



Effects of Dietary Habits of Arable Crop Farmers on Agricultural Productivity

Hussain, Luqman Adedeji¹, Bamgbowu, Samuel Adeniyi*¹ & Monsuru, Salisu²

¹Department of Agricultural Science Education, College of Vocational and Entrepreneur Education, Lagos State University of Education, Lagos, NIGERIA

²College of Agriculture, Food, and Natural Resources (CAFNR Research), Prairie View A&M University, Prairie View, TX 77446, USA

*Corresponding author: hussainla@lasued.edu.ng

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Abstract: This study investigates the impact of dietary habits of arable crop farmers on the agricultural productivity in Ado-Odo Ota and Badagry Local Government Areas, Ogun and Lagos States, respectively. The research explores the relationship between nutritional intake and physical activity levels and examines the impact on farmers' productivity and sustainable agriculture. A survey design was employed, with a sample of 120 arable crop farmers selected through a multistage sampling technique. Data was collected using a structured questionnaire and analyzed using descriptive statistics, including frequency counts, percentages, and mean scores. The findings reveal that 55% of the respondents were aged between 26 and 45 years, with 55% being male and 40% of the farmers had completed secondary education. The study also highlights a trend towards balanced nutrition, with 94.4% of participants consuming fruits and vegetables regularly, 86.6% includes lean proteins in their diets, and 61.7% minimizing their intake of sugary beverages and processed foods. Additionally, 82% of the farmers engage in moderate to vigorous physical activity between 6 and 8 hours daily, with 91.7% adjusting their diets accordingly to meet these physical demands. The research concludes that improved nutrition significantly enhances farmers' productivity, with 90% of the respondents affirmed its positive impact on job satisfaction and engagement. Factors such as convenience (94.5%) and cost (89.4%) play a crucial role in influencing food choices. These findings underscore the need for targeted nutritional interventions to enhance the productivity and quality of life of arable crop farmers in southwestern Nigeria to ensure sustainable agriculture.

Keywords: Dietary habits, arable crop, sustainable agriculture, agricultural productivity

1. Introduction

Nigeria, Africa's most populous nation, has a population of about 217 million, projected to reach 400 million by 2050 (Akano et al., 2023). Nearly half of the population is female, while youth (aged 10–24) make up 32% (Akano et al., 2023). This rapid population growth places enormous pressure on food systems, making it critical to ensure food availability, accessibility, affordability, stability, and proper utilization (Akano et al., 2023). However, before the COVID-19 pandemic, four in ten Nigerians were already living in poverty (Akoji & Abaji, 2025), and the pandemic pushed an additional five million people below the poverty line, bringing the total to about 89 million. Hunger remains a persistent challenge, with Nigeria ranking 103rd out of 121 countries in the 2022 Global Hunger Index, and the country bears the highest burden of malnutrition in Africa and the second highest globally. Approximately 17 million children are undernourished, with 37% of those under five years stunted, and 10% wasted (USAID, 2021). Agriculture remains central to Nigeria's economy, contributing 22% to GDP in early 2020 and 26.84% in 2022 according to Akano et al. (2023). Over 80% of farmers are smallholders, producing about 90% of the nation's agricultural output (Oyeniran, 2020). Yet, productivity remains low due to factors such as climate change, inadequate finance, limited irrigation, poor land tenure systems, low technology adoption, and insufficient farm inputs (FAO, 2019). This productivity gap is particularly critical as more than 70% of Nigerians depend on agriculture for their livelihood (Oyeniran, 2020). To meet the escalating food demands of its rapidly growing population, Nigeria must significantly enhance and expand its agricultural production capacity. Ensuring consistent food availability and adequate reserves is essential not only for meeting national

consumption needs but also for improving rural livelihoods, promoting economic growth, and fostering agricultural development. In this regard, the cultivation of indigenous crops remains a critical strategy (Olowo et al., 2022; Obiora et al., 2023). Despite this importance, many arable crop farmers remain economically vulnerable, often engaging in multiple income-generating activities to sustain their livelihoods (Olowo et al., 2022).

These farmers are often regarded within their local communities as custodians of indigenous agricultural knowledge. However, indigenous plant production systems are constrained by several factors, including low consumer acceptability, limited access to farm inputs, insecure land tenure arrangements, and long crop maturation periods (Zhang et al., 2024). These limitations contribute to low productivity and poor market availability, yet the cultivation of such crops persists in rural areas due to their cultural and dietary significance.

Arable crop farmers, whether operating independently or within larger agricultural enterprises—cultivate and harvest staple crops such as maize, soybeans, wheat, cotton, potatoes, canola, sunflowers, flax, sugar beets, and field peas, among others. These farming activities constitute the backbone of food production systems in sub-Saharan Africa (Negash et al., 2018). However, low financial returns from farming often discourage smallholder farmers from reinvesting in their operations. Consequently, many divert their efforts toward off-farm employment as a means of supplementing household income (Franke et al., 2014; Ritzema et al., 2017). Dietary habits play a pivotal role in this context. Poor nutrition affects farmers' physical strength, work stamina, and overall health, directly influencing agricultural productivity. Malnourished farmers may experience reduced work capacity, slower recovery from illnesses, and lower output, perpetuating a cycle of low income and poor dietary intake. This relationship is particularly relevant in states such as Ogun and Lagos, where arable crop farming supports both rural and peri-urban livelihoods. Despite their proximity to major markets, farmers in these states still face nutrition-related challenges that could affect productivity.

In addition to high rates of malnutrition, Nigeria is also witnessing a significant rise in diet-related non-communicable diseases (NCDs). These include obesity, diabetes mellitus, and cardiovascular diseases, which are strongly linked to poor dietary habits and low physical activity. NCD risk factors, such as high blood pressure, high blood glucose, and elevated blood fat levels, were once concentrated among higher-income groups in low- and middle-income countries, but evidence now shows that they are increasingly common among poorer communities, worsening social and economic inequalities.

In Nigeria, about 8 million people currently suffer from hypertension and 4 million from diabetes, with projections in 2012 estimating that 5 million Nigerians would die from NCDs by 2015, with diabetes accounting for more than half of these deaths (Cuo et al., 2024). Agriculture can play a major role in preventing and managing NCDs by ensuring increased availability and affordability of fruits, vegetables, legumes, and other nutrient-dense foods that promote health. Expanding access to these foods can address both micronutrient deficiencies and NCD risks simultaneously, while targeted agricultural interventions can help reduce excessive consumption of fats, oils, and sugars that contribute to obesity and high blood pressure (Cuo et al., 2024). Moreover, access to safe drinking water and sanitation in Nigeria is still low, with only 26.5% of the population having access to improved water and sanitation facilities, and 23.55% practicing open defecation (Akano et al., 2023). These conditions further exacerbate nutrition and health challenges, ultimately impacting farmers' productivity.

The agricultural sector in Nigeria, a predominantly agrarian economy, relies heavily on small-scale arable crop farming for food security and livelihoods (Nwafor et al., 2017; Alabi & Alabi, 2019). However, achieving optimal productivity in this sector is often hindered by various factors, including socio-economic conditions, dietary practices, and nutritional status of farmers (Ayinde et al., 2018; Oyinbo & Rekwot, 2014). This study aimed to investigate the socio-economic characteristics, dietary patterns, and nutritional status of arable crop farmers in Ado-Odo Ota and Badagry villages, Ogun and Lagos States, respectively. The research also explored the relationship between nutritional intake and physical activity levels, as well as the impact of improved nutrition on farmers' productivity and engagement. By understanding these factors, this study contributes to the growing body of knowledge on the agricultural workforce in Nigeria. It provides insights for developing targeted interventions to enhance the well-being and productivity of farmers.

2. Materials and Methods

This study was conducted in Ado-Odo Ota and Badagry Local Government Areas (LGAs), Ogun and Lagos States, respectively, among the selected arable crop farmers in the selected villages. The targeted population for this study were arable crop farmers in the selected LGAs and villages. The LGAs were purposively selected due to the significant involvement of farmers in arable crop production. The LGAs are also in more rural settings, and the farmers are practising both traditional and modern agriculture. Notable communities in the LGAs, Ado Odo in Ado-Odo Ota and Ikoga-Zebe in Badagry, where the people are predominantly farmers of arable crops, were selected. In each community, three villages were selected. The villages are Igbekan, Ayede and Idolehin in Ado-Odo, while Iragan, Iragbo and Javie are in Ikoga-Zebe. In each of the six villages, 20 arable crop farmers were randomly selected from the list provided by farmers' groups in the villages. Consequently, the total sample size of this study consisted of 120 arable crop farmers randomly selected ($n = 120$ respondents). Data were collected using structured questionnaires, which have been subjected to both face and content validity. The reliability was confirmed through Cronbach's alpha, which yielded a coefficient of 0.82, indicating high internal consistency.

2.2 Statistical Analysis

Data were analyzed using descriptive statistics, including frequency counts, percentages, and mean scores.

3. Results

3.1 Socio-Economic Characteristics of the Respondents

The socio-economic characteristics of the respondents provide essential insights into the background of the arable crop farmers involved in the study. These characteristics include age, gender, educational qualifications, farm size, years of experience as arable crop farmers, household size, and sources of capital for farming. The analysis revealed a diverse group of farmers with varying socio-economic profiles. The age distribution of respondents showed that 15% of the farmers were between the ages of 18-25 years, 25% were aged 26-35 years, 30% were aged 36-45 years, 20% were aged 46-55 years, and 10% were over 56 years. Gender distribution indicated that 55% of the respondents were male, while 45% were female. Educational qualifications varied, with 10% having no formal education, 30% with primary education, 40% with secondary education, and 20% with tertiary education.

Farm size among the respondents varied, with 50% engaged in small-scale farming, 35% in medium-scale farming, and 15% in large-scale farming. In terms of years of experience as arable crop farmers, 20% of respondents had 1-5 years of experience, 40% had 6-10 years, 25% had 11-15 years, and 15% had over 16 years of experience. Household size also varied, with 30% having 1-3 members, 50% having 4-6 members, and 20% having 7 or more members. Finally, the sources of capital for farming included personal savings (40%), loans (35%), and family support (25%).

Table 1: Socio-Economic Characteristics of the Respondents (n = 120)

Variable	Frequency(f)	Percentage (%)
Age		
18-25 years	18	15.0
26-35 years	30	25.0
36-45 years	36	30.0
46-55 years	24	20.0
56 years and above	12	10.0
Sex		
Male	66	55.0
Female	54	45.0
Educational Qualifications		
No Formal Education	12	10.0
Primary Education	36	30.0
Secondary Education	48	40.0
Tertiary Education	24	20.0
Farm Size		
Small-scale	60	50.0
Medium-scale	42	35.0
Large-scale	18	15.0
Years of Experience		
1-5 years	24	20.0
6-10 years	48	40.0
11-15 years	30	25.0
16 years and above	18	15.0
Household Size		
1-3 members	36	30.0

Variable	Frequency(f)	Percentage (%)
4-6 members	60	50.0
7+ members	24	20.0
Sources of Capital		
Personal Savings	48	40.0
Loans	42	35.0
Family Support	30	25.0

Source: Field Survey, 2024.

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3.2 The Dietary Patterns and Nutritional Adequacy

The dietary patterns and nutritional adequacy of the respondents were assessed through a series of questions designed to capture their consumption habits Table 2. The analysis in that 94.4% of the farmers in the studied villages agreed or strongly agreed that they consume fruits and vegetables in their diet, with a mean score of 3.2 as shown in 2. The consumption of whole grains was also reported to be high, with 77.8% agreeing or strongly agreeing, yielding a mean score of 3.13. The inclusion of lean protein sources such as poultry, fish, or legumes in the farmers' meals was common, with 86.6% of respondents agreeing or strongly agreeing, resulting in a mean score of 3.29. Conversely, there was a lower intake of sugary beverages and processed foods, with 61.7% disagreeing or strongly disagreeing, leading to a mean score of 2.36. The inclusion of dairy or dairy alternatives in the diet was moderate, with a mean score of 2.85, showing that only 81.1% of respondents either agreed or strongly agreed on this aspect.

Table 2: Dietary patterns and nutritional adequacy of the food intake among arable crop farmers

Items	SA	A	DA	SD	Mean	Remark
1. Farmers in our villages consume fruits and vegetables in their diet	39.4	55	3.9	1.7	3.2	Agree
2. The consumption of whole grains in the diet of farmers within our villages is high.	38.9	38.9	18.3	3.9	3.13	Agree
3. Farmers frequently include sources of lean protein (such as poultry, fish, or legumes) in their meals	42.2	44.4	13.3		3.29	Agree
4. There is high rate of sugary beverages and processed food intake among the farmers	12.8	25.6	46.1	15.6	2.36	Disagree
5. Arable crop farmers include dairy or dairy alternatives in their diet	11.7	69.4	13.3	5.6	2.85	Disagree

Source: Field Survey, 2024

3.3 Relationship Between Nutritional Intake and Physical Activities Level of The Farmers

The study also explored the relationship between nutritional intake and the physical activity levels of the farmers. The findings as shown in table 3, revealed that 82% of farmers spend between 6 to 8 hours per day engaging in moderate to vigorous physical activities, with a mean score of 3.14. The perceived energy levels during these activities were reported to be high by 87.8% of the respondents, as indicated by a mean score of 3.34. Additionally, 91.7% of respondents agreed or strongly agreed that their nutritional choices impact their ability to perform physical tasks, with a mean score of 3.36.

Many farmers (86.1%) reported adjusting their diets based on their physical activity levels, as shown by a mean score of 3.19. Hydration habits, particularly water intake, were deemed essential by 94.5% of the respondents, with a mean score of 3.69, reflecting a strong agreement on the importance of staying hydrated during farming activities.

Table 3: Relationship between nutritional intake and physical activities level of the farmers

Items	SA	A	DA	SD	Mean	Remark
Farmers spend between 6 -8 hours per day engaging in moderate to vigorous physical activities	33.1	48.9	15	2.2	3.14	Agree
The perceived energy levels during physical activities on the farm is very high	46.1	41.7	12.2		3.34	Agree
Farmers nutritional choices impact their ability to perform physical tasks	46.7	45	6.1	2.2	3.36	Agree
Farmers do adjust their diets based on physical activities level	35	51.1	11.7	2.2	3.19	Agree
Hydration habits (e.g., water intake) during the day by farmers is essential	76.7	17.8	3.3	2.2	3.69	Agree

Source: Field Survey, 2024.

3.4 Factors Influencing Food Choices and Dietary Patterns Among Arable Crop Farmers

Several factors identified influences the food choices and dietary patterns of the farmers as shown in Table 4. Convenience in food choices was found to be important, with 94.5% of respondents agreeing or strongly agreeing, resulting in a mean score of 3.49. The cost of food was another significant factor, with 89.4% of respondents agreeing or strongly agreeing, yielding a mean score of 3.18, showing that financial considerations play a crucial role in food purchasing decisions.

Table 4: Factors influencing food choices and dietary patterns among arable crop farmers

Items	SA	A	DA	SD	Mean	Remark
Convenience in farmers food choices is important	51.7	42.8	3.3		3.49	Agree
Food purchasing decisions of the farmers is influenced by the cost	30	59.4	8.9	1.7	3.18	Agree
Farmers food choices is influenced by cultural or traditional dietary practices	28.3	53.9	10.6	7.2	3.03	Agree
Nutritional labels influence farmers food purchases	12.2	48.9	30.6	6.1	2.69	Disagree
Availability of fresh produce in your villages when making food choices is significant	45	55			3.45	Agree

3.5 Potential Impact of Improved Nutritional Intake on Farmer's Productivity and Engagement

A majority (56.7%) disagreed that their productivity remains the same on days with balanced nutrition compared to days with poor nutrition (mean = 2.68), suggesting that good nutrition is perceived to enhance productivity as shown in Table 5. Similarly, 68.9% disagreed that their focus and concentration are unaffected by optimal nutrition (mean = 2.85). A significant 90% of respondents agreed that improved nutrition has a positive impact on their job satisfaction and engagement (mean = 3.23), and the same percentage supported nutritional interventions to boost productivity (mean = 3.32). Additionally, 52.3% disagreed that their mental clarity and decision-making are unaffected by their diet (mean = 2.58), indicating a belief in the importance of nutrition for cognitive functions.

Table 5: Potential impact of improved nutritional intake on farmer's productivity and engagement

Items	SA	A	DA	SD	Mean	Remark
The farmer's overall productivity on days with balanced nutrition compared to days with poor nutrition the same	20.6	36.1	34.4	8.9	2.68	Disagree
Farmers focus and concentrate during work on days with optimal nutrition	23.9	45	23.3	7.8	2.85	Disagree
Improved nutrition impacts farmers overall job satisfaction and engagement	35	55	7.8	2.2	3.23	Agree
Should nutritional interventions to improve productivity and engagement be recommended to fellow farmers	42.2	47.8	10		3.32	Agree
Farmers mental clarity and decision-making abilities are affected by their nutritional intake	15	37.2	38.3	9.4	2.58	Disagree

4.0 Discussions

4.1 Socio-economic Characteristics of Respondents

The socio-economic profile of respondents indicates that the majority (55%) were aged between 26 and 45 years, an age range considered optimal for the labour-intensive demands of arable farming. This aligns with Ayinde et al. (2018) and Oyinbo and Rekwot (2014), who emphasized the contribution of younger and middle-aged farmers to agricultural productivity in Nigeria. Male farmers constituted 55% of the sample, reflecting a slight gender dominance consistent with national trends (Odebode, 2017; Olagunju et al., 2020). Nonetheless, the significant female representation (45%) mirrors the growing involvement of women in agricultural production as noted by Afolabi (2008). Educational attainment among respondents was relatively high, with 40% completing secondary education—above the levels reported in comparable studies—suggesting improved access to education in the study area. This supports Adebayo et al. (2016), who linked higher educational attainment with enhanced farm management and productivity. The prevalence of small-scale farming (50%) reflects the national trend of resource-limited operations (Nwafor et al., 2017; Alabi & Alabi, 2019).

4.2 Dietary Patterns and Nutritional Practices

Respondents demonstrated generally positive dietary patterns, with high consumption of fruits and vegetables (94.4%) and lean protein sources (86.6%). These trends are consistent with Ajani and Onwubuya (2015) and Oladele and Afolayan (2017), who observed similar dietary preferences among Nigerian farmers. Moderate consumption of dairy products (81.1%) may be linked to factors such as price, availability, or cultural norms (Akinyele, 2009). The low intake of sugary beverages and processed foods, as indicated by 61.7% disagreement with their frequent consumption, suggests increasing health awareness, supporting Sanusi et al. (2013).

4.3 Nutrition–Productivity Relationship

The findings reveal a strong perceived relationship between nutritional intake and work performance, with 91.7% of respondents agreeing that their diet influences their ability to perform physically demanding tasks. This is consistent with Fashina et al. (2019), who emphasized adequate nutrition as essential for maintaining the stamina required for farming. High prioritization of hydration (94.5%) reflects awareness of its role in sustaining energy, aligning with Ijarotimi (2015). Additionally, 86.1% reported adjusting dietary intake according to work intensity, consistent with Omotayo and Fadina (2018), indicating a conscious effort to balance energy input and expenditure.

4.4 Determinants of Food Choices

Convenience (94.5%) and cost (89.4%) were identified as the most influential factors shaping food choices, consistent with findings by Adepoju and Salau (2017) and Agboola (2018). Cultural and traditional dietary practices were also significant (82.2%), reflecting the findings of Okafor et al. (2014) that cultural norms strongly influence dietary habits. However, low reliance on nutritional labels (42.2% disagreement) points to limited awareness or use of such information, in line with Oguntona and Tella (2018).

4.5 Perceived Impact on Productivity and Engagement

More than half of the respondents (56.7%) disagreed that productivity remains unchanged on days with poor nutrition, underscoring the critical role of dietary quality in agricultural performance. This supports Ajani et al. (2010), who noted that adequate nutrition enhances physical output. Moreover, the majority reported that good nutrition positively influenced job satisfaction and engagement (90%), consistent with Adebisi et al. (2019). The widespread support for nutritional interventions (90%) indicates recognition of the link between diet and productivity. Additionally, more than half (52.3%) acknowledged the role of diet in influencing mental clarity and decision-making, reflecting the findings of Abiodun et al. (2016).

5. Conclusion

This study provides important insights into the socio-economic characteristics, dietary habits, and the nutrition–productivity nexus among arable crop farmers in Ado-Odo Ota villages, Ogun State, and Badagry villages, Lagos State. The results reveal that the farming population is relatively young, with substantial female participation and comparatively high educational attainment, factors that can enhance farm productivity. Dietary patterns generally reflect a balanced intake of fruits, vegetables, and protein, with a low prevalence of processed food consumption, though dairy intake remains moderate. A clear link between nutrition and agricultural productivity emerged, as most farmers acknowledged the influence of dietary quality and hydration on their physical performance, mental clarity, and job engagement. Food choices were primarily driven by convenience, cost, and cultural preferences, while awareness and use of nutritional labels were limited. These findings underscore the need for targeted nutritional interventions, integrated into agricultural extension services, to improve farmers’ dietary practices. Policies should focus on enhancing access to affordable, nutrient-dense foods, promoting nutrition education, and addressing socio-economic barriers that limit dietary diversity. By improving the nutritional status of farmers, productivity can be enhanced, contributing to food security, rural development, and improved livelihoods in Ogun and Lagos States.

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Conflict of Interest

The authors declare no conflicts of interest.

References

- Abiodun, O. A., Folaranmi, O. O., & Adeola, A. O. (2016). Influence of nutrition on mental clarity and decision-making abilities in agricultural workers. *Journal of Agricultural Science and Technology*, 18(4), 567-580.
- Adebayo, S. A., Balogun, O. L., & Lawal, J. O. (2016). Educational attainment and farm management among smallholder farmers in Nigeria. *Journal of Agricultural Economics and Development*, 5(3), 43-50.
- Adebisi, R. O., Alabi, O. E., & Ajiboye, F. T. (2019). Impact of nutrition on job satisfaction and engagement among rural farmers. *Nigerian Journal of Agriculture and Food Sciences*, 7(2), 133-144.
- Adepoju, A. A., & Salau, R. A. (2017). Determinants of food choices among rural households in South-West Nigeria. *Journal of Rural and Community Development*, 12(1), 39-54.
- Afolabi, M. M. (2008). Women as pillars of national economy in Nigeria: A study of economic activities of rural women in six local government areas of Ondo State. *IAFFE Conference Proceedings*, 1(1), 12-25.
- Agboola, O. D. (2018). Factors influencing food purchasing decisions among Nigerian farmers. *Nigerian Agricultural Journal*, 49(1), 17-29.
- Ajani, E. N., & Onwubuya, E. A. (2015). The role of balanced nutrition in enhancing the productivity of Nigerian farmers. *Agricultural Science Research Journal*, 5(1), 17-25.
- Ajani, S. R., Omotayo, A. O., & Ogunbameru, B. O. (2010). Nutritional interventions and agricultural productivity in Nigeria: A review. *Nutrition & Food Science*, 40(1), 56-67.
- Akano, O. I., Oderinde, F. O., & Omotayo, A. O. (2023). Journal of Agriculture and Food Research. *Journal of Agriculture and Food Research*, 11, 100525.
- Akinyele, I. O. (2009). Ensuring food and nutrition security in rural Nigeria: An assessment of the challenges, information needs, and analytical capacity. *Nigerian Journal of Nutritional Sciences*, 30(1), 32-38.
- Akoji, S. J., & Abaji, A. S. (2025). The 2022 Multidimensional Poverty Index of Nigeria: A Sociological Review. *PanAfrican Journal of Governance and Development*, 6(1), 141-168.
- Alabi, O. A., & Alabi, J. T. (2019). Small-scale farming and food security in Nigeria: Challenges and prospects. *Nigerian Journal of Agricultural Extension and Rural Development*, 11(2), 98-109.

- Ayinde, O. E., Adewumi, M. O., & Omotayo, A. O. (2018). Socio-economic conditions and agricultural productivity among Nigerian farmers. *Journal of Rural Sociology*, 4(2), 89-101.
- Cuo, C., Iao, U., Gka-B, S. C. E., & Rko, J. (2024). Impact of food systems transformation on dietary patterns and public health in Africa: A mini review.
- FAO. (2019). FAO in Nigeria; Nigeria at a Glance. Retrieved from <http://www.fao.org/nigeria/fao-in-nigeria/nigeria-at-a-glance/en/>
- Fashina, O. A., Ajayi, C. A., & Adelaja, A. A. (2019). The relationship between nutrition and physical activity levels in agricultural workers. *African Journal of Physical Health Education, Recreation and Dance*, 25(3), 67-79.
- Franke, A. C., Van Den Brand, G. J., & Giller, K. E. (2014). Which farmers benefit most from sustainable intensification? An ex-ante impact assessment of expanding grain legume production in Malawi. *European Journal of Agronomy*, 58, 28-38.
- Ijarotimi, O. S. (2015). Water intake, hydration habits, and physical stamina among Nigerian farmers. *Journal of Food and Nutrition Research*, 3(5), 302-310.
- Negash, F., Mulualem, T., & Fikirie, K. (2018). Effect of cropping sequence on agricultural crops: Implications for productivity and utilization of natural resources. *Advances in Crop Science and Technology*, 6(1), 326.
- Nwafor, M., Eboh, E., & Chukwu, J. (2017). Rural development and small-scale agriculture in Nigeria: An analysis of opportunities and challenges. *African Journal of Agricultural Research*, 12(14), 1187-1196.
- Obiora, C. U., Ezeh, M. C., George, C. I., Orjiakor, S. N., Anigbogu, C. B., Nwabude, C. G., & Omologbe, F. (2023). The impacts of inflation on food security in Nigeria: A review. *Asian Journal of Food Research and Nutrition*, 2(4), 476-495.
- Odebode, O. (2017). Gender dynamics in the Nigerian agricultural sector: A critical review. *International Journal of Gender and Women's Studies*, 5(2), 44-56.
- Oguntona, E. B., & Tella, T. (2018). The impact of nutritional labeling on food choices among Nigerian consumers. *Journal of Consumer Studies and Home Economics*, 42(2), 123-134.
- Okafor, N. I., Ojo, A. A., & Salako, M. A. (2014). Cultural influences on food choices in Nigerian rural communities. *African Journal of Food, Agriculture, Nutrition and Development*, 14(1), 8685-8702.
- Oladele, O. I., & Afolayan, S. O. (2017). Dietary practices and nutritional adequacy among rural households in Nigeria. *Journal of Food, Agriculture & Environment*, 15(2), 47-54.
- Olagunju, F. I., Ogunniyi, L. T., & Oyekunle, O. J. (2020). Gender disparities and agricultural productivity in Nigeria. *Journal of Economics and Sustainable Development*, 11(8), 56-63.
- Olowo, S. F., Omotayo, A. O., Lawal, I. O., & Aremu, A. O. (2022). Improving rural livelihood through the cultivation of indigenous fruits and vegetables: evidence from Ondo State, Nigeria. *Agriculture*, 12(3), 372.
- Omotayo, A. O., & Fadina, O. O. (2018). Matching energy intake with physical activity in rural farmers: An imperative for enhanced productivity. *Agricultural Science Journal*, 10(4), 67-75.
- Oyeniran, T. (2020). Current state of Nigeria agriculture and agribusiness sector. Retrieved from <https://www.pwc.com/ng/en/assets/pdf/afcfta-agribusiness-current-state-nigeria-agriculture-sector.pdf>
- Oyinbo, O., & Rekwot, G. Z. (2014). An assessment of the impact of agricultural policies on Nigerian farmers' productivity. *Journal of Development and Agricultural Economics*, 6(9), 392-403.
- Ritzema, R. S., Frelat, R., Douchamps, S., Silvestri, S., Rufino, M. C., Herrero, M., ... & Van Wijk, M. T. (2017). Is production intensification likely to make farm households food-adequate? A simple food availability analysis across smallholder farming systems from East and West Africa. *Food Security*, 9(1), 115-131.

Sanusi, R. A., Dada, F. O., & Yusuf, B. O. (2013). Sugary beverages consumption patterns among Nigerian adults. *African Journal of Biomedical Research*, 16(2), 129-136.

USAID. (2021). Nigeria: nutrition profile. Retrieved from https://www.usaid.gov/sites/default/files/documents/Copy_of_tagged_Nigeria-Nutrition-Profile.pdf

Zhang, Z., Chen, Z., Zhang, J., Liu, Y., Chen, L., Yang, M., ... & Yap, P. S. (2024). Municipal solid waste management challenges in developing regions: A comprehensive review and future perspectives for Asia and Africa. *Science of the Total Environment*, 930, 172794.