The Nexus Between Farm Productivity, Financing, and Gender Equality: Evidence from Rural Arable Crop Farmers in South-South Nigeria

Michael I. E. Edaba

Department of Agricultural Economics and Extension, University of Africa, Toru-Orua, Bayelsa State, Nigeria

Corresponding Author:
Michael I. E. Edaba

Publication Date: 25 April-2025
DOI: 10.55677/GJEFR/07-2025-Vol02E4

ABSTRACT

One of the most essential and crucial considerations in the world today is how to afford adequate food for the over seven billion people in the globe. This paper examined the nexus between farm productivity, financing, and gender equality: evidence from rural arable crop farmers in South-South Nigeria. A multi-stage random sampling procedure was employed to select 284 respondents for the study. Primary data was analyzed using descriptive statistics such as frequency, percentage, and mean, as well as econometric models such as z-test and multiple regression. From the results, farmers in the formal credit sector enjoyed a substantially greater levels of farm productivity (with mean productivity level of 6.85) compared to their counterparts who depended on the informal credit sector for farm financing (with mean productivity level of 5.34). In the same vein, the mean level of productivity of male headed farmers and female headed farmers were 8.474 and 5.15 for formal financing category; and 6.377 and 4.972 for farmer categories who only access finance through the unregulated informal sector, implying that the male headed farmers were more productive than their female folks. Factors such as land area, labour, fertilizer-use, age and marital status were found to have significant effects on crop productivity in the study area. For farmers to become more resilient and viable, it is strongly recommended that government and all stakeholders make necessary financial investments to support farmers to obtain greater access to funding opportunities. Also, it is fundamental to ensure that farmers are not discriminated on gender basis when applying for loans and credit facilities.

INTRODUCTION

Guaranteeing food security and gender equity has become a critical issue for countries with varying levels of economic development, especially as the world experiences extremely unequal patterns of socioeconomic growth and disparities in social status (Odoh, Sennuga, Bamidele, and Ameh, 2024). According to Moseley and Battersby, (2020), nearly one thousand million people today live in what is known as absolute poverty, with daily wages of less than US$1. Most of these people are chronically hungry. Hunger is not a natural state; it is the result of human activity (or inaction), and in a world capable of producing more than enough food for everyone, poverty is the primary reason. As populations grow and more people migrate from rural to urban areas, alleviating hunger will become even more challenging than it is now, unless efforts to ease it and enhance support for agriculture are put in place (Edaba, Aroyehun, Onyeama and Edaba, 2024).

Thus, the agricultural sector is critical for increasing the supply of food and ensuring the availability of rich diet (Adenle, Weding, and Azadi, 2019). However, while there is widespread consensus that demand for food worldwide will increase in the future decades, there is ambiguity about global agricultural capacity to meet this need through food supply expansion and augmentations (Ayinde, Otekunrin, Akinbode, and Otekunrin, (2020).

Enhanced food supply through increased agricultural production and expanded agricultural land use appears to be a feasible approach of eradicating hunger and malnutrition. Unfortunately, low-income developing countries like Nigeria would struggle to

meet their food production needs beyond 2027 due to limited technology and knowledge (Pawlak and Kołodziejczak, 2020). According to Ahmed (2023), agricultural productivity refers to overall farm production in connection to access and utilization of farm inputs such as labour, capital, land, chemicals and fertilizer. Increasing productivity leads to higher farm performance and higher returns (Odoh, et al., 2024; and Ahmed, 2023). Most developing countries require high agricultural production to promote economic development and achieve food security (Afolabi, Ola, and Egbogu, 2018). Farmers' use of improved agricultural technology may result in an upsurge in agricultural output, stimulating the transition from low to high agricultural productivity (Cordelia and Edwin, 2020). However the vast majority of them are unable to provide for themselves or their families. This low productivity is mostly due to fragmented land ownership, an overreliance on rain-fed agriculture, poor input supply, climate variability, and limited access to farm finance (Aroyheun, Edaba, and Gbassi, 2023).

According to Adigun, (2022) farmers' access to finance is thought to play an important role in improving the welfare of the rural poor by improving agricultural output and ensuring the incorporation of productivity-enhancing modern inputs such as seeds, fertilizers, and farm equipment. Farmer's access to farm finance increases productivity and raises living standards by breaking the cycle of poverty (Rahman, et al., 2023). For instance, Osondu, (2015); and Nchuchuwe and Adejuwon, (2012) reported that agricultural finance is recognized as a key component in the development of the agricultural sector as it has the ability to boost resource productivity, capital development, and agricultural diversification among rural farmers. Despite this reality, agricultural funding options are limited and restrictive, especially amongst the female folks (Ajewole, Eyitayo, Ojehomon, Agboho-Noameshie, and Diagne, 2015; and Qing, 2020).

In one study by Ashagidigbi (2022), it was noted that gender disparities in accessing economic and productive resources have garnered a lot of attention in Sub-Saharan Africa. Gender involvement in Nigeria is governed by the expectations, duties, and conduct of both the male and female folks. Besides, women in Nigeria perform important roles in the agricultural sector; and they account for about 75 percent of the sector's workforce (Akokuwebe, Amusan, and Odularu, 2021).

For these reasons, this paper offers a crucial and comprehensive perspective on farm productivity, financing, and gender equality in Nigeria. The study compared the mean productivity levels of farmers who rely on the informal financial sector for funding to those who obtain credit facilities from the formal financial sector. The productivity levels of male and female headed farmers were also compared. Also, the factors that affect the productivity of farmers were determined.

LITERATURE REVIEW
i.   Conceptual perspectives
Farm productivity although have various descriptions, it is most commonly referred to as agricultural production per unit of input, total output per hectare, and output per worker Cordelia and Edwin, 2020). But regardless of the measurement, empirical research backs up the notion that increases in agricultural output are crucial for growth. For instance, Christiansen *et al.,* (2011) and Awotide *et al.* 2015) investigated how credit access affects farm productivity in Nigeria and found that credit institutions need to improve on their core services to rural farming households in order to benefit more families. In a related work, Ali and Awade (2019) studied the implications of credit constraints on the welfare of soybean farmers in rural Togo and found that access to funding opportunities increases soybean performance by 1.35 percent and further boosts farmers' sales by 1.32 percentage. Chandio et al. (2019)

Access to finance and other financial services has been proven to reduce poverty and promote increased farm productivity. However, as Osabohien *et al.* (2020) observed that producing sufficient food to feed the exploding global population appears to be challenging because, among other things, there are less arable lands, higher-priced farm due to inflation, fewer farmers who have access to finance and increasing rural-urban migration. Many rural farmers are unable to achieve maximum output in their farm business due to numerous constraints including the aforementioned (Adeleye *et al.,* 2020; Osabohien *et al.,* 2020; Balana, and Oyeyemi, (2021). In most developing economies, both formal and informal financial sources are available for rural agriculture financing. Formal financial entities, such as legally chartered banks, are the major credit lenders. However, borrowers and depositors must follow prescribed application procedures under official sources in order to get credit from credit institutions (Ijioma, and Osondu, 2015). In Nigeria, the Central Bank as an apex bank governs and oversees financial institutions, providing loans, savings, insurance, and other financial services and products (Gadanakis, 2019). Informal lenders, on the other hand, include friends, family members, and money lenders in rural regions. These lenders are essential in helping farmers to access short-term repayable funds for their farm operations (Isaga, 2018). According to Ijioma, and Osondu, (2015). Farmers usually get modest, quickly repayable loans from these unofficial lenders in the form of cash or crop supplies. It is worth noting that these lenders' operations are usually not monitored by any regulatory agency, and less stringent screening mechanisms are employed in their daily operations.

ii. Theoretical perspectives:
The theory of rural credit market, production and capital constraint theory forms the theoretical foundation of this study.
*   **Theory of rural credit market**
The theory of rural credit market was proposed by Hoff and Stiglitz (1996). According to the first argument, informal moneylenders in villages operate as usurious monopolists, maximising earnings by charging exorbitant interest rates. To fully grasp this extremely complex market, we need to go beyond this categorization, even though there are some levels of monopoly that attracts significant

transaction costs. The second phase of this theory holds that high interest rates are a sign of high borrower risk and that the rural lending market is roughly perfectly competitive with a market-clearing equilibrium.

- **Theory of Production**

This study is also based on the theory of production, which states that at a given level of technology and production inputs, an efficient producer will realize optimum production of outputs. This theory assumed effects of external and internal factors on different households (especially rural farmers) in the creation of food (Kurz and Salvadori, 1995).

- **Capital Constraint Theory**

This theory depicts how banks behave when it comes to lending to small businesses because there aren't enough financial resources. According to this theory, banks are subject to both market- and regulator-imposed capital requirements (Obamuyi's (2017).

METHODOLOGY

South-South Nigeria served as the location of the study. The following states are included in the South-South geopolitical region of Nigeria: Akwa Ibom, Bayelsa, Cross River, Delta, Edo, and Rivers States. The South-South zone has an estimated human population of 26,551,327 and occupies nearly one-third of Nigeria's total land area. Sheep, goats, and chickens are just a few of the animals that farmers in the area mostly raise, along with arable food crops. Among these food crops are rice, cassava, maize, sweet potatoes, yams, plantains, bananas, and vegetable crops.

The sampling frame methodology created by Krejcie and Morgan (1970) and applied by Nanjundeswaraswamy and Divakar (2021), was employed to get the sample size of 284. Cross-sectional data gathered from primary sources was used for this investigation. Respondents who grow arable crops were surveyed in the 2021–2022 cropping season. These relationships provided guidance for designing the research instrument (questionnaire) as well as assistance with pre-testing the instruments. The following variables were used to gather the primary data: the respondents' socioeconomic characteristics, including their age, sex, household size, educational background, farming experience, farm size, extension contacts, yields and market price of crops, costs, and benefits; the amount of land cultivated; access to finance; labor input; loan repayment history etc.

Descriptive statistics such as frequency distribution, percentage, and mean; and inferential statistics such as z-test, and ordinary least square regression model were used for data analysis.

Test of difference in mean value of productivity among the male and female farmers was analysed using the mean formula:

$$Z = (\bar{x}_1 - \bar{x}_2) / \sqrt{[(V^2_1 / N_1) + (V^2_2 / N_2)]} \qquad (1)$$

Where,

Z= calculated worth of the statistical significance of the mean difference of male and female household headed rural arable crops farmers who have access to formal finance and those who do not.

$\bar{x}_1$ = mean amount of farm credit accessed by male headed arable crop farmers to ensure efficiency in their farms

$\bar{x}_2$ = mean amount of farm credit accessed by female household headed arable crop farmers to ensure efficiency in their farms.

V^2_1 = sample variance of amount of farm credit accessed by female household headed arable crop farmers in the study area

V^2_2 = sample variance of amount of farm credit accessed by male household headed arable crop farmers in the study area.

N_1 = number of observations of amount of rural credit accessed by male arable crop farmers in the study area.

N_2 = number of observations of amount of rural credit accessed by female arable crop farmers in the study area.

Rule of thumb: if Zcal is > Ztab at 5% level of significance, reject the null hypothesis, if otherwise, accept the null hypothesis.

The total factor productivity of the farmers was determined using Hugo *et al* (2016) approach. This is given as.

$$TFP_i = Y_i / \sum P_i Q_i \qquad (2)$$

where TFP_i = Total factor productivity for i^{th} farmer (Kg)

Y_i = Total value of arable crop output by i^{th} farmers (Kg)

P_i = Unit price of variable input (₦)

Q_i = Quantity of variable input used (Kg)

$\sum$ = Summation.

The effect of access of farm finance on the output of the arable crop farmers was analysed using Ordinary Least Square Regresssion (OLS) was fitted to data following Obasi (2015). This is expressed as:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8 + \beta_9 X_9 + \beta_{10} X_{10} + \beta_{11} X_{11} + \beta_{12} X_{12} + \beta_{13} X_{13} + \beta_{14} X_{14} + U \qquad (3)$$

Y= output of cassava (in Kg)

X_1 = land area (ha)

X_2 = fertilizers (kg)

X_3 = herbicides X_1 (litres)

X_4 = planting materials (bundles)

X_5 = land area (ha)

X_6 = age (number of years in school)

X_7 = gender (dummy, male = 1, female = 0)

X_8 = marital status (married = 1, single = 0)

X_9 = household size (number of household members)

X_{10} = level of education (number of years in school)

X_{11} = years of farming experience

X_{12} = extension visits (number of extension visits in the previous years)

X_{13} = credit received ((Naira);

X_{14} = cooperative membership (membership- 1, non-membership = 0)

RESULTS AND DISCUSSIONS

Table 1: Distribution of respondents based on level of productivity of arable crop **farms:**

TF Productivity	Formal credit-access households		Informal credit-access households		Pooled	
	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
0.1-1.0	6	3.8	8	5.8	14	12.8
1.1-2.0	18	11.5	25	18.1	27	9.3
2.1-3.0	33	21.2	**33**	**23.9**	**65**	**22.5**
3.1-4.0	**34**	**21.8**	26	18.8	56	19.4
4.1-5.0	17	10.9	11	8.0	28	9.7
5.1-6.0	10	6.4	10	7.2	21	7.3
6.1-7.0	3	1.9	6	4.3	16	5.5
7.1-8.0	7	4.5	1	0.7	14	4.8
8.1-9.0	3	3.2	1	0.7	7	2.4
9.1-10.0	1	0.6	1	0.7	3	1.0
10.1-11.0	2	1.3	-	-	1	0.3
11.1- above	1	0.6	1	0.7	3	1.0
Total	151	100	133	100	284	100
Mean	**6.85**		**5.34**		**4.26**	

 Source: *field survey data, 2023*

The level of productivity of the farmers is computed and presented in Table 1. The results from the study found mean productivity levels of 6.85 and 5.34 for the formal and informal financial access categories of farmers, respectively; agreeing with the productivity levels reported by Iheke, Ndim, and Chimaobi, (2019); and indicating that farmers in the area are basically engaged in small-scale farming. The reason for the low productivity levels in the study may be due to the fact that the amount of credit received by farmers in the area may not be enough to acquire large expanse of farmlands required to contribute positively to ensure efficiency in farm operations. This also conforms to the findings of Osundare, (2020), who reported that farmers in Sub-Sharan Africa are confronted with the challenge of accessing basic farm inputs, and are therefore compelled to practice subsistence farming. In a similar study, Saleem, Jan, Khattak, and Quraishi, (2014), (2014) reported that the availability of credit to farmers had a direct impact on the output of their crops because credit is crucial for raising agricultural productivity. Farmers may buy the equipment and inputs they need to run their farms when credit is readily available. He observed that a 1% increase in institutional credit disbursed for seeds, fertilizer, and pesticides improved agricultural output by roughly 1.5%.

Chaiya, Sikandar, Pinthong, Saqib, and Ali, (2023) had shown in their research that agricultural mechanization and the use of basic farm inputs such as fertilizers, pesticides and access to farm credit ensure higher productivity. In a similar study, Rahman, et al, (2022) found that farmers who use agricultural credit increases productivity, raises farm output and improves living standards, which enhances the wellbeing of the people with respect to food security.

Table 2: Tests for difference in mean values of productivity among male and female farmers

Variable	Obs.	Mean	Std. error	Std dev.	Z-value
Formal financial access	**151**	6.847	2.549	31.334	7.807***
Informal financial access	**133**	5.343	0.684	7.893	2.685
pooled	**284**	4.262	0.256	4.315	
Productivity					
Male headed households	**77**	8.474	43.629	6.377	0.650**
Female headed households	**74**	5.151	54.86	4.972	0.663
Pooled	151	4.262	0.256	4.315	

 Source: *field survey data, 2023*

Note: Obs. = observation, Std. =standard; ** and *** indicates statistical significance at 5 percent and 1 percent level of significance. The results of the statistical tests of difference in productivity level amongst the two groups of farmers (formal and informal financial access) were presented in table 2. The test revealed that a significant difference in productivity level exists between farmers in the formal finance category of the study area and their counterparts in the informal financial access group. The calculated t-test for productivity effect was positively significant at 1 percent level. Similarly, the mean level of productivity for those in the formal financial access category was 8.474 for males, and 5.151 for the females compared to 6.377 and 4.972 for the informal category, implying that farmers who sourced farm finance through the formal credit sector recorded higher productivity levels in relation to those who rely on informal sources. The interpretation of this outcome is that access to formal finance contributed meaningfully to the productivity of the farmers in the area. Findings from Samson, and Obademi (2018); and Gadanakis, (2019) have reported that access to credit is a development tool capable of persuading farmers to invest in and embrace better farming practices and production technologies in order to increase productivity. This also conforms to the work of Oyewo, and Oladeebo, (2023).

To account for gender disparity, the effect of access to farm finance on productivity levels among male and female farmers were further tested and presented in Table 2. From the results, there was a significant difference in the productivity levels of male and female farmers, as shown by the estimated t-statistic for productivity effect, which was positively significant at the 5 percent level. Similarly, male farmers were found to have a mean productivity level of 8.474, while their counterpart female farmers recorded 5.151 mean productivity level.

Evidence from previous studies have shown that women in Nigeria put in more man-days than men in farming as they are visibly seen planting, weeding, harvesting, marketing and processing storage of farm produce. They rally round to ensure that fresh and nutritious farm foods are available for their families (Nwandu, 2019; and Ashagidigbi, 2022). Despite their visible roles in farming ventures, numerous studies, particularly in sub-Saharan Africa, have shown that women have less access than their male counterparts to productive inputs, such as improved seed varieties, extension services land, and capital input due to traditional beliefs which constrain them from inheriting lands from loved ones (Odoh, et al., (2024); Edaba, Onoja and Elum, (2023); and Ashagidigbi (2022)). This situation envisions a danger to development because gender equity is a prerequisite for both sustainable development and poverty reduction, making it more than just a goal in and of itself. This condition is made even more disturbing by the fact that women are more likely to spend their farm earnings on family medical needs, food, and clothing than men are, who either reinvest their earnings for increased agricultural productivity or use them for personal development (Sadiq et al. 2022).

Table 3: **Regression results of effects of rural credit access on output of arable crop farmers**

Variables	Exponential (informal access)	Double-Log (+) (Formal Access)	Double-log (+) (Pooled households)
(Constant)	7.754	6.217	5.186
	(11.148)***	(2.966)***	(3.611)***
Land area	0.920	0.855	0.311
	(7.686)***	(6.755)***	(2.310)***-
Labour	0.103	0.425	0.545
	(3.468)***	(1.906)*	(4.002)***
Fertilizer	0.012	-0.094	0.033
	(2.843)**	(-1.770)*	(0.758)
Herbicides	0.002	0.032	-0.019
	(0.054)	(0.533)	(-0.341)
Planting materials	0.005	0.187	0.432
	(1.267)	(1.228)	(3.511)***
Age of farmer	-0.014	0.033	0.118
	(-1.882)*	(0.072)	(0.342)
Gender (M=1; F=0)	-0.018	0.166	0.150
	(-0.133)	(1.094)	(1.226)
Marital status	-0.318	0.071	-0.184
	(-3.146)***	(0.391)	(-1.677)*
Level of education	-0.018	0.202	0.154
	(-0.222)	(0.830)	(0.868)
Farming experience	0.004	0.049	-0.003
	(0.466)	(0.336)	(-0.024)
Extension contact	-0.132	0.149	-0.047
	(-0.874)	(1.006)	(-.379)
Credit access	0.422	-0.701	0.264

	(0.513)	(-0.742)	(1.880)
Cooperative membership	-0.295 (-1.267)	-0.115 (-0.690)	-0.169 (-1.102)
R^2	0.650	0.750	0.776
F Ratio	6.478***	8.628***	4.790)***

Source: *field survey data, 2023* ***, **and * are significant at 1%, 5% and 10% respectively

From the result, land area, labour, fertilizer, age and marital status were the significant determinants of farm output of farmers in the informal financial access category at 1 percent, 5 percent and 10 percent respectively. For those in the formal financial access category, land area, labour, planting materials and fertilizer were the significant determinants of farm output of farmers at 1 and 10 percent respectively. Similarly, land area, labour, fertilizer, age and marital status were the significant determinants of farm output of farmers in the pooled category at 1 percent and 10 percent respectively.

The coefficient for land area was found to be positively significant in all the three categories of farmers (informal, formal and pooled access categories) at 1 percent level of significance, implying that a one percent rise in land area would lead to a 0.920 percent increase in arable crops farm output. Farmers with larger farm sizes are likely to achieve greater output due to cultivating larger land areas (Johnson, 2021; Smith *et al*., 2022). In their study, Patil, Hiwarka and Verma (2019) affirmed that planting materials play a central role in agricultural production because excellent planting material relates with the environment to affect the crop's health and productivity.

Similarly, in the three groups of farmers, the coefficients of labour (0.012, 0.425, and 0.545) remained positively significant at 1 percent, 10, and 1 percent, suggesting that farmers' increased labour input would lead to higher output levels. It's possible that in this situation, the marginal productivity of labour which implies an increase in production brought on by the addition of an extra unit of labour exceeds the marginal cost of labour. Additional labour can contribute to improved productivity by facilitating various farming activities such as planting, harvesting, and crop maintenance. Jones, Brown and Palumbo, (2020) supports the notion that increased labour utilization positively impacts farm productivity and output.

The coefficients of fertilizer (0.012, and -0.094), were also found to be significant at 5 percent and 10 percent, respectively for both informal and formal financial access categories. Fertilizer is a significant component that has attracted advancement in technology which raises the frontier of production and increases farm output. Fertilizers play a crucial role in enhancing growth, development, and overall output in agricultural production systems. Therefore, it is expected that farmers who make extensive use of fertilizers are more likely to achieve higher yields. However, the results from the findings contradicts *apriori* expectations. However, this result is in line with Okoye and Onyenweaku's (2007), Ukoha et al.'s (2010) and Green *et al.* (2019) who opined that higher utilization of fertilizers leads to increased farm output. This implies that higher utilization of fertilizers in the study area leads to decrease in farm output. The reason for this disturbing departure from expectations may be due to the fact that most farmers in the study area are still illiterate, ignorant, and slow to technology adoption and thus dependent on traditional farming practices which do not encourage the adoption of improved farming methods.

Also, the coefficient of age (-0.014) for the informal credit category was negatively significant at 10 percent level; indicating that an inverse relationship existed between age and output levels of the farmers; a year increase in the age of farmer brings about a corresponding decrease in output of the farmer. This conforms to a priori expectation; Idiong (2007) and Ihieke et al. (2019) have reported that the older a farmer becomes, the more he is unable to pool his assets optimally, given the available tools. Hlouskova and Prasilova, (2020) and further posited that the risk bearing abilities and innovativeness of a farmer, his mental prowess to cope with the daily challenges and demands of farm production activities and his ability to do manual work decreases with advancing age. Following Malabayaba, and Mishra, (2022); and Ibeagwa (2012), farmers become more conventional, more subtle to risk and subsequently less innovative as they become older. Thus, economic plans for promoting agricultural production should be more tilted to the youths than adults.

CONCLUSION AND RECOMMENDATIONS

Global pandemics, conflicts, population growth, shifting dietary patterns, and climate change have all put food security and the growth of the agriculture food sector at risk. These difficulties greatly increase the demand on policymakers to focus on building a more resilient and sustainable global agriculture and food industry. The findings of this study emphasize the importance of age, land area, labour, Planting materials, fertilizer and gender equality as factors that influences farm output.

From the results, farmers who had access to formal finance maintained higher mean productivity levels (6.85) compared to their counterparts (with mean productivity level of 5.34) who only depend on informal sources of finance for their farm operations. In a similar vein, it was shown that the mean productivity level of male farmers was higher, 6.847, in comparison to that of female farmers (which was 5.343).

As the consensus for sustaining food security in developing countries steadily gains momentum, we must make investments to help farmers get access to the farm finance. Also, in this situation that women predominate and play key roles in the production of farm produce, gender balance is strongly recommended. Agricultural policies and programs must ensure inclusive funding in order to attain food security and sustainable development throughout Africa, including Nigeria.

There is also need for the government and all stakeholders to establish a supervised financial program in addition to functional and effective credit schemes; to ensure that farmers are not subjected to gender discrimination during the processes of loan application.

REFERENCES

1. Adeleye, N., Osabuohien, E. & Asongu, S. (2020). Agro-industrialisation and financial intermediation in Nigeria. *African Journal of Economic and Management Studies*, 11(3), 443-456.

2. Adenle, A.A.; Weding, K. & Azadi, H. (2019). Sustainable Agriculture and Food Security in Africa: The Role of Innovative Technologies and International Organizations. *Technol. Soc*, *58*, 1–17.

3. Aderinoye-Abdulwahab, S. A. (2020). "Agricultural policies and economic recovery and growth plan (ERGP 2017-2020)," in Strategic Lenses: Economic Diversification and National Development in Nigeria, eds Kadiri, M. M., Attu, E. A., Alarape, A. L., and Udeh, C. S. (Abuja: National Defence College, Abuja, Nigeria).

4. Adigun, G.T. (2022) Determinants of Credit Access among Smallholder Women Farmers. In Kwara State, Nigeria. *Nigeria Agricultural Journal,* 53(2), 121-128

5. Afolabi, M.B., Ola, A.A., & Egbogu, P.N (2018). Food security: A threat to human security in Nigeria. Journal of Health and Social Issues, 7(2), 1-13.

6. Ahmed, Gharira (2023). Agricultural Productivity in the Country Will Have a Good Future. *African Journal of Economics and Sustainable Development* 6(3), 1-17.

7. Ajewole, O., Eyitayo, O., Ojehomon, V., Agboho-Noameshie, R., & Diagne, A. (2015). Gender Analysis of Agricultural Innovation and Decision Making amongRice Farming Household in Nigeria, *Journal of Agricultural Informatics,* 6(2), 72-82.

8. Akokuwebe, M. E., Amusan, L. & Odularu, G. (2021). "Women development in agriculture as agency for fostering innovative agricultural financing in Nigeria". *African Journal of Food, Agriculture, Nutrition and Development*. 21 (7): 18279–18299.

9. Ali, E. & Awade, N.E. (2017). Credit constraints and soybean farmer's welfare in subsistence agriculture in Togo. *Heliyon* 5, 1550.

10. Aroyehun A. R., Edaba M. I.E. & Gbassi I. J. (2023). Assessment of Climate Change Vulnerability on Cassava Output in Nigeria. *Journal of Agriculture and Environmental Resources*, 5(5), 650-1220.

11. Ashagidigbi, W. M., Orilua, O. O., Olagunju, K. A. & Omotayo, A. O. (2022). "Gender, Empowerment and Food Security Status of Households in Nigeria". *Agriculture*. 12 (7): 956 – 970.

12. Awotide, B.A.; T.; A.,; & Manyong, V. M. (2010). Impact of Access to Credit on Agricultural Productivity: Evidence from Smallholder Cassava Farmers in Nigeria. *International Association of Agricultural Economists* (IAAE) > 2015 Conference, August 9-14, 2015, Milan, Italy.

13. Ayinde, I. A., Otekunrin, O. A., & Akinbode, S. O. (2020). Food security in Nigeria: impetus for growth and development. *J. Agric. Econ.* 6, 808–820.

14. Ayinde, I.A., Otekunrin, O.A., Akinbode, S.O., & Otekunrin, O.A (2020). Food Security in Nigeria: Impetus for Growth and Development. *Journal of Agricultural Economics and Rural Development,* 6(2). 808-820.

15. Balana, B. & Oyeyemi, M., (2021). Credit constraints and adoption of agricultural technologies in developing countries? Evidence from Nigeria. Paper presented at the *International Conference of Agricultural Economits* (ICAE 2021), August 17-31.

16. Chaiya, C.; Sikandar, S.; Pinthong, P.; Saqib, S.E.; Ali, N. (2023). The Impact of Formal Agricultural Credit on Farm Productivity and Its Utilization in Khyber Pakhtunkhwa, Pakistan. *Sustainability,* 15, 1-14.

17. Chandio, A. A., Jiang, Y. Gessesse, A.T. & Dunya, R. (2019). The Nexus of Agricultural Credit, Farm Size and Technical Efficiency in Sindh, Pakistan: A Stochastic Production Frontier Approach. *Journal of the Saudi Society of Agricultural Sciences* 18 (3), 348–354.

18. Chen, Y., Fu, W. & Wang, J., (2022). Evaluation and influencing factors of China's agricultural productivity from the perspective of environmental constraints. *Sustainability,* 14(5), 2807-2832.

19. Christensen, C. M., Horn, M. B., and Johnson, C. W. (2011) *Disrupting Class: How Disruptive Innovation Will Change the Way the World Learns*, New York, McGraw Hill.

20. Cordelia N.O. & O. Edwin (2020). Analysis of the factors influencing productivity of rice farms in Ebonyi State, Nigeria, International *Journal of Agricultural Science*, 2(2), 316-325

21. Edaba, M.I.E., Onoja, A.O., & Elum, Z.A.., (2023). The Effects of Rural Credit Access on Technical Efficiency among Cassava-Based Farmers in South-South Nigeria, *Agricultural economics and extension studies*, 11(2), 13-23.

22. Ejikeme, J. O., Ojiako, J. C., Onwuzuligbo, C., & Uand Ezeh, F. C. (2017). Enhancing food security in Anambra state, Nigeria using remote sensing data. *Environ. Rev.* 6, 27–44.

23. Food and Agriculture Organization of the United Nations (2020) Statistical Database. Value of Agricultural Production. Available online: http://www.fao.org/faostat/en/#data/QV

24. Food and Agriculture Organization of the United Nations (2022). Statistical Database. Suite of Food Security Indicators Available online: http://www.fao.org/faostat/en/#data/FS

25. Food and Agriculture Organization of the United Nations Statistical Database. FAOSTAT (2020). Available online: http://www.fao.org/faostat/en/#data

26. Gadanakis, Y (2019) it sources, access and factors influencing credit demand among rural livestock farmers in Nigeria Article in Agricultural Finance Review · October 2019.

27. Hlouskova Z., Prasilova M. (2020): Economic outcomes in relation to farmers' age in the Czech Republic. *Agric.Econ–Czech,* 66: 149–159.

28. Ibeagwa O.B., Nnamerenwa G.C.O. & Anorue C.P. (2012). "Analysis of Returns on Investment of Cassava Processing in Kwara State, Nigeria". Paper presented at the Annual Conference of the Farm Management Association; Michael Okpara University of Agriculture, Umudike. Oct. 15th-19th, 2012; 46-50.

29. Idiong, I. C. (2007). Estimation of Farm Level Technical efficiency in smallscale swamp Rice Production in the Cross River State of Nigeria: A stochastic frontier Approach. *World Journal of Agricultural Sciences.* 3 (5): 653-658.

30. Iheke, O.R., Ndim, A.R., & Chimaobi, N.T (2019). Effects of Oil Spillage on Productivity of Farmers in River State, Nigeria. *International Journal of Agriculture and Development Studies,* 4(1), 23-35.

31. Ijioma, C. J. & Osondu, C. K. (2015). Agricultural credit sources and determinants of credit acquisition by farmers in Idemili Local Government Area of Anambra State. *Journal of Agricultural Science and Technology,* 5(2015), 34-43

32. Isaga N. (2018). Access to bank credit by smallholder farmers in Tanzania: A case study. *Afrika Focus,* 31 (1), 241-256.

33. Johnson, R. (2021). The Role of Land Area in Agricultural Productivity: Evidence from Farm-Level Data. *Journal of Agricultural Economics,* 72(1), 231-250.

34. Jones, L., Brown, D. and Palumbo, D. (2020) Coronavirus: A Visual Guide to the Economic Impact. BBC News, 3 April 2020. https://www.unic.ac.cy/da/2020/05/08/

35. Kayode, A.O., Adebayo, S.A., Salami, M.F., & Odeleye, S.T. (2024). Gender gaps in agro-based income generating enterprises among rural households in Ogun state, Nigeria, SVU-International *Journal of Agricultural Sciences,* 6(2), 110-120.

36. Krejcie, R.V., & Morgan, D.W., (1970). Determining Sample Size for Research Activities. Educational and Psychological Measurement.

37. Kurz, H. D. & Salvadori, N. (1995), Theory of Production. A Long-period Analysis, Cambridge, New York and Melbourne: Cambridge University Press.

38. Malabayaba, M.L, & Mishra, A.K (2022). Assessing inverse relationships in joint farm decision-making households: an empirical evidence from Eastern India, Front. *Sustain. Food Syst.* 6:1000156. doi: 10.3389/fsufs.2022.1000156

39. Mallum A. (2016). A Review of Agricultural Finance Policy Development in Nigeria). 26(1) University of Maiduguri Annals of Borno.

40. Moseley, W. G., & Battersby, J. (2020). The vulnerability and resilience of African food systems, food security, and nutrition in the context of the COVID-19 pandemic. *African Studies Review, 63*(3), 449–461

41. Nanjundeswaraswamy, T.S. & Divakar, S. (2021) Determination of sample size and sampling methods in applied research. *Proceedings on Engineering Sciences.* 3, (1) (2021) 25-32,

42. Obamuyi, T. M. (2017). An explanatory study of loan delinquency among SMEs in Ondo state of Nigeria. *Labour and Management in Development Journal,* 8. 1-10.

43. Odoh, P.O., Sennuga, S.O., Bamidele, J., & Ameh, D.A. (2024). Gender and food Security in Nigeria, Analyzing Disparities and Empowering Women: A Critical Review, *Research Journal of Food Science and Quality Control,* 10(1), 20-36.

44. Olomola, A. S., & Gyimah-Brempong, K. (2014) Loan Demand and Rationing Among Small-Scale Farmers in Nigeria (December 31, 2014). IFPRI Discussion Paper 01403, Available at SSRN: https://ssrn.com/abstract=2545468

45. Onyebinama, U.A.U; & Onyejelem, J.C. (2010). Comparative Analysis of Income of Cassava Farmers in Rural and Urban Areas of Abia State, Nigeria. *Agricultural journal 5 (2), 57-62.*

46. Osabohien R, D. Ufua, C.L. Moses, E. Osabuohien (2020). Accountability in agricultural governance and food security in Nigeria, *Braz. J. Food Technol.,* 23 (2020), 2019054

47. Osundare, F. O. Toluwase, S. O. W. Adekunmi, A. O. Ajiboye, A; Oluwatusin F.M. & Arifalo, S.F (2020). Credit Accessibility and Productive Efficiency of Arable Crop Farmers: Empirical Evidence from Ekiti State. European *Journal of Physical and Agricultural Sciences*, 8(1), 10-18.

48. Oyeyemi, S.D. (2021). Preliminary Investigation on the Phytochemical Constituents of HoneySamples from Ado-Ekiti, Ekiti State, Nigeria, _Agricultural and Food Science Journal of Ghana_ 10(1), 787-794.

49. Patil, A. S., Hiwarkar, V. D., Verma, P. K., & Khatirkar, R. K. (2019). Effect of TiB2 addition on the microstructure and wear resistance of Ti-6Al-4V alloy fabricated through direct metal laser sintering (DMLS). *Journal of Alloys and Compounds*, *777*, 165-173.

50. Pawlak, K., & Kołodziejczak, M. (2020). The role of agriculture in ensuring food security in developing countries: Considerations in the context of the problem of sustainable food production. *Sustainability*, *12*(13), 5488

51. Qing, S. (2020). 'Gender role attitudes and male-female income differences in China.' *The Journal of Chinese Sociology, 7, 12.*

52. *Rahman, Z., Islam, J.*, Mahmuda,S., and Hossain, E (2022). Factors Influencing Farmers' Access o Formal Credit Market in Naogaon District of Bangladesh: An Empirical Analysis, *European Journal of Business and Management Research,* 7(5), 30-38.

53. Sadiq, A.A.; Khardi, S.; Lazar, A.-N.; Bello, I.W.; Salam, S.P.; Faruk, A.; Alao, M.A.; Catinon, M.; Vincent, M.; Trunfio-Sfarghiu, A.-M. A (2022) Characterization and Cell Toxicity Assessment of Particulate Pollutants from Road Traffic Sites in Kano State, Nigeria. *Atmosphere*, *13*, 80

54. Saleem, A., Jan, F. A., Khattak, R. M., & Quraishi, M. I. (2014). Impact of farm and farmers characteristics on repayment of agriculture credit. *Abasyn Journal of Social Sciences*, 4(1), 23e35

55. Ukoha, O.O, Okoye, B.C. & Emetu, J. (2010). Analysis of the Determinants of Total Factor Productivity among Small-Holder Cassava Farmers in Ohafia L.G.A of Abia State, *International Journal of Agriculture and Development.* Retrieved from: https://mpra.ub.unimuenchen.de/26125

56. Wegren, S.K.; Elvestad, C. (2018) Russia's food self-sufficiency and food security: An assessment. *Post-Communist Econ. 30*, 565–587

57. Wudil, A. H., Ali, A., Hassan, S., and Mushtaq, K. (2021). Exploratory factor analysis of the perceived constraints affecting rice farmers of Kano river irrigation (KRIP) Kano state, Nigeria. *International Journal of Agricultural Extension* 9, 485–492.