



Combating Food Insecurity in Nigeria: The Emergence of Agro-Entrepreneurship Marketing on Campus

¹Veronica N. Ndubuisi, ²Umma A, U. Mani, & ³Richard I.B.

^{1&2}Department of Marketing, University of Maiduguri, Maiduguri, Nigeria.

³Department of Crop Protection, Faculty of Agriculture, University of Maiduguri, Maiduguri

¹<https://orcid.org/0009-0000-4950-7417>

*Corresponding Author: veronicawaltern@gmail.com

ABSTRACT

Background: Nigeria is classified as the poverty capital of the world. This study explores the role of agro-entrepreneurial marketing and campus farming in combating food insecurity causing extreme hunger and death at the University of Maiduguri.

Objective: In Nigeria food insecurity is a problem where a large population cannot have a sufficient and reliable nutritious food. To combat this menace the paper is set out to address the challenges and proffering solutions.

Method: leveraging on modern farm technology and methods on campus. of farming. a descriptive survey design, data were collected through structured questionnaires from a sample of/ 200 respondents, including students and staff involved in agro-entrepreneurship marketing activities.

Results: The study also highlights the active participation of respondents in climate-smart agricultural practices, particularly those aimed at mitigating the effects of climate change.

Conclusion: The conclusion suggests that by adopting agro-entrepreneurship and campus farming techniques, universities can become more self-sufficient in food production, contributing to broader national efforts in tackling food insecurity

Unique Contributions: Findings reveal that agro-entrepreneurial marketing plays a key role in enhancing access to affordable food, promoting local food production, creating awareness about food security, and generating income.

Recommendations: Recommendations include enhancing agro-entrepreneurship programs, expanding campus farming initiatives, supporting climate-smart practices, and fostering public-private partnerships to ensure sustainable food security solutions.

Keywords: Agro-Entrepreneurship Marketing, Campus Farming, Climate-Smart Agriculture, Sustainable Food Security in Nigeria, and Food Insecurity.

INTRODUCTION

In general term, the absence of protection of adversity of life compounded by extreme low standard of living is food insecurity while specifically food insecurity is the persistent concern of insufficient and affordable food at all times which leads to an increase in food poverty and malnutrition in communities with low standard of living. Food insecurity affects the nutritional



conditions of a large population of the world in times of epidemics, wars and natural disasters. Further this can lead to stress and anxiety in people due to no means of livelihood, lack of income and limited access to food security (Covid 19, 2022). It is also observable that food severity can vary from mild to severe and this may depend upon the uncertainty, anxiety, unbalanced diet, and changes in diet quality (Covid 19, 2022).

Nigeria as most populous country in Africa is resident to more than 206 million people (Wikipedia, 2021). One of the major issues affecting the citizens is hunger which hangs at 40%, representing 82% million people of the citizens who live below International Poverty Line (IPL) of \$1.90 daily while another 25% are vulnerable to hunger (Vanguard, 2021 & Bongaarts, 2021). Globally, Nigeria was ranked second poorest in food affordability and sufficiency by the Institute of Development Studies, United Kingdom (Vanguard, 2021) and poverty capital of the world (Nigeria Hunger Statistics, 2021). (Appendix 1).

PROBLEM STATEMENT

In Nigeria, factors that contribute to hunger in various states of Nigeria are insecurity and environmental factors such as destruction of habitats, devastating effects of Covid-19, and economic challenges (Punch NG, 2021) while climate change is a wider threat to food security in Nigeria (Adjei, 2021) as the country experiences more frequent drought and flood. The climate change leads to weather events, damage crops and live-stocks and at the same time making it difficult for farmers to produce enough food.

As observed by Eme, Onyishi, and Uche (2014) in Wikipedia (2021) that food insecurity in Nigeria has a number of negative consequences that can lead to malnutrition to disastrous health that can impair physical and mental development of its people. The outcome of this is social unrest as people become desperate for food. The manifestation of social unrest is hunger and the product of hunger are malnutrition, under-nutrition and nutritional deficiencies of child wasting. According to UNICEF (2019), this manifests to underweight at 36.4%, stunting at 41.3% and wasting at 15.6% in health index scale.

These phenomena and challenges informed the need for this study as food insecurity has a number of negative consequences in Nigeria, leading to hunger – malnutrition, undernutrition, nutritional deficiencies and child wasting. Overall, it is a cycle of poverty manifesting to little or no productivity at all.

OBJECTIVE OF THE STUDY

To combat this menace of food insecurity, there is a clarion call to think out of box to address the challenge leveraging on modern farm technology and multifaceted methods of farming (Noba Africa, 2024). This paper explored these multifaceted innovation farming practices and has chosen Agro-Entrepreneurship marketing on campus as synonymous to Urban Agriculture with the understanding of how Nigeria can achieve food security. The specific objectives of the study are to:

- i. examine the role of agro-entrepreneurship marketing in combating food insecurity in Nigeria's university campuses;



- ii. assess the effectiveness of campus farming practices (such as backyard gardens, greenhouses, and vertical farming) in improving food security among university staff and students, and
- iii. explore the impact of climate-smart agricultural practices and innovative farming technologies on enhancing food production and mitigating food insecurity in Maiduguri, Nigeria.

LITERATURE REVIEW

Conceptual Issues

Food Insecurity: According to FAO (2024) a person is said to be food insecure when he lacks regular access to enough safe and nutritious food for normal growth and development for an active and healthy life. This circumstance may be as a result of unavailability of food or lack of access to obtain food and food insecurity can be experienced at different levels of severity, FAO (2024) emphasized.

On the other hand, hunger is unforeseen or painful physical stimuli or sensation caused by insufficient consumption of dietary energy. When hunger becomes chronic, it gets to a stage when the person does not consume a sufficient food of calories called dietary energy on regular basis to have a normal, active and healthy life (FAO, 2024).

Hunger and Food Insecurity: In a situation when someone is severely food insecure, they are said to have run out of food and must have gone a day or more without eating. In this case and in the absence of normal nutrition, they must most likely experienced hunger. The FAO (2024) goes further to explain that “severe food insecurity is one extreme of the scale, but even moderate food insecurity is worrisome. For those who are moderately food insecure, access to food is uncertain. They might have to sacrifice other basic needs, just to be able to eat. When they do eat, it might be whatever is most readily available or cheapest which might not be the most nutritious food”.

Additionally, the Food and Agricultural Organization continues, “the stress of living with uncertain access to food and going periods without food can lead to physiological changes that can contribute to overweight and obesity. Children facing hunger, food insecurity and undernutrition today may have a higher risk of overweight, obesity and chronic diseases like diabetes later in in life. In many countries, under-nutrition and obesity co-exist and both can be consequences of food insecurity”. Kwashiokor which is a consequence of lack of protein is however not ruled out also.

Monitoring and measuring Food InsecSDG 2

In monitoring and measuring the progress SDG, the FAO (2024) indicator measures the proportion of the population who are experiencing moderating or severe food insecurity in a population:

Moderate Food Insecurity: People experiencing moderate food insecurity reduce the quality and quantity of theirs and they are uncertain about their ability to obtain food as a result of poor



income or other sources of livelihood. Malnutrition in stunting children, micronutrient deficiency and kwashiorkor in children or obesity in adults can also increase the risk in one form or the other of moderate food insecurity.

Severe Food Insecurity: Equally, people experiencing severe food insecurity often run out of food and at the extreme situation have gone days without eating. This group of the population are those for days and nights without food and they are said to be “extremely hungry”.

Situation Report on Food Insecurity in Nigeria

The situation-report by UNICEF (2023) Resident in Nigeria stated that nearly 25 million Nigerians are at risk of facing hunger in 2023 in lean period if urgent action was not taken. This report was from Cadre Harmonize (2023), a government-led and UN-supported food and nutrition analysis. It is observed that conflict, climate change, inflation and rising food crisis are key drivers of this alarming report. The persistent violence affected food access in the North-east states of Borno, Adamawa and Yobe (BAY) and armed banditry and kidnapping in the states of Katsina, Sokoto, Kaduna, Benue and Niger are also affected by lack of food access.

According to the National Emergency Agency during the same period, wide spread flooding in the 2022 rainy season damaged more than 676,000 hectares of farmlands, diminished harvests and increased the risk of food insecurity for families across the country. The flooding is one of the effects of climate change and variability impacting Nigeria food insecurity.

Three million were in the North-east BAY states out of 17 million who are food insecure and the report warned that without immediate action, the figure was expected to increase to 4.4 million during the lean period. This included highly vulnerable displaced populations and the returnees who were already struggling to survive a large-scale humanitarian crisis of which 8.3 million needed assistance.

The food security and nutrition situation were very critical and alarming in Nigeria that Mr. Matthias Schmale, the Resident and Humanitarian Coordinator for Nigeria has this to say:

“The food security and nutrition situation across Nigeria is deeply concerning. I have visited nutrition stabilization centers filled with children who are fighting to stay alive. We must act now to ensure they and others get the life-saving support they need”.

It was also reported that most vulnerable to food insecurity are children and approximately 6 out of 17 million food-insecure Nigerians today are children under 5 living in BAY states, Sokoto, Katsina and Zamfara states. There is a serious risk of mortality among children attributed to acute malnutrition. In BAY states alone, the number of children suffering from acute malnutrition was expected to rise from 1.74 million to 2 million in 2023.

Around Katsina, Zamfara and Sokoto states in the North-west region is an increasing food insecurity and malnutrition hotspots. According to Cadre Harmonize Phase 3 Report, it is estimated that 2.9 million people are critically food insecure and this figure is projected to increase to 4.3 million in the lean season.



To mitigate the situation and save the lives of the population threatened by malnutrition and hunger, the United Nations called on the Government of Nigeria, donor communities, and public and private stakeholders to urgently commit resources and implement mitigation measures to save lives and prevent potentially catastrophic food security and nutrition situation. The UN report ended thus, “Support for vulnerable families across the country is needed today, not tomorrow”.

Agro-Entrepreneurial Marketing

Entrepreneurial Marketing is a critical part of entrepreneurship that focuses on the customer as the fundamental driver of entrepreneurial success with emphasis on agricultural product from farm to distribution and to the consumer. Therefore, it is not an over emphasize that entrepreneurial marketers should not underestimate the importance of gathering customer insight to get new ideas, new products and innovative processes. It is a mix of up/down-down/up process.

Agro-entrepreneurial marketing is the development and implementation of marketing strategies for business that are directly involved in agriculture. It is also known as agricultural entrepreneurship which is a process of starting, managing, and organizing a business that focuses on agriculture.

Agro-Entrepreneurial marketing strengthens and enhances infrastructure such as storage facilities, transport network, and processing plant which reduces post-harvest losses and ensures that farm produce reaches market in good time and in good condition (Noba Africa, 2024).

Combating Food Insecurity in Nigeria

In Nigeria, food insecurity is a pressing issue involving a very significant population without a reliable access to sufficient and nutritious food. To combat this challenge, a holistic multifaceted approach is required as detailed by Noba Africa (2024), the approach being:

Technology to Combat Food Insecurity: Technological advancements have the potential to revolutionize agriculture in Nigeria. This involves precision farming and the use of data analytics and GPS technology to optimize planting schedules, irrigation, and fertilizer, leading to increased crop yields. Further for the healthy monitoring of crops, drones that are equipped with multispectral cameras can be used to identify pest infestation, and assess soil conditions and at the same time allowing for timely interventions. Mobile apps can also be provided to farmers with real time information on weather, market prices of different farm output, and best practices, enhancing their decision-making processes. Here the weather man will be handy with UNIMAID FM Station on campus. By adopting these technologies, Nigerian farmers can significantly improve productivity and reduce food insecurity.

The Role of Public-Private Partnership: Public-private partnerships (PPPs) play a crucial role in addressing food insecurity. Collaboration becomes necessary between the government, private sector NGOs create sustainable solutions. The government provides infrastructure and policy



supports while the private companies provide technological innovations and investments. At the same time, NGOs facilitate capacity-building programs and ensure community involvement.

Empowering Small-holder Farmers: It is a magic wand giving small-holder farmers resources, training and market access to boost their productivity and livelihoods in the way of providing high-quality seeds, fertilizers, and modern farming equipment to enhance their yields. Training programs on sustainable farming practices, pest management, post-harvest handling, and equipment will equally improve the quality of their farm produce. Cooperatives can also be formed to pool their resources, and negotiate better prices for their products.

Innovative Financing Solutions: Access to finance is a great barrier for many Nigerian farmers. Microfinance, insurance schemes and investment funds are supportive of agricultural development. While microfinance offers small loans to farmers, enabling them to purchase inputs and invest in their farms; agriculture insurance protects farmers against crop failures due to adverse weather conditions, reducing their financial risks. Investment funds on agriculture provides capital for scaling up operations and adopting modern technology.

Promoting Sustainable Agriculture: Agric innovation tech like crop rotation, organic farming and agroforestry enhance soil fertility, conserve water, and reduce reliance on chemical inputs leading to minimal use of pesticide while protecting crops. These practices in agriculture are essential for sustainable food security.

Youth Involvement in Agriculture: Youth involvement in agriculture is essential for agricultural sector to survive in the long-run. This could be done through education, training and entrepreneurial opportunities right from the class-room. While training and internship programs offer experience and mentorship, agricultural education program provides students with knowledge and skills in modern farm techniques. Entrepreneurial opportunities are supportive of young agripreneurs with access to finance, markets, and technology.

Urban Agriculture: This presents a viable solution to food insecurity in Nigeria's urban cities. These initiatives involve flower bed gardens, rooftop gardens, community gardens, Horti-culture and aqua culture and vertical farming which provide fresh farm output. Advantages are enormous such as reduction of food dependence on rural agriculture, provision of fresh and nutritious food, reduction on commuter fares, and improvement of urban resilience. Others are improvement of general well-being of urban population, contribution to greener environment and lastly but not the least, food sufficiency to the households.

Climate Change Mitigation Strategies: Unpredictable weather patterns such as droughts, floods and heavy wave lengths pose significant challenges to agriculture in Nigeria. For food sustainability, it is very crucial to mitigate the effects of climate change with climate-smart agriculture practices such as drought-resistant crops of different kinds, efficient water management systems and agroforestry. These help farmers adapt to changing conditions and improve their farm yields. Further, early warning systems weather-man forecast should be made available to enable farmers make informed decisions and reduce risks.



Strengthening Agricultural Value Chains: Strengthening agricultural value chain from lab to farm, farm to production and from production to distribution involves the availability of infrastructure such as storage facilities, transportation networks and processing plants. Certainly, this reduces post-harvest losses and ensures that farm produce get to the target market in good conditions. Thus, value chain strengthens food security by increasing efficiency, reducing waste and assuring food insurance.

Policy Intervention: These recommendations to scuffle food insecurity in Nigeria leveraging from innovative technology, public-private partnership, youth involvement, urban farming and others stemmed up from government concerns and policy interventions. These interventions and policies become necessary in creating conducive environment for agricultural growth and food security in Nigeria. Investment support such as provision of subsidies for input, access to credit for farmers and promotion of research development will lead to high-yield crop varieties and innovative farming techniques. Follow-up policies and implementing them, objectives of the policy intervention for agricultural growth, food security and provision of nutritious food to its population can be achieved

Of all these agricultural technologies and innovations, study is carried out in University of Maiduguri using campus farming as synonymous to urban farming. It embraces all urban farming practices (Machuka, 2021) under the purview of campus farming.

METHODOLOGY

Study Area

This study is home agriculture domiciled at the University of Maiduguri as “Combatting Food Insecurity in Nigeria: Emergence of Agro-Entrepreneurial Marketing on Campus”. The study is grown out of curiosity to combat food insecurity and to have food safety by having fresh and nutritious vegetables, fruits, and meat products.

Climate change poses a significant challenge in general in Nigeria and in Maiduguri in particular. In Maiduguri, this includes unpredictable weather patterns, drought and, floods. Mitigating these effects according to Noba Africa (2024) is crucial for food security and these require specialist agriculture practices such as drought-resistant crop varieties and efficient water management. Early warning system and weather man forecast are readily available in UNIMAID campus radio station for expertise information to the resident farmers. Cultivated are sweet potato, cucumber, maize, okro, yakwa, saint leave, ugu, pawpaw, groundnut, beans and poultry.

Research Design

This study adopted a descriptive survey design. It aimed to collect data on the role of agro-entrepreneurial marketing and campus farming practices in addressing food insecurity in Nigeria, specifically at the University of Maiduguri. The approach was quantitative and involved structured questionnaires administered to respondents involved in campus farming.



Population

The target population consisted of students and staff involved in agro-entrepreneurship and campus farming activities at the University of Maiduguri. Additionally, local farmers who practiced urban agriculture within the region were considered part of the population.

Sample

A sample of 200 respondents was selected from the University of Maiduguri. This included individuals actively involved in campus farming, such as those participating in farming activities, and those directly engaged with agro-entrepreneurial marketing initiatives.

Sampling Technique

A stratified random sampling technique was used to ensure that the sample represented different groups (students and staff). Random selection within each stratum ensured that diverse perspectives were captured from participants involved in different aspects of campus farming.

Method of Data Collection

Data were collected through questionnaires designed to assess participants' involvement, awareness, and perspectives on agro-entrepreneurial marketing and food security. The questionnaire included both closed and open-ended questions to gather both quantitative and qualitative data.

Instrument for Data Collection

A structured questionnaire was developed for the study. The instrument consisted of demographic information such as age, gender, and academic level; knowledge of food insecurity and campus farming; involvement in agro-entrepreneurship and urban agriculture; perceptions of the effectiveness of campus farming in combating food insecurity; and attitudes toward sustainable farming and innovative technologies.

Method of Data Analysis

Data were analyzed using descriptive statistics, including frequencies, percentages, and means, to summarize the responses. The results were presented in tables to allow for clear interpretation. Additionally, inferential statistics (such as chi-square tests) were applied to explore relationships between demographic variables and involvement in campus farming or agro-entrepreneurial marketing.



RESULT

Table 1: Socio-Demographic Characteristics of Respondents n = 200

Variable	Category	Frequency	Percentage
Age Group	18–24 years	120	60%
	25–30 years	50	25%
	31–35 years	20	10%
	36 years and above	10	5%
	Total	200	100%
Gender	Male	100	50%
	Female	100	50%
	Total	200	100%
Academic Level	Undergraduate	150	75%
	Postgraduate	40	20%
	Staff	10	5%
	Total	200	100%
Field of Study	Agriculture / Agricultural Science	80	40%
	Environmental Science	40	20%
	Engineering	30	15%
	Social Sciences	30	15%
	Business Administration	20	10%
	Total	200	100%
Level of Involvement in Campus Farming	Actively involved	120	60%
	Moderately involved	50	25%
	Not involved at all	30	15%
	Total	200	100%

Table 1 presents the socio-demographic characteristics of the 200 respondents included in the study. The age distribution shows that the majority of respondents (60%) were between 18 and 24 years, followed by 25% in the 25–30 age group. A smaller proportion of respondents (10%) were aged 31–35 years, while only 5% were 36 years and above, indicating a predominantly younger population

Regarding the level of involvement in campus farming, a significant majority of respondents (60%) were actively involved, while 25% reported moderate involvement. Only 15% of the respondents were not involved in campus farming at all. This indicates strong participation in farming activities among respondents, aligning with the study's aim to assess agro-entrepreneurship and its role in addressing food insecurity.



Objective 1: Examine the role of agro-entrepreneurship marketing in combating food insecurity on campus.

Table 2: Role of Agro-Entrepreneurship Marketing in Combating Food Insecurity on Campus **n = 200**

Response Category	Frequency	Percentage
Enhancing Access to Affordable Food	70	35%
Encouraging Local Food Production	85	42.5%
Creating Awareness of Food Security Challenges	30	15%
Generating Employment and Income	15	7.5%
Total	200	100%

Source: Field Survey, 2025

Table 2 highlights the significant contributions of agro-entrepreneurship marketing in addressing food insecurity on campus, as perceived by the respondents. The most prominent role identified is encouraging local food production, with 85 respondents (42.5%) recognizing this as a critical aspect. This indicates that agro-entrepreneurship marketing fosters local farming practices, thereby increasing food availability and reducing dependence on external food supplies.

Overall, the data underscores the multifaceted role of agro-entrepreneurship marketing in promoting food security on campus, addressing both accessibility and production challenges while offering educational and economic benefits.

Objective 2: Assess the effectiveness of campus farming in improving food security.

Table 3: Effectiveness of Campus Farming in Improving Food Security

Farming Practice	Frequency	Percentage
Backyard Gardens	60	30%
Greenhouses	50	25%
Vertical Farming	40	20%
Poultry Farming	50	25%
Total	200	100%

Source: Field Survey, 2025

Table 3 highlights respondents' perceptions of the effectiveness of agro-entrepreneurship marketing in addressing food insecurity on campus. Out of the 200 respondents, 42.5% considered agro-entrepreneurship marketing to be effective, while 35% viewed it as very effective. Together, these two categories account for a significant majority (77.5%), indicating a strong belief in the potential of agro-entrepreneurship marketing to combat food insecurity within the campus setting.



Overall, the findings demonstrate that most respondents recognized agro-entrepreneurship marketing as a valuable tool in addressing food insecurity on campus. However, the presence of respondents who viewed it as ineffective or expressed uncertainty underscores the need for more awareness campaigns, training, or enhanced initiatives to maximize its impact.

Objective 3: Explore the impact of climate-smart agricultural practices.

Table 4: Impact of Climate-Smart Agricultural Practices

Practice	Frequency	Percentage
Use of drought-resistant crops	90	45%
Efficient water management	65	32.5%
Agroforestry practices	45	22.5%
Total	200	100%

Source: Field Survey, 2025

Table 4 provides insights into the adoption of climate-smart agricultural practices among respondents. The most widely practiced strategy was the use of drought-resistant crops, reported by 45% of respondents. This high adoption rate reflects a growing awareness of the importance of crop resilience in mitigating the effects of climate change, particularly in regions prone to erratic rainfall or prolonged dry seasons.

Overall, the data indicate that respondents are actively engaging in diverse climate-smart agricultural practices to address climate-related challenges. However, the lower adoption rates for agroforestry and efficient water management suggest the need for targeted interventions, such as capacity-building programs, incentives, or access to resources, to encourage broader implementation of these sustainable practices.

Summary of Findings

1. Enhancing access to affordable food, encouraging local food production, creating awareness of food security challenges and generating employment and income were the role of agro-entrepreneurship marketing in combating food insecurity on campus.
2. Majority of the respondents recognized agro-entrepreneurship marketing as a valuable tool in addressing food insecurity on campus.
3. Majority of the respondents are actively engaging in diverse climate-smart agricultural practices to address climate-related challenges.

DISCUSSION

The findings of this study reveal the pivotal role agro-entrepreneurship marketing plays in combating food insecurity on campus. The identified contributions include enhancing access to affordable food, encouraging local food production, creating awareness of food security challenges, and generating employment and income. These roles align with previous studies that



highlight agro-entrepreneurship marketing as an effective strategy for addressing food security issues by improving food accessibility, reducing costs, and promoting sustainable local farming practices (Adekunle et al., 2020). By prioritizing local food production and affordable pricing, agro-entrepreneurship marketing directly contributes to reducing the prevalence of food insecurity within the campus community.

Furthermore, the study indicates that the majority of respondents view agro-entrepreneurship marketing as a valuable tool in addressing food insecurity. This widespread acknowledgment reflects its impact on bridging gaps in food supply chains, fostering self-reliance, and creating economic opportunities for campus residents. Empirical research by Okafor and Eze (2021) similarly supports the notion that agro-entrepreneurship initiatives enhance food availability and affordability, particularly in institutional settings.

Practices such as the use of drought-resistant crops, efficient water management, and agroforestry were notably embraced by respondents. These practices demonstrate a proactive approach to mitigating the effects of climate change on agricultural productivity, which is crucial for ensuring food security. Previous studies, such as those by Akinyele and Yusuf (2019), have emphasized the importance of climate-smart agriculture in sustaining food production amid increasing environmental uncertainties.

Collectively, these findings illustrate a comprehensive approach to addressing food insecurity on campus, combining the benefits of agro-entrepreneurship marketing with adaptive agricultural strategies. This dual approach not only ensures food accessibility but also fosters resilience to climate-induced food production challenges, thereby contributing to the overall sustainability of food systems.

CONCLUSION

Agro-entrepreneurship marketing and the adoption of campus farming techniques can significantly improve food security on university campuses in Nigeria. Climate-smart practices are especially vital in areas prone to drought and flooding. By leveraging these farming practices, universities like the University of Maiduguri can become more self-sufficient in food production and contribute to broader efforts in combating national food insecurity.

RECOMMENDATIONS

1. **Enhance agro-entrepreneurship programs:** Universities should promote agro-entrepreneurship through practical training and access to resources such as funding and technology.
2. **Expand campus farming initiatives:** Increase the number of farming initiatives like vertical farming, greenhouses, and poultry projects to improve food availability.
3. **Support climate-smart practices:** The government and universities should invest in research and technologies related to drought-resistant crops and efficient water management systems.
4. **Encourage public-private partnerships:** Collaboration between universities, the government, and private sector can help create sustainable models for food security.



Ethical clearance

Ethical consent was sought and obtained from the participants used in this study. They were made to understand that the exercise was purely for academic purposes, and their participation was voluntary.

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Conflict of Interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Authors' Contributions

Veronica N. Ndubuisi conceived the study, including the design, Umma A. U. Mani collated the data, and Richard I.B. handled the analysis and interpretation, while Veronica N. Ndubuisi also wrote the initial manuscript. All authors have critically reviewed and approved the final draft, and are responsible for the content and similarity index of the manuscript.

Availability of data and materials

The datasets on which conclusions were made for this study are available on reasonable request.

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APPENDIX 1

Nigeria Hunger Statistics

Year	% of population	Annual Change
2018	12.60%	0.70%
2017	11.90%	-0.10%
2016	12.00%	0.90%
2015	11.10%	1.30%
2014	9.80%	1.20%
2013	8.60%	1.00%
2012	7.60%	0.10%
2011	7.50%	0.10%
2010	7.40%	0.10%
2009	7.30%	0.10%
2008	7.20%	0.30%
2007	6.90%	-0.10%
2006	7.00%	-0.40%
2005	7.40%	-0.80%
2004	8.20%	-0.60%
2003	8.80%	-0.30%
2002	9.10%	0.00%
2001	9.10%	0.00%

Source: Nigeria Hunger Statistics (2021)

APPENDIX II

Plate 1: Maize plants



Plate 2: Sweet Potato Plants



Plate 3: Sweet Potato Tubers





Plate 4: Ugu Vegetable

