

## **Effect of Socio-Economic Demographics of Rice Farmers' on Accessing Credit from Financial Institutions in Kano, Nigeria**

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### **Abstract**

The increase in demand for rice in Nigeria was associated with population growth and urbanisation and banning the importation of rice to save a huge amount of money spent by the government. This necessitated the government to provide funds to financial institutions through Anchor Borrowers Programme. The major aim is for rice farmers to afford farm inputs and finance farming expenses and produce more rice. However, recently, there was an increase of complaints from most of rice farmers upon inability to access credit from the financial institutions in the country. Thus, this study examined the effect of the socio-economic demographic of rice farmers on accessing credit from the financial institutions in Kano, Nigeria. The study administered the questionnaire to the 180 rice farmers selected through the multistage sampling technique. The analysis of the data was done through descriptive statistics and Probit regression. The study found age, level of education, gender, farm size, farming experience, and farmers' association influence accessing credit. While the family size and farmer's income do not influence access to credit. Leaving these problems unattained may likely lead to food insecurity and poverty in the country. Therefore, this study recommends, credit provider institutions should understand the characteristics profile of the rice credit applicants. Also, they should delegate staff who can guide the farmers on how to fill the request form and explain the requirements in their native language. Also, a free interest loan should adequately be provided to the farmers.

*Keywords: access, credit, farming, Nigeria, rice*

### **1 Introduction**

Rice is one of the global foremost food crops contributes about 42% of the globe's required source of calorie intake. Today, more than half of the globe's population uses it as their main food (Lobell, Schlenker, & Costa-Roberts, 2011; Udemezue, 2018). Asian countries such as China, India, Indonesia, Thailand, and Singapore are the major top rice producers in the world with almost a share of 90.4% of the world production, USA, 5%, Europe 0.6%, and 4% Africa (FAOSTAT, 2019). Correspondingly, in Nigeria rice crop is essential to food security and generates more income for farmers than any other crops in Nigeria (FAO, 2020). However only half of the fertile land is utilising out of more than 6 million hectares for rice cultivation (Scott, Nzeka, & Taylor, 2017), and the majority of rice farmers are smallholders using low farm inputs (USAID 2011). The demand for rice in Nigeria is increasing annually and expected to reach almost 36 million tons by the year 2050, due to massive population growth as the country was forecasted to be the third most populated country in the same year, against the current population of 198 million (Adeyemo, 2018). Besides, the increase of harvested area from 2011 to 2017 yet, the rice production increment is yet to meet the demand (FAO, 2018). The banning

of rice importation in the country imposed the government to provide credit to rice farmers (Abraham, 2018).

The imperative of rice has made food security studies since the beginning of the 21st century to explore the possibilities of boosting and sustainability of rice production (Chen, Cao, Fang, & Kang, 2019; Kabir, Cramb, Alauddin, & Gaydon, 2019; Paresys et al., 2018; Silva, Reidsma, Lourdes, Velasco, Laborte, & van Ittersum, 2018; Tsinigo & Behrman, 2017).

Recently, many countries have focused their effort on providing and easing the process of credit accessibility to farmers (Chandio, Jiang, Wei, Rehman, & Liu, 2017). Also, the significant effect on expediting crop processing and marketing services as well as purchasing of farm equipment and inputs such as improved seeds, labor, and planting materials which in turn can improve farmers' welfare (Ali & Awade, 2019). It was reported that about 1.7 billion households and adults continue to be without access to financial institutions and many more are likely to be poor globally and the majority of them are from China, India, Bangladesh, Indonesia, Mexico, Pakistan, and Nigeria (World Bank, 2017). It was believed any obstacle in accessing funds in a rural area will lead to a worsening in farm crops production, affect GDP and national food security in poor countries. However, rural farmers in developing nations experiencing difficulties in accessing credit (Linh, Long, Chi, Tam, & Lebailly, 2019). Nigeria established many financial institutions in the 1970s to provide credit to farmers. However, only 4% of total lending to the entire sectors was allocated to the agricultural sector by commercial banks. Nevertheless, many rice farmers have been reported complaining about the inability to access credit from Anchor Borrowers Programme in the country (Gabriel, 2018).

Kano state is one of the rice growers' states in Nigeria. The state has forty-four local government areas with a total land area of 20,760 square kilometers. The majority of the people are either directly or indirectly engage in agriculture for their livelihood. The food staple crops produce include maize, rice, wheat, sorghum, and millet among others (NBS, 2016). Also, the state has the highest labour force about 3,713,679 (NBS, 2017). Thus, the study areas selected were Bunkure and Kura because of the availability of fertile land and the amount of rice produced in the areas.

Many studies were focused on the effect of credit access on increasing rice production, adoption of technology, and efficiency in rice production without given much consideration to the socio-demographic of rice farmers. While those studies conducted in the same area were conducted on other food staples. The few studies conducted on farming were more on the effect of credit. The factors that affect rice farmers on accessing the fund kept by the government in various financial institutions could not adequately be analysed or understood without examining the socio-demographic of the paddy farmers. The socio-economic analysis is based on finding the adaptive capability of communities or individuals based on their internal features such as education, income, age, etc. it is essentially required to have a clear picture of the inclusive idea about the composition of the respondents in the study area (Athota, Suhasini, & Rao, 2016). The major question the study attempts to find an answer is how do demographic and farm factors affect rice farmers in accessing credit from financial institutions? Thus, it was on this backdrop, this study was purposely to analyse the socio-demographic of rice farmers in accessing credit from financial institutions in Nigeria. This will be useful to find valid conclusions which may help the researcher to recommend better location-specific viable solutions to the problems identified for the improvement of efficacy in the study area.

This paper consists of five sections. Section one is an introduction that clarifies the background of the study. Section two discussed the previous studies conducted in the area. Section three is the materials and methods. The process of data collection, sampling, and sample size

techniques, related theory, and tools of analysis were also stated. Section four discussed both the socio-demographic of rice farmers and farm factors and estimator model results. Lastly, section five is the conclusion. This includes policy implications, recommendations, and suggestions for future studies.

## 2 Literature review

Although many studies conducted found the significant role of availability of financial accessibility on farming production, technology adoption, efficiency, and productivity (Abraham, 2018; Khanal & Regmi, 2017; Makate et al., 2019; Mitra & Prodhan, 2018). Moreover, Porgo, Kuwornu, Zahonogo, Baptist, & Jatoe, (2017) found credit restraints negatively affect farm households' decision to allocate land to his interested maize crops and cotton farming. Also, Bidisha, Hossain, Alam, & Hasan, (2018) found, the availability of formal sources of credit, changes a farmer's interest away from an inefficient mode of sharecropping to the fixed rental contract. The Mishra, Bairagi, Velasco, & Mohanty, (2018) found access to credit, level of education and drought are the main causes that significantly affect rice farming inefficiency in Cambodia. They suggested a further study to be conducted on access to credit, educational attainment.

Furthermore, Azam & Banumathi, (2015) found that age, educational level, and gender influenced the adoption of organic farming. While the land ownership and family size do not affect the adoption in the study area. Muriu-ng, Mucheru-muna, Waswa, & Mairura, (2017) examines socio-economic factors that affect utilisation of rainwater harvesting and saving technologies in Kenya. The study used a 351 sample size from the proportionate sampling technique. The analysis employed a logistic regression. The result indicates that formal education, farmer's age, farm size, farming history, household size, and training influenced utilisation of rainwater harvesting and saving technologies in the study area. Moreover, Alam et al., (2018) found that vulnerable rural farmers in Bangladesh have unique quality in accessing mobile phones and varied in other ICT such as computers and the Internet, Television, and radio. Likewise, Saqib, Kuwornu, Ahmad, & Panezai, (2018) found household size, age, education, experience, and total landholding of farmers and proportion of own land stimuli the agricultural credit adequacy. Also, Chandio, Jiang, Gessesse, & Dunya, (2019) study the impact of credit and farm size on the technical efficiency of rice productivity in Sindh, Pakistan found farm size and credit are the major leading functions in the provision of rice production. Conversely, Ali & Awade, (2019) studied the impact of access to the agricultural credit on subsistence soybean farmers' welfare of Togo. The results revealed that members of the soybean association and farmers' age are significant indicators for accessing the full amount of credit. Maina, Ritho, Lukuyu, & Rao, (2020) examines socio-economic determinants among dairy farmers in Eastern and Western Kenya. Age, farmer group membership, access to extension, and perceived benefits of the technology influence the adoption of *Brachiaria* grass. Also, Moahid & Maharjan, (2020) found the financial activities of the households were positively determined by the size of land, access to extension, education, number of adults in a household and crop diversity.

Lin, Wang, Gan, Cohen, & Nguyen, (2019) assess the effects of rural households' demographic characteristics on formal credit constraint and explores the relationship between informal and formal lending in rural China. The sample size of 28,228 households was selected and Bivariate Probit model. The result shows that credit constraint is affected by age, level of education, annual household, family size, nonagricultural income, and history of informal borrowing. (Zeb et al., 2020) examines the socio-economic of farmers in Pakistan. The study used 395

respondents derived from the multisampling method. In the analysis, multinomial logistic regression was employed. The result indicates that farmers with large farm sizes are less liable to have quality and more liable to have price information asymmetry. Farmers with more physical assets are likely to have higher education, and better access to other sources of information and are less likely to have both quality and price information asymmetry. Furthermore, Yazd, Wheeler, & Zuo, (2020)

analysed the socio-economic demographics on farmer mental health in the Murray-Darling Basin Australia. The sample size of the respondent of 2141 observations was used in the study. Correlative Random Effects panel data regression was employed in the analysis. The findings indicate that farmer's income, was a positive influence on the farmer's mental health during a nondroughted period.

### **3 Methodology/Materials**

#### ***3.1 Data source***

The data of this study were collected from the questionnaire administered to rice farmers from Bunkure and Kura in Kano state around July- September 2019. The study areas were selected based on their engagement in rice farming activities as well as the availability of fertile land for both rice rain-fed and irrigation farming. The questionnaire instrument contains information on rice farmers' socio-demographic profile and access to credit.

#### ***3.2 Sampling and sample size technique***

The multistage sampling technique was used in selecting the sample. It was considered when the elements of the population are spread over a wide geographical region. The rice farmers of this study were spread into many villages. At the first stage, the top rice farming villages were selected. In the second stage, six villages were randomly selected from the studied area. In the third stage, the list of rice farmers was obtained from the farmers' association. Lastly, a total of 180 respondents were selected as a sample size.

#### ***3.3 Theoretical analysis of farmers accessing financial credit.***

The accessing of credit by rice farmers may likely induce him to adopt new technological methods that consist adoption of hybrid farm input chemicals, mechanisation, and other new methods all to increase the quantity of rice produced per hectares, improve the living standards, and improve his social status through the accessing credit from financial institutions. It is obvious in the literature that risk and uncertainty play a great role in the farmers accessing credit from financial institutions. Concerning the theory of expected utility. It can be used and replaced by the word adoption of technology with the word accept credit. The farmer's decision, whether to accept credit or not to accept, the bottom line is based on the evaluation of expected utility from maximizing profit (Mercer, 2004; Schoemaker, 1982). Also, Joao, Luzardo, & Vanderson, (2015) stated that it is difficult to measure utility. However, profit can be used as a proxy. For example, if rice farmers expect that securing credit from financial institutions would lead to an increase in rice crops and yields to earn more profit. They will do everything possible to secure the credit (Kassie et al. (2015).

#### ***3.4 Analytical model***

The data collected was analysed based on the percentage and Probit regression model in estimation parameters. The Probit is a powerful tool model that is homoscedastic and the probabilities of dependent variables are dichotomous (Aldrich, Nelson, & Adler, 1984). This model was employed in this study to determine the effect of socio-demographic factors on accessing credit. The dependent variable is referred "Yes" if access credit. While if do not access credit was referred to as "No". Moreover, the marginal effects showing the changes that may occur in accessing credit were presented. A positive marginal effect coefficient indicates

that the independent variable is positively connected with accessing credit (in this case). This means the greater the coefficient indicates a strong connection. While the opposite shows a weak relationship. The Probit model was used in many studies to determine the relationship between the dependent and independent variables (Berihun, Bihon, & Kibrom, 2017; Ismail & Sivadas, 2020; Tanoh, Boadu, & Obeng, 2019)

The Probit model specification followed Greene, (2002). Thus, the standard cumulative normal distribution can be expressed as follows:

$$\text{Prob}(Y=1/x) = \int_{-\infty}^{x\beta} \delta(t)dt \Rightarrow \varphi(x\beta) \quad (1)$$

Moreover, according to Wooldridge, (2012) Probit model can be derived based on a particular latent variable model. Assuming  $y^*$  is an unobserved latent variable such that can be expressed as follows:

$$y = \beta_0 + \beta_1 + \beta_k \quad y = 1[y^* > 0] \quad (2)$$

Then the response probability for  $y$  is express as follows:

$$P(y=1/x) = p(y^* > 0/x) = p(e > -(\beta_0 + x\beta)/x) = 1 - \Phi(-(\beta_0 + x\beta)/x) = \Phi(\beta_0 + x\beta) \quad (3)$$

Where  $\Phi$  is a function that takes between 0 and 1. The Probit model for accessing credit can be expressed as  $P(\text{access to credit} = 1/x) = 1/\varphi(\beta_0 + \beta_1 DMG + \beta_2 FRM + e)$  (4)

Where  $\varphi$  = accessing credit (1= Accessing credit, 0= Not accessing credit), The *DMG* indicates demographic factors of the rice farmers that include age, level of education, gender, income, and family size. While *FRM* indicates farm size, farm experience, and farmer's association and  $e$  indicates error terms. The marginal effect relates to continuous explanatory variables  $X_k$  on the probability  $P(Y_i = 1 | X)$ , holding the other variables constant. It can be shown below:

$$\partial \pi / \partial x_{ik} = \varphi(x_i \beta) \beta_k \quad (5)$$

Where the discrete variations in the forecasted probabilities established an alternative to the marginal effect when evaluating the effect of a dummy variable (Hayo, 1971).

Furthermore, equation 4 was breaking into two for easy estimation. The demographic factor was estimated as follows:

$$1/\varphi(\beta_0 + \beta_1 AGE + \beta_2 EDU + \beta_3 GND + \beta_4 INC + \beta_5 FML + e) \quad (6)$$

AGE refers to the age of the respondents, EDU level of education, GND is the gender, INC is the farm income and FML is the family size.

The farm factor was breaking as follows:

$$1/\varphi(\beta_0 + \beta_1 FRM + \beta_2 EXP + \beta_3 ASSOC + e) \quad (7)$$

FRM is the farm size, EXP years of experience in rice farming and ASSOC is the membership of rice farmers association.

#### 4. Results/Findings

This section is divided into two sections. The first section describes the socio-demographic characteristics of rice farmers. The second section clarifies the results of the Probit regression model and the marginal effect. Also, the discussion of the significant effects and implications of variables on accessing credit for the improvement of rice farming production.

##### 4.1 Socio-demographic characteristics of rice farmers

Table 2 presents the sociodemographic characteristics of rice farmers in the studied areas. Most of the rice farmers (80.56%) in the study were male, while only 15.44% of the respondents were female. Also, about 43% of the respondents are within the age bracket of youth. The average age of the respondents is 38 years old, which shows, the farmers are within economic productive labour force age. Also, about 28% who constitute many rice farmers have rice farming experience of at least 6-10 years. This is related to the increasing demand for domestic

rice. Besides, the educational level of most respondents (38%) is a secondary certificate. It has found that only 12% of the respondents were graduates. This shows there is low educational qualification among rice farmers. Moreover, about half of the respondents (69%) size of the farm is averagely within the small size group, as only two hectares per farmer. The low rice output is associated with the small size of land as the average production was about 9793 Kg per farmer. About 73% registered with the farmers' association. This relates to the policy of the government of providing farm subsidies and other incentives through association. Also, about half of the respondents (53%) secured credit from the financial institution.

**Table 2: Socio demographic Profile of Rice Farmers**

<b>Variable</b>	<b>Frequency</b>	<b>Percentage</b>
<i>Gender of the household head</i>		
Male	145	80.56
Female	35	15.44
<i>Age distribution</i>	38*	
18-35	78	43.33
36-60	90	50.00
61 and above	12	6.67
<i>Farming experience (years)</i>		
1-5	34	18.89
6-10	51	28.33
11-15	44	24.44
16 -20	29	16.11
21 above	22	12.22
<i>Level of Education</i>		
No formal education	20	11.11
Primary school	32	17.78
Secondary school	68	37.78
Sub degree	39	21.67
Graduate	21	11.67
<i>Family size (number)</i>		
1-5	44	24.44
6-10	66	36.67
11-15	35	19.44
16-20	20	11.11
21 above	15	8.33
<i>Yearly farming income status (naira)</i>	1,390,088*	
Low income	105	58.33
Middle income	55	30.56
High income	20	11.11
<i>Farm size (hectares)</i>		
0.1-2.0	125	69.00
2.1-4.0	35	19.44
4.1 above	15	8.33
<i>Quantity of paddy produced per hectares (kg)</i>	9793. Kg*	
1501-10000	80	44.44
10001-18500	55	30.56
18501-27000	25	13.89
27001-45000	20	11.11
<i>Farmer's association</i>		
Registered	132	73.33
Not registered	48	26.67
<i>Credit</i>		
Accessed	95	52.77
Not accessed	85	47.22

\* Indicate average of variables

#### 4.2 Probit and Marginal Effect Results

The results were presented in the Table 3. The access to credit is a dependent variable and the explanatory variables that include both demographic and farm factors were estimated in the third model as corresponds to equation 4. The demographic factor was estimated in the first model (corresponds to equation 6). The second model estimation used the farm factors (corresponds to equation 7). The first column indicates the demographic and farm factors variables. The columns under each model shows both the coefficient variables, the standard error coefficient (in the bracket), and the astray indicate the level of significance of P-value. While the marginal effect (ME) column indicates both the changes, the coefficient, and the astray level of significance of P-value. However, the variables that found insignificance were not listed in the Table.

Besides, under demographic factors (model I), an increase of farmer's age within the labour force may likely increase his chances of accessing credit from the financial institution by 0.2%. Also, a percentage increase in the level of education of a rice farmer may likely increase his potentials to access credit by 2%. This was accredited to an educated farmer who is more familiar and understands of the process and the requirements needed to access credit such as filling the credit application form, presenting guarantor and collateral as well as the duration of credit payment. Also, being a male rice farmer has more chances to access credit by 7%. From farm factors (model II). Percentage increase in farm size by 1% may likely increase in access to credit by 5%. This is attributed to the farm size usually determines the quantity of crops produced. Also, a percentage increase in farming experience influences accesses to credit by 5%. This means those who have spent more years in rice farming and participate in the process of accessing credit have more experience in the credit requirements. Farmers association plays a great influence on farmers accessing credit by almost 8%. However, the influence effect results of age and level of education are the same demographic factors results in the previous studies (Kuye et al., 2019; Mitra and Prodhan, 2018; Olounlade et al., 2018). The influence of farm size and farming experience in accessing credit is in line with the previous findings (Ragasa & Mazunda, 2018; Sibande, Bailey, & Davidova, 2017; Wang, Manjur, Kim, & Lee, 2019).

**Table 3: Probit estimates and marginal effects of subsidized farming technology.**

Variable	Model I	ME	Model II	ME	Model III	ME
Age	0.047*	0.002*			0.030**	0.005**
	(0.028)	(0.001)			(0.011)	(0.002)
Level of education	0.168**	0.002**			0.092***	0.007***
	(0.033)	(0.010)			(0.034)	(0.003)
Gender	0.199***	0.068***			0.026**	0.004**
	(0.526)	(0.019)			(0.012)	(0.002)
<b>Farm factors</b>						
Farm size			0.279***	0.053***	0.480***	0.105***
			(0.074)	(0.014)	(0.220)	(0.047)
Farming experience (yrs)			0.047*	0.009*		
			(0.024)	(0.004)		
Farmer's association			0.422*	0.079*	0.049**	0.009**
			(0.235)	(0.043)	(0.023)	(0.005)
Log-likelihood	-280.10		-125.35		-260.13	



Prob. Chi <sup>2</sup>	0.000	0.000	0.000
Pseudo R <sup>2</sup>	0.088	0.756	0.080

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ME – Marginal Effects    Significance levels \* p < 0.1, \*\* p < 0.05, \*\*\* p < 0.01,  
Standard errors in parentheses

## 5. Conclusion

The study examined the socio-economic demographic of rice farmers on accessing credit from the financial institution. The study found age, educational attainment, gender, farm size, farming experience, and farmers' association influence on accessing credit. While the family size and farmer's income do not influence access to credit. This result has added advantage in the literature by providing the major characteristics profile of rice farmers precisely gender and farmer's association. Contrary to many among the little literature in the area were more focused on the age, educational attainment, and income of farmers. Also, the study observed that some rice farmers have no intention to apply for credit from any financial institutions, they preferred to obtain it from their friends and relatives due to interest charges which they believed is against their religious beliefs. While some farmers were discouraged to apply due to difficulties encounter in accessing credit. These challenges may likely affect the rice farming of the study area to continue to be subsistence in nature. Considering the population growing and the high cost of imported rice in the country. Leaving these problems unattained may likely lead to food insecurity and poverty in the country. It will also hamper the current efforts of the government on food self-sufficient and poverty alleviation in the country. Therefore, this study recommends, credit provider institutions should understand the characteristics profile of the major rice credit applicants. Among the measures to be taken in addressing the problems; to delegate staff who can guide the farmers on how to fill the request form and explain the requirements in their native language. Also, a free interest loan should adequately be provided to the farmers. Thus, further study should be conducted on factors that affect women's access to credit from financial institutions.

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## References

- Abraham, T. W. (2018). Estimating the effects of financial access on poor farmers in rural northern Nigeria. *Financial Innovation*, 4(25), 1–20. <https://doi.org/10.1186/s40854-018-0112-2>
- Adeyemo, I. (2018, April 12). *Nigeria's population now 198 million – NPC*. pp. 6–7. <https://doi.org/https://www.premiumtimesng.com/news/top-news/264781-nigerias-population-now-198-million-npc.htm>
- Aldrich, J. H., Nelson, F. D., & Adler, E. S. (1984). *Linear probability, logit, and probit models*. Sage.
- Ali, E., & Awade, N. E. (2019). Credit constraints and soybean farmers' welfare in subsistence agriculture in Togo. *Heliyon*, 5(4), 1–24. <https://doi.org/10.1016/j.heliyon.2019.e01550>
- Athota, S., Suhasini, K., & Rao, I. S. (2016). An analysis of socio-economic profile of rice farmers in Nalgonda district of Telangana state. *A Journal of Radix International Educational and Research Consortium RIJSS Radix International Journal Of Research In Social Science*, 5(1), 1–10.
- Azam, S., & Banumathi, M. (2015). The role of demographic factors in adopting organic

- farming : A logistic model approach. *International Journal of Advanced Research*, 3(8), 713–720.
- Berihun, K., Bihon, K., & Kibrom, A. (2017). Off-farm participation decision and its impact on crop yield in Northern Ethiopia. *Journal of Development and Agricultural Economics*, 9(2), 16–25. <https://doi.org/10.5897/jdae2016.0757>
- Bidisha, S. H., Hossain, M. A., Alam, R., & Hasan, M. M. (2018). Credit, tenancy choice and agricultural efficiency: Evidences from the northern region of Bangladesh. *Economic Analysis and Policy*, 57, 22–32. <https://doi.org/10.1016/j.eap.2017.10.001>
- Chandio, A. A., Jiang, Y., Wei, F., Rehman, A., & Liu, D. (2017). Famers' access to credit: Does collateral matter or cash flow matter?—Evidence from Sindh, Pakistan. *Cogent Economics and Finance*, 5(1), 1–13. <https://doi.org/10.1080/23322039.2017.1369383>
- 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. <https://doi.org/10.1016/j.jssas.2017.11.001>
- Chen, W., Cao, C., Fang, X., & Kang, Z. (2019). Expanding the theory of planned behaviour to reveal urban residents' pro-environment travel behaviour. *Atmosphere*, 10(8), 467. <https://doi.org/10.3390/atmos10080467>
- FAO. (2018). Rice market monitor. In *Food and Agriculture Organization of the United Nations* (Vol. XX1). Retrieved from <http://www.fao.org/3/I9243ES/i9243es.pdf>
- FAO. (2020). Nigeria at a glance. Retrieved 20 June 2019, from <http://www.fao.org/nigeria/fao-in-nigeria/nigeria-at-a-glance/en/>
- FAOSTAT. (2019). No. Retrieved 18 June 2019, from <http://www.fao.org/faostat/en/#data/QC/visualize>
- Gabriel, E. (2018, January 26). Access To Financing Agriculture. *Leadership Nigeria Newspaper*. <https://doi.org/10.1590/s1809-98232013000400007>
- Greene, W. (2002). *Econometric analysis*. Prince Hall Ltd., Newar.
- Hayo, B. (1971). *Applied econometrics*.
- Ismail, N. W., & Sivadas, S. (2020). Urban health and the prevalence of non-communicable diseases in Malaysia. *Malaysian Journal of Medicine and Health Sciences*, 16(2), 3–9.
- Joao, A. R. ., Luzardo, F., & Vanderson, T. . (2015). An interdisciplinary framework to study farmers decision on adoption of innovation: insights from expected utility theory and theory of planned behaviour. *Afr.J.Agric. Res*, 10(29), 2814–2825.
- Kabir, M. J., Cramb, R., Alauddin, M., & Gaydon, D. S. (2019). Farmers' perceptions and management of risk in rice-based farming systems of south-west coastal Bangladesh. *Land Use Policy*, 86(December 2018), 177–188. <https://doi.org/10.1016/j.landusepol.2019.04.040>
- Khanal, A. R., & Regmi, M. (2017). Financial constraints and production efficiency: A case from rice growers in drought prone areas of Indonesia. *Agricultural Finance Review*. <https://doi.org/10.1108/AFR-07-2016-0068>
- Kuye, O. O., Abiodun, S. O., & Edet, E. U. (2019). Determinants of access to formal and informal agricultural loan among farmers in Obubra local government area, Cross River State, Nigeria. *International Journal In Management And Social Science*, 07(03), 41–49.
- Lin, L., Wang, W., Gan, C., Cohen, D. A., & Nguyen, Q. T. T. (2019). Rural credit constraint and informal rural credit accessibility in China. *Sustainability MDPI*, 1–20. <https://doi.org/10.3390/su11071935>
- Linh, T. N., Long, H. T., Chi, L. Van, Tam, L. T., & Lebailly, P. (2019). Access to rural credit markets in developing countries, the case of Vietnam: A literature review. *Sustainability (Switzerland)*, 11(5), 1–18. <https://doi.org/10.3390/su11051468>
- Lobell, D. B., Schlenker, W., & Costa-Roberts, J. (2011). Climate trends and global crop production since 1980. *Science*, 333(6042), 616–620.

- Luan, D. X., & Bauer, S. (2016). Does credit access affect household income homogeneously across different groups of credit recipients? Evidence from rural Vietnam. *Journal of Rural Studies*, 47, 186–203. <https://doi.org/10.1016/j.jrurstud.2016.08.001>
- Maina, K. W., Ritho, C. N., Lukuyu, B. A., & Rao, E. J. O. (2020). Socio-economic determinants and impact of adopting climate-smart Brachiaria grass among dairy farmers in Eastern and Western regions of Kenya. *Heliyon*, 6(May), e04335. <https://doi.org/10.1016/j.heliyon.2020.e04335>
- Makate, C., Makate, M., Mutenje, M., Mango, N., & Siziba, S. (2019). Synergistic impacts of agricultural credit and extension on adoption of climate-smart agricultural technologies in southern Africa. *Environmental Development*, 100458. <https://doi.org/10.1016/j.envdev.2019.100458>
- Mercer, D. . (2004). *Adoption of agroforestry innovations in the tropics a review*. Agrofor sys.
- Mishra, A. K., Bairagi, S., Velasco, M. L., & Mohanty, S. (2018). Impact of access to capital and abiotic stress on production efficiency: Evidence from rice farming in Cambodia. *Land Use Policy*, 79(June), 215–222. <https://doi.org/10.1016/j.landusepol.2018.08.016>
- Mitra, S., & Prodhan, M. H. (2018). Factors determining credit access of tomato farmers in a selected area of Bangladesh. *National Journal of Multidisciplinary Research and Development*, 3(1), 406–410.
- Moahid, M., & Maharjan, K. L. (2020). Factors affecting farmers' access to formal and informal credit : Evidence from rural Afghanistan. *Sustainability MDPI*, (12), 1–16.
- Muriu-ng, F. W., Mucheru-muna, M., Waswa, F., & Mairura, F. S. (2017). Socio-economic factors influencing utilisation of rain water harvesting and saving technologies in Tharaka South , Eastern Kenya. *Agricultural Water Management*, 194, 150–159. <https://doi.org/10.1016/j.agwat.2017.09.005>
- NBS. (2016). *LSMS-integrated surveys on agriculture general household survey panel 2015/2016*.
- NBS. (2017). *Labor force statistics Vol. 1: Unemployment and Underemployment*.
- Olounlade, O. A., Li, G., Sodjinou, K. M., & Traore, L. (2018). Determinants of rice farmers access to credit in Benin: A case study of the municipality of Glazoue. *African Journal of Agricultural Research*, 13(43), 2382–2391. <https://doi.org/10.5897/ajar2018.13448>
- Paresys, L., Saito, K., Dogliotti, S., Malézieux, E., Huat, J., Kropff, M. J., & Rossing, W. A. H. (2018). Feeding the world while reducing farmer poverty? Analysis of rice relative yield and labour productivity gaps in two Beninese villages. *European Journal of Agronomy*, 93(March 2017), 95–112. <https://doi.org/10.1016/j.eja.2017.10.009>
- Porgo, M., Kuwornu, J. K. M., Zahonogo, P., Baptist, J., & Jatoe, D. (2017). *Credit constraints and labour allocation decisions in rural Burkina Faso Sustainability of organic food systems in Africa View project*. 77(2), 257–274. <https://doi.org/10.1108/AFR-05-2016-0047>
- Ragasa, C., & Mazunda, J. (2018). The impact of agricultural extension services in the context of a heavily subsidized input system : The case of Malawi. *World Development*, 105, 25–47. <https://doi.org/10.1016/j.worlddev.2017.12.004>
- Rahman, M. S., Khatun, M., Rahman, M. A., Azam, M. G., & Sultana, S. (2014). Assessing the impact of credit on rice production and food security on farm households in Bangladesh. *International Journal of Innovative Research and Development*, 3(6), 300–308.
- Saqib, S. E., Kuwornu, J. K. M., Ahmad, M. M., & Panezai, S. (2018). Subsistence farmers' access to agricultural credit and its adequacy some empirical evidences from Pakistan. *International Journal of Social Economics*, 45(4), 644–660. <https://doi.org/10.1108/IJSE-12-2016-0347>
- Schoemaker, P. J. . (1982). The expected utility model: its variants, purposes, evidence and limitations. *J.Econ.Lit*.

- Scott, R., Nzeka, U., & Taylor, J. (2017). *Nigeria grain and feed. Annual Annual Executive Summary*
- Sibande, L., Bailey, A., & Davidova, S. (2017). The impact of farm input subsidies on maize marketing in Malawi. *Food Policy*, 69, 190–206. <https://doi.org/10.1016/j.foodpol.2017.04.001>
- Silva, J. V., Reidsma, P., Lourdes Velasco, M., Laborte, A. G., & van Ittersum, M. K. (2018). Intensification of rice-based farming systems in Central Luzon, Philippines: Constraints at field, farm and regional levels. *Agricultural Systems*, 165(May), 55–70. <https://doi.org/10.1016/j.agsy.2018.05.008>
- Tanoh, D., Boadu, S., & Obeng, E. (2019). An empirical assessment of the impact of access to credit on farm output : A case study of sefwi-wiawso municipality Ghana. *Journal of Social Economics Research*, 6(1), 20–33. <https://doi.org/10.18488/journal.35.2019.61.20.33>
- Tsinigo, E., & Behrman, J. R. (2017). Technological priorities in rice production among smallholder farmers in Ghana. *NJAS - Wageningen Journal of Life Sciences*, 83(August), 47–56. <https://doi.org/10.1016/j.njas.2017.07.004>
- Udemezue, J. . (2018). Analysis of rice production and consumption trends in Nigeria. *Journal of Plant Sciences and Crop Protection*, 1(3), 5–10.
- Wang, S. W., Manjur, B., Kim, J. G., & Lee, W. K. (2019). Assessing socio-economic impacts of agricultural subsidies: A case study from Bhutan. *Sustainability*, 11, 1–12. <https://doi.org/10.3390/SU11123266>
- Wooldridge, J. (2012). *Introductory econometrics*. Mason: South-Western.
- World bank. (2017). The Global Findex Database. Measuring financial inclusion and the Fintech revolution. In A. Demirgüç-Kunt, K. Klapper, D. Singer, A. Ansar, & J. Hess (Eds.), *The Global Findex Database*. <https://doi.org/10.1596/978-1-4648-1259-0>
- Yazd, S. D., Wheeler, S. A., & Zuo, A. (2020). Understanding the impacts of water scarcity and socio-economic demographics on farmer mental health in the Murray-Darling Basin. *Ecological Economics*, 169(February 2019), 106564. <https://doi.org/10.1016/j.ecolecon.2019.106564>
- Zeb, A., Mahmood, N., Ullah, A., Arshad, M., Harald, K., & Müller, K. (2020). Socio-economic analysis of farmers facing asymmetric information in inputs markets : evidence from the rainfed zone of Pakistan. *Technology in Society*, 63(July). <https://doi.org/10.1016/j.techsoc.2020.101405>

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