Journal of Agricultural Extension
Vol. 27 (1) January 2023
ISSN(e): 24086851; ISSN(Print): 1119944X
Website: http://journal.aesonnigeria.org; http://www.ajol.info/index.php/jae
Email: editorinchief@aesonnigeria.org; agricultural.extension.nigeria@gmail.com

Determinants of Youth Farmers' Utilization of Improved Rice Production Practices in South West, Nigeria

https://dx.doi.org/10.4314/jae.v27i1.6

Ogunkunle, Tajudeen
Department of Agricultural Extension and Rural Development
Ladoke Akintola University of Technology Ogbomoso, Nigeria
Email: ogunkunletajudeen@gmail.com Phone: +2348029411206
https://orcid.org/0000-0002-9391-1043

Olaniyi, Olumuyiwa Akin
Corresponding Author
Department of Agricultural Extension and Rural Development
Ladoke Akintola University of Technology Ogbomoso, Nigeria
Email: oaolaniyi@lautech.edu.ng Phone: +2348060202639
https://**orcid.org**/0000-0003-0262-5293

Puseletso, Likoetla
Department of Agricultural Economics and Extension
National University of Lesotho, Roma Southern Africa
Email: p.likoetla@nul.ls Phone: +266 63080394
https://orcid.org/0000-0001-9346-9462

Submitted: 10th October 2022
First Request for Revision: 17th November 2022
Revisions: 21st, 22nd, 25th December 2022.**Accepted**: 25th December 2022
Published: 21st January 2023

Cite as: Ogunkunle, T., Olaniyi, O. A., Puseletso, L. (2023). Determinants of youth farmers' utilization of improved rice production practices in south west, Nigeria. *Journal of Agricultural Extension 27* (1) 61-74. https://dx.doi.org/10.4314/jae.v27i1.6

Keywords: Improved practices, rice production, utilization, young farmers

Conflict of Interests: The authors declare that no conflict of interest existed for this study.
Acknowledgements
The authors are grateful to the participants in this study (young rice farmers) and the agricultural extension workers in the selected States of South West Nigeria for their support in providing valid information for this study.
Funding: No fund was received by the authors to carry out this research.
Authors' Contributions
OT (60%): Conceptualized the research idea, developed the methodology, collected research data, and wrote the original draft of the manuscript.
OAO (30%): Supervised the research process and proofread the manuscript
PL (10%): Suggested the idea of data results interpretation

Abstract

The study assessed the determinants of young farmers' utilization of improved rice production practices in South West Nigeria. A multistage sampling procedure was used in the selection of 317 respondents for the study. Data were collected through the use of an interview schedule. Frequency counts, percentages, mean, and Probit- censored double-hurdle regression model was used to analyze the data. Findings reveal that the major improved rice production practices utilized by the young farmers included: the selection of improved rice varieties (88.3%) and appropriate use of agrochemicals (99.3%), while the most intensively utilized practices were: farm planning and use of cropping calendar (WMS=1.38), timely planting of rice (WMS=2.24) and safekeeping and handling of agro-chemicals (WMS=2.48). Age (β = -0.073646, -0.0039496).

Years of education (β = -0.0565773, 0.003665), years of farming experiences (β = 0.0081413, 0.003140, availability of improved agricultural practices information (β = 0.0413969, 0.114309) and knowledge level of improved rice production practices (β = 0.0396945, 0.408986) had the likelihood of determining utilization and intensity of use of Improved rice production practices in the study area. Government and other relevant agricultural stakeholders should focus on the identified factors in view to enhance the utilization of improved rice production practices in the study area.

Introduction

Rice (*Oryza sativa*) is one of the most important cereals globally and represents staple food for over 50% of every household (Akinniran and Faleye, 2020). The Food and Agriculture Organization (FAO) (2020), reported that Nigeria produces approximately 2 million metric tons of milled rice and imports close to 3 million metric tons annually. This gap has resulted in Nigeria becoming the highest importer of the commodity in sub-Saharan Africa (Toba et al., 2022). To arrest this trend, efforts of relevant agencies had been directed towards boosting the productivity of the crop along the value chain. These include; the Anchor Borrowers Scheme, Agricultural Transformation Agenda Special Programme (ATASP) as well as other initiatives by international agencies (Omolehin et al., 2019). Despite several programmes and projects, rice yield and quality are still very low (Senuga et al., 2020).

Youths represent important agents of change towards prosperity in the overall developmental process in any sector of the economy, agriculture inclusive. Youth has been identified as an important segment as well as a key component of rural agrarian communities. Unlike the aged, the participation of youth in agriculture is a result of numerous qualities that they possessed which include; high latent energy to work, propensity to learn new things, risk takers and high tendency to source new technologies from diverse sources (Osabohien et al; 2021, FAO, 2021). Even though youths are being hindered and marginalized in agricultural programmes and projects, they remain an important force in agriculture in Nigeria. Hence, they need to be carried along in the developmental and poverty reduction process to harness their inherent potential fully in agricultural development and resource utilization. Although some factors determine youth participation in agriculture, Dio *et al* (2018) identified farming experience, land ownership and awareness as positive determinants while age, household size and access to credit as negative determinants of youths' participation in agricultural production in Nigeria.

Production resources are scarce information inclusive, therefore, all strategies should be geared towards optimization in the utilization of these scarce resources in agriculture. Resources utilization efficiency should not be stagnated to the present short-term goals but should be able to provide food for the present generation without compromising the status of food security of future generations. This calls for improved rice production practices to achieve maximum production.

Maximizing rice productivity requires directing attention towards boosting the technical efficiency of the farmers. The possibility of this rests on the proper enlightenment of the youth on best practices for rice farming which guarantee sustainability in the entire production cycle (Akinniran and Faleye, 2020). Several factors have been identified to determine the adoption of improved rice production technologies. These include awareness of such technology, level of education, farming experience, availability and access to funds (Baban and Marinal, 2018).

Nevertheless, there is a dearth of information on the factors that influence the extent to which young rice farmers utilized improved rice production technologies in Nigeria. Based on the above background, the study investigated the determinants of utilization of improved rice production technologies among young farmers in Southwest Nigeria. Specifically, it; identified the sources of information on improved rice production technologies by the youth; ascertained improved rice production technologies available to the respondents and; investigated the intensity of utilization of improved rice production technologies among the youth.

Methodology

The study was carried out in South West region (Latitude $9^0\, 4^1\, 55.19^{11}$ N and Longitude $8^0\, 40^1\, 30.99^{11}$) of Nigeria with a total land area of 77.81 km^2. Ogun and Oyo State were purposively selected from the constituent states of South West Nigeria. These two States were selected due to their prominence in rice production. According to reports of Ogun State Agricultural Development programme OGADEP (2016) and Oyo State Agricultural Development Programmes OYSADEP (2017), the two States share common agro-ecological features which include among others tropical rainforest vegetation.

The population of the study consisted of all young rice farmers between the ages of 18-35 years, which is in tandem with the national youth policy of the country.

A multistage sampling procedure was used in the selection of respondents for the study. The first stage involved a random selection of 50 per cent of the constituent agricultural zones. There are 4 agricultural zones in each State. From Ogun State, Ilaro and Ikene were randomly selected while Oyo and Ogbomoso Agricultural Zones were chosen from Oyo State. The second stage involved a purposive selection of major rice-producing blocks in the zones. This is because not all the blocks in the selected zones are rice-producing areas Therefore, Sawonjo block was selected in Ilaro zone because it is the only block that produces rice while Obafemi and Someke were selected to represent Ikene zone in Ogun State. Iseyin, Oyo East and Oyo West blocks were selected from Oyo agricultural zone while Ogooluwa, Oriire and Surulere blocks were selected from Ogbomoso agricultural zone of Oyo State.

In the third stage, from each selected block, 50 per cent of the total cells were randomly selected and lastly from the list of registered respondents (634 young rice farmers). 50 per cent of the total respondents were randomly selected to form a representative sample size of 317 used for the study. An interview schedule was used for data collection. Frequency, percentage, means and probit – censored double-hurdle regression models were used for data analysis. Utilization of improved rice production practices was measured at the nominal level as Yes = 1 and No = 0. The total utilization scores of the 32 items were aggregated and dichotomized into 0 and 1 based on the mean aggregate score.

Measurement of variables

The sources of information on improved rice production technologies were measured at the nominal level for a response of yes=1 and no was scored 0. There are 32 items on improved rice production technologies. Availability of the technologies for use objective 2 was measured on a four (4) points rating scale as; Highly available for use = 3, Moderately available for use= 2, Rarely available for use= 1 and Not available for use = 0. Based on the two stages decision employed, utilization was measured nominally as yes = 1 and No = 0. The scores were aggregated and dichotomized using a mean utilization score of 22.0. Therefore, utilization scores greater than or equal to the mean were assigned 1, otherwise 0.

The dependent variable for the study was the intensity of utilization of improved rice production technologies which was operationalized on a four (4) point rating scale of very often =3, Often =2, Sometime = 1 and never utilized = 0. The summation of the scores for each respondent was used to establish the index for the intensity of utilization of improved rice production practices.

Model Specification

Double-huddle (Probit – Censored) regression model

Probit- censored double hurdle (DH) regression model by Cragg (1971) was used to elucidate the determinants of utilization and intensity of utilization of improved rice production technologies. The first decision to utilize improved rice production technologies made use of a probit regression model while the second ‘intensity of utilization’ employed a censored continuous dependent variable (Gedefaw and Sisay 2019). The models are expressed below following, Raymond 2020).

First hurdle: Utilization of improved rice production technologies (Probit Regression Model specification)

$Ui = 1$ if $Ui^* > 0$

$Ui = 0$ if $Ui^* \leq 0$

$Ui = \beta_0 + \beta_i X_i + \epsilon_i$ ………………………………………..(Equation 1)

$Ui^* = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \ldots\ldots \beta_{14} X_{14} + \epsilon$

Second hurdle: Level or intensity of utilization of improved rice production technologies which utilized censored regression Model specification.

$Lu_i = Y_i^*$ if $Y_i^* > 0$ $Ui^* > 0$

$Y_i^* = 0$ otherwise

$Y_i^* = \alpha_0 + \alpha_i X_i + \omega_i$ …………………………………… (Equation 2)

$Lu_i = Yi^* = \alpha_0 + \alpha_1 X_1 + \alpha_2 X_2 + \alpha_3 X_3 + \alpha_4 X_4 + \alpha_5 X_5 + \alpha_6 X_6 + \alpha_7 X_7 \ldots\ldots\ldots \alpha_{14} X_{14} + \omega$

Where:

Ui^* is the latent variable that takes the value of 1 if the respondent utilized improved rice production technologies and 0 otherwise.

$Lui=Y_i^*$ is the observed response on the optimum proportion of improved rice production practices intensively utilized.

β_0 and α_0 are the constant term (intercept) of each equation.

β_i and α_i are the parameters of the explanatory variables (Slope)

$X_i = X_1 - X_{14}$ Vector of the explanatory variable.

ϵ_i is the error term of equation 1. N(0,1) .

ω_i is the error term of equation 2. $N(0, \sigma^2)$.

X_1 = Age (Actual), X_2 - Gender (Male 1, Female 0), X_3 - Marital status (Married 1, otherwise 0), X_4 - Household size (Actual), X_5 - Years of formal education (Actual), several years spent in formal schooling, X_6- Membership of social organization (Member -1, Non- member - 0), X_7 = Years of farming experience (Actual)., X_8 = Farm size (Actual), X_9 - Income (Actual), X_{10} - Output (Actual), X_{11} - Participation in training on IAPs in the past (Participated =1 not participated = 0), X_{12} - Number of information source utilized (Aggregated scores), X_{13} - Availability of IAPs information for usage (Aggregated scores), X_{14} - Knowledge level (Knowledge index).

Results and Discussion

Sources of Information on Improved Rice Production Technologies

The result in Table 1 revealed that the major sources of information on improved rice production technologies explored by the respondents were mobile phones (100%) followed by co-farmers (94.0%) and extension agents (87.1%). Other sources of information on improved rice production technologies include radio (48.9%), farmer field school (FFS)(30.3%), cooperative society (23.9%), input dealers (23.0%), television (15.8%), and print media (bulletin, poster and pamphlets (10.1%). This finding implies that ICT and interpersonal sources are relevant for promoting information on improved rice production technologies, especially among young farmers. Muhammed et al., (2019) reported that Information and communication technology such as a mobile phones is one of the major sources of information for farmers in rural communities still holds and counts.

Table 1: Sources of information on improved rice production technologies

Sources of information on improved rice production	Percentage
Mobile phone	100.0*
Co-farmers	94.0
Extension Agents (Training and Demonstration)	87.1
Radio	48.9
Farmer Field Business School (FFBS)	30.3
Cooperative society	23.9
Input dealers	23.0
Television	15.8
Print media(bulletin, Poster, pamphlets)	10.1

Source: Field survey, 2021 * Multiple Responses

Utilization of Improved Rice Production Technologies

Pre-planting stage

Table 2 shows the intensity of utilization of improved rice production technologies. The most utilized improved rice production technologies under pre-planting operations include farm planning and use of cropping calendar (WMS = 1.38), selection of site dominated with clayey-loamy soil type for the cultivation of rice (WMS = 1.35), and selection of improved varieties for planting (WMS = 0.90). These were ranked first, second, and third respectively. This finding shows that those that are mostly utilized are technical information that is needed for the optimum propagation of rice. The least utilized information improved rice production technologies under pre-planting operations are those on nursery techniques (WMS = 0.69), seed germination testing (WMS = 0.61) and soil testing (WMS = 0.16). The least utilized informati on in this category is those that required practical skills to be carried out. The least utilization of nursery techniques, seed germination tests and soil testing could be due to technical know-how on its operations as well as the high cost of conducting the tests.

Planting stage

It was revealed that timely planting (following the recommended planting date) (WMS = 2.24), planting at the recommended spacing of 20 x 25cm at depth of between 2-3 cm (WMS = 2.17) and seedling transplanting 2 – 3 weeks after nursing (WMS = 2.05) were the most intensively utilized information on improved rice production technologies while straight line planting of rice (WMS = 0.49) and planting of recommended 5 – 7 number of seeds or seedlings per stand (WMS = 0.20) were the least utilized among other improved rice production technologies items under planting operation activities. This may probably be due to the complexity of the practices which makes it difficult for farmers to utilize. This finding tallies with that of Kallmuthu et al., (2018), who reported that in Tanzania, the planting practices produce better rice yield but some of these practices are somehow difficult to implement on the farm

Post-planting

The most utilized improved rice production technologies are safe keeping and handling of agrochemicals (WMS = 2.48), the timely harvest of rice with the use of sharp tools when 3/4 of paddy has turned brown or golden yellow colour (WMS = 2.31) and appropriate use of agrochemicals (WMS = 2.28). These were ranked first, second and third respectively. The least utilized improved rice production technologies include the use of organic manure with recommended fertilizer and rate (WMS = 0.29), supplying and thinning 10 – 14 days after planting (WMS = 0.26) and timely application of fertilizer using Urea Deep placement or spot application techniques (WMS = 0.06). This finding reveals that some of the post-planting practices were not utilized especially the use of fertilizers. This may probably be due to the bulkiness of organic manure and the high cost of inorganic fertilizers.

Table 2: Intensity of utilization of available improved rice production technologies

Improved rice production technologies	Utilization	
pre-planting activities	WMS	Standard deviation
Farm planning and use of cropping calendar.	1.38	0.63
Selection of site dominated with (Clayey-loamy soil) for rice cultivation.	1.35	0.81
Selection of improved rice variety for planting.	1.18	0.65
Coping strategies with climate variability.	1.13	0.73
Good land preparation (Stumping, grooving and levelling.	1.04	0.64
Seed preparation (sorting, cleaning and priming before sowing).		
Zero burning and minimum tillage.	0.74	0.53
Water management techniques (Bunding and drainage construction).	0.71	0.67
Nursery technique.	0.69	0.48
Seed germination testing.	0.61	0.65
Soil testing.	0.16	0.54
Planting activities		
Timely planting	2.24	0.71
Planting at the appropriate spacing of 20 x 25 or 30 cm by 2-3cm depth.	2.17	0.60
Seedling transplanting 2-3 weeks after nursing.	2.05	0.86
Straight line planting technique.	0.49	0.69
Planting of the recommended number of seeds/seedlings 5-7 per stand.	0.28	0.54
Post planting activities		
Safekeeping and handling of agrochemicals.	2.48	0.61
Timely harvest with a sharp tool when ¾ of paddy turns golden yellow colour.	2.31	0.55
Appropriate use of agrochemicals.	2.28	0.58
Threshing on a neat platform.	2.24	0.65
Market demand/Supply trend and quality improvement for rice.	2.06	0.86
Appropriate paddy cleaning and drying before bagging.	1.74	0.80
Safety practices before harvesting.	1.72	0.88
Integrated Pest and Disease Management techniques.	1.25	0.97
Bagging in jute sacs for transportation and good storage.	1.10	0.54
Welfare, safety and motivation of workers.	1.04	0.64
General farm records keeping.	0.77	0.60
Regular weeding (2-3) times before harvest.	0.76	0.59
Regular removal of off-types.	0.55	0.61
Use of organic manure with recommended fertilizer and rate	0.29	0.50
Supplying and thinning (10-14) days after planting.	0.26	0.72
Timely application of fertilizer using Urea Deep placement or spot application techniques.	1.06	0.88

Determinants of Utilization of Improved Rice Production Technologies

Table 3 shows the factors that determined the utilization of improved rice production technologies. The Wald statistic estimate was 63.31 and was significant this implies that the model significantly fitted the data. By implication, the independent variables included in the model were jointly important in terms of explaining the variation in the decision and the level of utilization of improved rice production technologies. The first and second Tier of the double hurdle model in Table 3 shows the maximum likelihood estimates of the probit model for observing a positive level of utilization of improved rice production technologies. It was observed that out of the fourteen independent variables considered, five (age, years of farming experience, income, availability of improved rice production technologies information and level of knowledge) were significant at the first stage. But, eleven variables (age, sex, years of education, household size, membership of social organization, years of farming experience, farm size, output, sources of information, availability of improved rice production technologies information and level of knowledge of IAPs) were significant at the second stage.

The results of Double Hurdle show that some variables appearing in both equations exerted opposite influences in terms of both signs and level of significance. This is a confirmation that the likelihood of these variables to determine utilization as well as the intensity of utilization may differ or be similar at a different level of probability.

As the variables increases or decrease in magnitude, there is the probability that the decision to utilize and intensity of utilization of improved rice production technologies may also increase or decreases as the case may be.

Across the two hurdles, each variable exerted influences on the decision to first utilize and then the intensity of utilisation differently at different levels of significance.

In the first hurdle (Table 3), age was negatively and significantly related to the decision to utilize improved rice production technologies. This implies that as the farmers advance in age there is a probability of a decrease in the decision to utilize improved rice production technologies. This finding shows that older youths are developing apathy for improved rice production technologies. This implies that ageing has a negative relationship with the adoption of agricultural innovation (Centre for Development Research, 2020).

Farming experience, income, availability of improved rice production technologies information and knowledge of improved rice production technologies were found to be positively and significantly related to the probability to utilize improved rice production technologies at 1% and 5% respectively. This implies that the respondents with higher numbers of years of farming experience, income, available information on as well as higher knowledge of improved rice production technologies have the probability to decide to utilize more of improved rice production technologies.

The second tier hurdle shows the maximum likelihood estimates of the truncated regression model for the expected level of utilization of improved rice production technologies. The same variables included in the first hurdle were included in the second hurdle. From the same Table 3, sex was positively and significantly related to the intensity of utilization of improved rice production technologies as males were more likely to intensively utilize improved rice production technologies than their female counterparts. This may be because, in South Western Nigeria, males are predominantly known to be responsible for on-farm production activities while female folks are majorly involved in the processing and marketing of agricultural products like rice.

Household size was positively and significantly related to the intensity of utilization of improved rice production technologies on rice production by the respondents. This implied that as the number of persons in a household increases, there is a probability that decision to intensively utilize improved rice production technologies will also increase.

There exist a positive and significant relationship between years of education and the intensity of utilization of improved rice production technology. This implies that as the number of years spent in schooling by the respondents increases the intensity of utilization of improved rice production technologies will also increase. This finding implies that the educated youths utilized improved rice production technologies more.

Membership in social organizations was negatively and significantly related to the possibility of intensively utilizing improved rice production technologies. This implies that being a member of social organizations does not encourage the utilization of improved rice production technologies among youths may be those organizations are not agriculturally oriented to encourage and motivate youths in agriculture.

Furthermore, there exists a positive and significant relationship between years of farming experience and the probability of decision on the intensity of utilization of improved rice technologies by the young farmers at 5%. This implied that the more the respondents accumulate years in rice farming, the more likely that they will intensively utilize improved rice production technologies on rice production.

Farm size had a positive relationship and significantly influenced the probability of a decision on the intensity of utilization of improved rice production technologies. This implied that as farm size increases, there is the probability that the intensity of utilization of improved rice production technologies will also decrease. This may be due to the land ownership system that is prevalent in the study area. Youths are known not to have access to land for agricultural production.

Output had a positive and significant relationship with the probability of intensity of utilization of improved rice production technologies. This implied that if a unit of output is increased, there is a probability of a corresponding increase in the intensity of utilization of improved rice production technologies. This is not unexpected as every farmer is hoping to reap a bumper yield which often can never come by chance as other factors will have to be properly managed with accuracy.

There exist a positive and significant relationship between the number of information sources utilized and the intensity of utilization of improved rice production technologies by the respondents. This implied that when the number of information sources used for accessing improved rice production technologies increases, there is the likelihood that the intensity of utilization of improved rice production technologies will also be boosted.

There was a positive and significant relationship between the availability of improved rice production technologies information and the intensity of utilization of improved rice production technologies. This implied also that if improved rice production technologies information is available, the level of utilization of improved rice production technologies will also increase among the youth.

There was a positive significant relationship between knowledge and intensity of utilization of improved rice production technologies. As the knowledge of the respondents increases about improved rice production technologies, there is a probability that the intensity of utilization of improved rice production technologies will also increase. The previous result of Kumaran et al., (2017), asserted that the knowledge level of farmers predicts the adoption of innovation.

Table 4: Determinants of utilisation of IRPTs

Selected independent variables	1st Hurdle (Probit)		2nd Hurdle (Tobit –censored)	
	Coeff. (β)	**Robust Std Err**	**Coeff. (β)**	**Robust Std Err**
Age (year)	-0.073646*	0.035556	0.0039496*	0.0011196
Sex	-0.0753932	0.245497	0.015359*	0.0077638
Marital status	-0.320624	0.293004	-0.0095252	0.0093003
Household size	-0.1240961	0.134793	0.010068*	0.0041355
Years of education	-0.0565773	0.030993	0.003665*	0.0010303
Membership of social organization	0.1892002	0.267566	-0.0422995*	0.0085683
Years of farming experience	0.0081413*	0.002639	0.003140*	0.0013071
Farm size (ha)	0.2221613	0.477047	0.024613*	0.0127671
Income (Naira)	0.0070538*	0.003067	-0.0319863	0.0291083
Output (tonne /ha)	0.207659	0.270235	0.032558*	0.0084501
Participation in training.	-0.3073875	0.247606	0.010700	0.074013
Number of information sources utilized	0.0543322	0.280933	-0.0471122*	0.0081194
Availability of improved rice production practice information	0.0413969*	0.019453	0.114309*	0.0360536
Knowledge	0.0396945*	0.020360	0.408986*	0.0336748
Wald Chi^2 (14) =63.31				
Prob =0.0000				
Number of Observations = 317				

*** p≤ 0.05**
Source: Field data

Conclusion and Recommendations

The major sources of information explored by the respondents on improved rice production technologies are mobile Phones, extension agents and co-farmers. The study established some common factors that jointly determined the utilization of improved rice production technologies including age, years of education, years of farming experiences, availability of improved rice production practices information and knowledge level of improved rice production technologies. Government and other relevant agricultural stakeholders should focus on the identified factors in view to enhance the utilization of improved rice production practices in the study area. Also, capacity building of young farmers should be geared towards improved rice production technologies by extension institutions to improve their knowledge of improved rice production technologies.

References

Akinniran, T.N. & Faleye, G.R. (2020). Economic Analysis of Rice Production and Processing in Nigeria 1981 – 2019. International Journal of Agriculture, Environment and Bioresearch, 5(5): 113-132. https://doi.org/10.35410/IJAEB.2020.5557

Baban, B., & Mrinal, K.D. (2018). What influences the Adoption and Use Intensity of Artificial Insemination Technology among smallholder Dairy Farmers in Assam? A Double-hurdle Approach, International Journal of Agricultural Economics, 73(4),445-458.

Centre for Development Research (2020). Youth Aspiration. Perception of Farming and Migration decision in Rural sub-Saharan Africa, further Empirical evidence from Ethiopia, ZEF Discussion paper on Development Policy, No:296.Pp.56

Dio, P., Ajayi, O.J., & Ibrahim, M. (2018). Determinants of Rural Youths Decision to Participate in Agricultural Activities in Nasarawa State, Nigeria, Proceedings of 27th Annual National Congress of the Rural sociological Association of Nigeria (RuSAn) on Rural Social Protection and intervention in Nigeria at Amadu Bello University, Zaria between 8th and 11th October, 2018, Pp 66-69.

Food and Agriculture Organization (FAO).(2020). FAO in Nigeria: Nigeria at a glance. Retrieved from: http://www.fao.org/nigeria/fao-in-nigeria/nigeria-at-a-glance/en/ Accessed 18/05/2020

Food and Agriculture Organization (FAO) (2021). Promoting Youth Engagement and Employment in Agriculture and Food System, A report by the High Level Panel of Experts on Food Security and Nutrition of the committee on World Food security Rome Pp159. Retrieved from: https://www.fao.org/3/cb5464en/cb5464en.pdf

Food and Agriculture Organization (FAO) (2022) FAO in Nigeria: Nigeria at a glance Retrieved from https://www.fao.org/nigeria/fao-in-nigeria/nigeria-at-a-glance/en/ accessed 8th July, 2021

Kalimuthu, S. Bonaventure ,J. T, Jerome, M., & Jonne, R (2018) Increasing paddy Yields and Improving farm Management: results from Participatory Experiments with Good Agricultural Practices (GAP) in Tanzania, Paddy and Water Environment, 16:749–766 https://doi.org/10.1007/s10333-018-0666-7ARTICLE

Mohammed, L., Muhammed, Y., Saleem A., Muhammed, U.M. & Mujahid, K. (2019) Factors Influencing Use of Information and Communication Technologies among Farmers in Rural Punjab, Pakistan. Journal of Agricultural Extension, 23(3): 101-112. https://doi.org/10.4314/jae.v23i2

Omolehin. R. A., Oyewole. S. O., Muhammed, L., & Coker, A. A. (2019). Adoption of Good Agronomic Practices (GAP) Among Smallholder Rice Farmers in Nigeria Agricultural Transformation Agenda, Journal of Economics and Sustainable Development, 10(15), 8-14. https://doi.org//10.7176/JESD/10-15-02

Osabohien, R, Wiredu, A.N., Nguezet, P.M.D., Magnouna, D.B., Abdonlaye, T., Manyong,V., Bamba, Z. & Awotide, B.A. (2021) Youth Participation in Agriculture and Poverty Reduction in Nigeria, Sustainability, 13,7795, https://doi.org//10.3390/su13147795

Oyaniran, T (2020). Current State of Nigeria Agriculture and Agribusiness Sector. AfCFTA Workshop Retrieved from https://www.pwc.com/ng/en/assets/pdf/afcfta-agribusiness-current-state-nigeria-agriculture-sector.pdf 14pp

Raynold, R.C.M (2020). Double-hurdle Model estimation of smallholder Commercial farmers' Willingness to Adopt Crop Insurance in Zimbabwe: A Case of Mazowe District, International Journal of Research and Scientific Innovation, 7(9), 339-348

Senuga, S.O., Baines, R.N., Conway, J.S. & Angba, C.W (2020). Awareness and Adoption of Good Agricultural Practices Among Small holder Farmers in relation to the Adopted Villages Programme; The Case Study of Northern Nigeria, Journal of Biology, Agriculture and Health, 10(6), 34-49. https://doi.org/10.7176/JBAH/10-6-06

Toba. S.O., Fangbin, Q. & Shiping, M. (2022). Performance of Nigerian Rice Farms from 2010 to 2019: A Stochastic Mata frontier Approach. MPDI Agriculture, 12: 1000. : https://doi.org/10.3390/agriculture12071000.

Udemezue, J.C., & Osegbue, E.G. (2018) Theories and Models in Agricultural Development, Annals of Reviews and Research, 1(5), 00134-00137. https://doi.org/10.19080/ARR.2018.01,555574

Udemezue, J.C. (2018). Analysis of Rice Production and Consumption Trends in Nigeria, Journal of Plant Sciences and Crop Protection, 1(3),1-6.