content, packaging and labeling are becoming more important for consumers. Coelho *et al.*, 2018 also affirmed that the consumption of local foods, produced in ways adapted to the local environment using technologies with an ecological basis, is something beneficial and salutary for the environment, economy and society in general.

Table 12: Benefits of Producing/Consuming Indigenous Foods

Benefits	Frequency	Percentage
Healthy and Nutritious	85	47.2
Natural and Fresh	23	12.8
Aids local Trade and economy	19	10.6
Cheap and affordable	15	8.3
Accessible	13	7.2
Easy to prepare	10	5.6
To retain culture and traditional value	8	4.4
High satisfaction	7	3.9

Source: Questionnaire Survey, 2023

4.15. Familiarity with Food Rights

It was revealed from the study that 44.4% of the sampled participants are not familiar with food right issues in Nigeria (Table 14). This implies that there is a need for awareness on food policy and better interaction or communication between policy makers and citizens for a people-oriented government in the country.

Responses from the Key Informants confirmed that many citizens from the South Western zone of Nigeria are familiar with food rights issues and some of the issues identified included Rights to food and Nutrition security and Rights to safe food (Table 13). Participants from the North Central also indicated their awareness on food right issues and identified such as human right to safe food of the Sustainable Development Goals (Table 15). Mozaffarian *et al.*, 2018 ascertained that the effect of policies and regulations on ultimate dietary choices depends on how the policies affect the cost of producing commodities, how those costs relate to final retail prices, how responsive consumers are to price changes, and how the policies directly influence the consumers' preference for the product

Table 14: Participants' Familiarity With Food Rights

Value	Frequency	Percentage
No	80	44.44
Yes	21	11.67
No response	79	43.89
	180	100.0

Source: Questionnaire survey, 2023

Table 15: Participants Awareness on Food Rights

Question	South West	South South	South East	North East	North West	North Central
Are you familiar with food rights issues? Yes (), No () If Yes, how	Yes, I am familiar with the food rights issue. Food is a necessity and right not a privilege. Yes, Rights to food and Nutrition security Rights to feed oneself with dignity Yes, Ensures food security at all levels both micro and macro.	Nil	Nil	Nil	Nil	Yes . One of the Sustainable Development Goals. Human being must have right to food

Source: Key Informant Investigation, 2023

4.16. Types of Food Rights

Few of the participants who are familiar with food rights issues indicated such issues to be on the right to adequate food without discrimination, right to hygienic and healthy food, right to safe, nutritious and organic food as well as consumer right to affordability of food produce/ products (Table 16). However, none of the participants were able to identify any policy document supporting such right issues which is an indication that food policy documents are not available or not accessible to citizens. Food policy is another factor that readily affects the availability and accessibility of food to consumers. It is important to ensure that policies do not tamper with the consumer's right to food consumption. There is however the need to redouble efforts to implement the National Policy on Food Safety and its Implementation Strategy in accordance with 2005 FAO/WHO recommendations.

Table 16: Types of Food Rights

Food Rights Identified
Rights to adequate food, access to good food without discrimination
Right for hygienic food
Organically produced foods, use of organic manure alone, appropriate use of inorganic fertilizer.
Food safety
Malnutrition
Consumer right as well as producer/breeders right act
Inflation, climate change, conflict

Source: Questionnaire Survey, 2023

4.17. Strategies for Improving the Food System in Nigeria

The study as revealed on Table 17 indicated strategies for improving food systems in Nigeria. Key Informant Investigation revealed some programs and strategies executed by different governmental and non-governmental organizations in the different regions of the country. Different programs and strategies embarked upon by the South Western region organizations included State Program for Food Security (SPFS), Root Tuber Expansion Program (RTEP), State Program for Food Security (FADAMA), Federal Government Agro Processing, Productivity Enhancement and Livelihood Improvement Support (APPEALS) project, Youth Empowerment Scheme Agricultural Program in Oyo State, Lagos Agriculture Program (LAP), Establishment of poultry Estate, Erikorodo, Fish Farm Estate, Odogunyan, Piggery Estate, Gberigbe and Farm Settlement Scheme in Oyo State. Other programs and strategies include Imota Rice Mill establishment, Urbane Agriculture, Federal Govt. Schools Feeding Program, Federal Government N- Care program, Federal Government, Conditional Cash Transfer Program, Rural Finance Institution Building Program (RUFIN), Nigeria Rural Access and Agricultural Marketing Program, (RAAMP) and Urban and Peri urban program (RUAF).

Programs and Strategies embarked upon for food safety in the South-Eastern region of the country included Indigenous seed bank project, Crop bank project, Cassava peels and rice bran waste to fertilizer project.

Strategies initiated for food safety in the North West region included irrigation farming, green revolution project, biotechnical and appropriate technology, aeroponics and hydroponics agricultural system, subsidizing farm inputs to farmers and training of local farmers on sustainable agricultural practices. High Level Panel of Experts on Food Security and Nutrition (HLPE-FSN, 2014) also emphasized that a sustainable food system is one that delivers food and nutrition security for all in such a way that the economic, social, and environmental bases to generate food security and nutrition for future generations are not compromised, while the International Food Policy Research Institute (IFPRI), 2015) identified differences in food systems lead to variations in nutrition, health, and sustainability outcomes.

Table 17: Strategies for Improving the Food System in Nigeria

Question	South West	South South	South East	North East	North West	North Central
<p>Are there programs or strategies for improving the food system in your organization? Yes (), No ()</p> <p>If Yes, Kindly state such programs or strategies</p>	<p>Yes. ANSWER: (1) State Program for Food Security (SPFS). (2)Root Tuber Expansion Program (RTEP). (3) FADAMA. (4) APPEALS. (5)Agriculture-YES Program. (6)Rural Finance Institution (RUFIN).</p>		<p>Yes, Our organization now makes it a must for our farmers to save their seeds for next planting season. We have created a crop bank for keeping our farmers' crops in good condition till when they want to use it.</p>		<p>yes strategies to increase food system are i) irrigation: can double the amount of food produce ii) the new Green Revolution iii) Biotechnical and appreciate technology. iv)Aeroponics and hydroponics: are systems that allow plants to be grown without soil.</p>	<p>Are there programs or strategies for improving the food system in your organization? Yes (), No ()</p> <p>If Yes, Kindly state such programs or strategies</p>

Table 17: Strategies for Improving the Nigerian Food System Cont.

Question	South West	South South	South East	North East	North West	North Central
<p>Are there programs or strategies for improving the food system in your organization? Yes (), No ()</p> <p>If Yes, Kindly state such programs or strategies</p>	<p>Yes. ANSWER: (1) State Program for Food Security (SPFS). (2)Root Tuber Expansion Program (RTEP). (3) FADAMA. (4) APPEALS. (5)Agriculture-YES Program. (6)Rural Finance Institution (RUFIN).</p>		<p>Yes, Our organization now makes it a must for our farmers to save their seeds for next planting season. We have created a crop bank for keeping our farmers' crops in good condition till when they want to use it.</p>		<p>yes strategies to increase food system are i) irrigation: can double the amount of food produce ii) the new Green Revolution iii) Biotechnical and appreciate technology. iv)Aeroponics and hydroponics: are systems that allow plants to be grown without soil.</p>	

Source: Key Informant Investigation, 2023

4.18 Awareness on Genetically Modified Organisms (GMO) Foods

Only 47% of the sampled participants were aware of GMO foods despite their high educational qualification (Table 18). This implies that many citizens are still ignorant which calls for more awareness on the implications of the use of modern biotechnology in Agriculture..

The Key Informant Investigation further explained that few of the participants were aware of GM crops but many could not identify such crops or food produce. South East participants identified extraordinarily big maize or corn seeds, yellow maize and fruits as food items containing GMOs while imported foods including soy or maize were identified by North Western participants as GMOs (Table 19).

Table 18: Participants' Level of Awareness on GMO Foods

Aware of GMOs	Frequency	Percentage
No response	76	42.2
No	57	31.7
Yes	47	26.1

Source: Questionnaire Survey, 2023

Table 19: Participants' Awareness on GMOs Across Geopolitical Regions of Nigeria

Question	South West	South South	South East	North East	North West	North Central
Are you aware of foods with genetically modified organisms (GMO) in your locality? Yes (), No () If Yes, kindly list any of such food types	No No Yes, Maize, apple Yes I don't know any genetically modified food but I am aware it exists	Nil	Yes , Yellow maize Yes Maize. Rice, Orange flesh potatoes, yam is on the way now	Nil	Yes soy of all crops, soy is the most heavily modified corn also is one of the most heavily modified crops. * rice * Tomato	Nil

Source: Key Informant Investigation, 2023

4.19. Indigenous Food Types Perceived as GMOs or as Containing GMOs

Despite low knowledge of participants on genetically modified crops, participants perceived GMO food types to include imported cereals and grains especially maize, soybean and cowpea. Other perceived GMO food types by participants included imported fruits, junk foods, foods labeled with lecithin, among others (see Table 20).

Table 20: Perceived GMO Food Types by Participants

Value	Frequency	Percentage
Maize	11	23.4
Imported cereals and grains	8	17.0
Soyabean	7	14.9
Bean (cowpea) and imported foods	5	10.6
Foreign fruits like Apple, pears	4	8.5
Foods labeled with Lecithin	3	6.4
Chemically preserved foods	2	4.3
Preserved rice, turkey birds, cowpeas	2	4.3
Junk foods	2	4.3
Extremely big mangoes,	1	2.1
Cloned guava	1	2.1
Fruits, some grains	1	2.1

4.20. Awareness on Negative Impacts of GMO Foods on Human Health

Regarding awareness of participants on negative impacts of GMOs on human health, the majority of the participants (55%) that had knowledge of GMO foods were also aware of its negative impacts on human health (Table 21). This indicated that the knowledge of participants on GMO foods is primarily based on its health impacts to humans. Myers, (2019) also confirmed that GMOs have serious harmful effects on both humans and the environment and such effects include allergic reactions, risk of cancer and antibacterial resistance.

Table 21: Participants' Awareness on Negative impacts of GMOs

Aware of Negative impact of GMO	Frequency	Percentage
No Response	77	42.8
Yes	55	30.6
No	48	26.7

Source: Questionnaire survey, 2013

4.21. Negative Impacts of GMOs on Human Health

Results from the study also revealed that the majority (65.5%) of the participants that were aware of GMO foods perceived that they are cancerous. Few (7.3%) perceived that they likely compromise the genetic make-up of man and reduce resistance to diseases. Very few others perceive that GMO foods have low nutritional benefits, affect the immune system, reduce vision, and affect health generally (Table 22). Some others perceived that it is not sustainable as GM crops cannot be reproduced while few others attributed the negative impacts of GMO food consumption to increase in the cholesterol level and allergic reactions.

Key informant Investigation (Table 23) further discovered that a few of the participants were aware of the negative impacts of GMO foods and some of the identified effects were that they are cancerous and have reduced shelf life. Other identified negative impacts of GMOs on health include that they can cause cancer, high blood pressure, obesity, liver and heart failure etc., as well as resistance to medications.

Table 22: Perceived Negative Impacts of GMOs on Health

Negative Impacts	Frequency	Percentage
Cancer	36	65.5
Likely compromise of human genetic make up and less resistance to diseases	4	7.3
It has modifications	2	3.6
Loss of indigenous foods. Loss of nutritional value,	2	3.6
Seeds cannot be regrown, unhealthy to human body and environment	2	3.6
They affect the immune system, reduce vision, affect health generally	1	1.8
Low content of nutrients	1	1.8
Effect on health in the long run	1	1.8
It changes the taste of the food we take in our body, it contribute harm to our health, it can lead to early death	1	1.8
Can affect the human organs	1	1.8
Allergic reaction	1	1.8
Not readily digested by the body enzymes, can lead to stomach upsets, evolution of gastro-intestinal disorders, accumulation of anti-nutritive materials	1	1.8
Religious as well as health issues	1	1.8
It increases the cholesterol level which in turn gives home for some diseases	1	1.8

Source: Questionnaire Survey, 2023

Table 23: Participants' Awareness on Negative Impacts of GMOs

Question	South West	South South	South East	North East	North West	North Central
<p>Are you aware of the negative impacts of GMO foods on human health? Yes (), No ()</p> <p>If Yes, kindly state such impacts</p>	<p>Yes</p> <p>GMO foods are not healthy for consumption</p> <p>Yes. Impacts of GMOs: they are said to be cancerous and it reduces life</p>		<p>Yes,</p> <p>incidents of diseases such as Cancer and resistance to medications</p> <p>Yes</p> <p>Can cause cancer, high blood pressure, obesity, liver and heart failure etc</p>			

Source: Key Informant Investigation, 2023

5.0 CONCLUSION AND RECOMMENDATIONS

5.1. Conclusion

The study assessed the citizens' preference for local foods and their level of knowledge on the importance of producing and consuming indigenous food in Nigeria. In general, knowledge of food production and consumption, citizen's behavioral changes and responses to good local food over the past years, citizens' level of awareness of the nutritional values and health benefits of foods, as well as level of awareness of GMO foods and their health, economic and environmental impacts were assessed in this study.

Findings from the study established that participants from all geo political zones in Nigeria have good knowledge of food production and various native foods accustomed to their locality or tradition coupled with climatic conditions, irrespective of age, religion, academic or social status, as well as gender. The most consumed available indigenous foods across the zones were fruits and leafy vegetables, cereals/grains, roots and tubers and spices.

It was deduced from the study that despite the differences in the types and varieties of indigenous foods found in different localities or cultures in Nigeria, citizens have good attitude to consuming their local foods with positive behavioural pattern of consistent preference for such foods, irrespective of age, geopolitical regions, academic or social status, as well as gender.

However, It was also revealed from the study that many of the indigenous foods in the studied localities are going extinct and reasons highlighted include urbanisation, extinction of seed to produce, lack of access to storage facilities, poor weather conditions and unavailable market for products. Efforts should be made toward ensuring a preservation of our local foods as well as preservation of the culture of consuming them owing to their health, economic and environmental benefits.

It is evident from the study that consumption of indigenous foods by citizens from the different zones of the country is based on their perceived high health and nutritional benefits, freshness, being devoid of harmful substances, as well as ability to support local trade and the economy at large.

Also, participants' preference for local food consumption is based on their availability, taste and aroma, affordability, preservation, culture and tradition and ease of cooking. Other reasons highlighted by participants included accessibility of local foods, easy preparation, retention of cultural and traditional value as well as high/great satisfaction derived from their consumption. The study however revealed the majority of the participants were not familiar with food rights issues which may be due to lack of exposure to such information. This needs to be addressed.

Level of awareness of Nigeria citizens on Genetically Modified Organisms (GMOs) in food products is still on the low side, as revealed in this study. Although, the majority of sampled participants were not aware of GMO foods, some of them opined that some imported foods/processed products contain GMOs inputs. This situation of low awareness of citizens on the implications of GMOs in food is not good for Nigeria, considering several negative implications

linked with their consumption like cancers, loss of nutritional value, immune system disorders, and non-sustainability of seeds. Citizens of Nigeria deserve appropriate information on likely challenges associated with GMOs in order to make informed decisions.

5.2 Recommendations

Based on the information gathered in the study, the following are recommended for policy action for the sustainability of the Nigerian indigenous food system:

- Government especially at the local government levels should ensure preservation of indigenous food and seeds for example through set up and management of seed banks
- The government, CSOs and other concerned food system actors should increase awareness on agro-ecological and organic production systems
 - Efficient infrastructural facilities including storage amenities for the production/storage of local and indigenous foods should be made available to food producers
- Government should establish and promote markets for indigenous foods
- The government of Nigeria should hold the breaks on GMOs and ensure adequate, long term, independent human and environmental health impact assessment are done.
- CSOs and other concerned stakeholders should intensify training for citizens on health, economic and environmental implication of GMO products
- The government should intensify training of farmers on climate change adaptation strategies
 - Government should promote sustainability in production (ecological agriculture), post-harvest and value addition in Organic Agriculture
- Government, CSOs and other concerned stakeholders should increase awareness of Nigerian citizens on their right to food.
- The Nigerian indigenous food system should be protected from growing threats including climate change, introduction of risky/unproven technologies in Agriculture and laws/policies which do not serve the interest of our people or strengthen the local economy but champion the profiteering agenda of foreign corporations.



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About HOMEF

Health of Mother Earth Foundation (HOMEF) is an ecological think tank and an advocacy organization promoting environmental/climate justice and food sovereignty in Nigeria and Africa.

HOMEF's vision is for an ecologically just world where all beings live in harmony with Mother Earth and her driving mission is: working to support a wholesome ecological and socially cohesive/inclusive communities where people live in solidarity and dignity.

HOMEF's work tackles problems created by the agricultural model that is basically colonial and sees food as a commodity thereby generating hunger and encouraging biodiversity erosion through approaches including by using genetic engineering in agriculture and harmful agricultural chemicals such as the HHPs.

HOMEF also focuses on tackling problems relating to harmful extractives and the exploitation of nature and peoples. HOMEF has created a dynamic knowledge space through her Ikike Programme to drive the change she seeks. This space fosters development and sharing of knowledge as well as interrogation of concepts, policies and actions on various issues, ranging from environmental/climate justice, agriculture, re-source democracy and overall socio-ecological transformation.

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NIGERIAN INDIGENOUS FOODS

