Journal of Agricultural Extension
Vol. 28 (3) July 2024
ISSN(e): 24086851; ISSN(Print): 1119944X
Website: https://www.journal.aesonnigeria.org; https://www.ajol.info/index.php/jae
Email: editorinchief@aesonnigeria.org; agricultural.extension.nigeria@gmail.com

Socio-economic and Technological Factors Affecting Food Security Among Farming Households in Delta and Edo States, Nigeria

https://dx.doi.org/10.4314/jae.v28i3.10

Ehiwario, Fridday Akasiri
Department of Agricultural Extension and Rural Development,
Dennis Osadebay University, Asaba
Phone no: +234 803 372 3811
akasiriehiwario@gmail.com
http://ocid.org/0000-0002-5733-2431

Onemolease, Eddy Agbator
Department of Agricultural Economics Extension and Extension Management
Ambrose Alli University, Ekpoma
Onemolease@yahoo.com
Phone no: +234 806 532 1087
http://ocid.org/0000-0003-3451-1290

Onyemekonwu, Raymond Chukwuka
Corresponding author
Department of Agricultural Extension and Rural Development,
Dennis Osadebay University, Asaba
chukwukaraymond@gmail.com
Phone no: +234 803 628 2769
http://ocid.org/0000-0003-3406-2695

Submitted: 27th June, 2024
First Request for Revision: 2nd July, 2024
Revisions: 5th July, 7th July, 9th July, 2024
Accepted: 10th July 2024
Published: 19 July 2024
Cite as: Ehiwario, F A., Onyemekonwu, R.C. and Onemolease, E.A. (2024). Socio-economic and technological factors affecting food security among farming households in Delta and Edo States, Nigeria. *Journal of Agricultural Extension 28*(3) 88-97

Keywords: modelling, socio-economic, technological factors, food security, farming households.
Conflict of interest: The authors hereby declare that there is no conflict of interest
Acknowledgements: The authors sincerely appreciate all enumerators of who assisted data collection.
Funding: This research received no funding from any organisation or individual
Authors' contributions:
EFA: 40% Development of research concept and methodology, data interpretation and writing of first manuscript
ORC: 30% literature search, manuscript review, data collection, and data analysis and interpretation
EAO: 30% Development of research concept and methodology, data analysis, interpretation and literature review

Abstract

The study examined the socio-economic and technological factors affecting food security among farming households in Delta and Edo States, Nigeria by determining the food security status of the farming households, examining the farm technologies adopted by the households, and determinants of the farming household food security status. Data from 425 respondents were analyzed using frequency mean, percentage, and Logit regression. The result shows that a high proportion of the respondents adopted fertilizer (93.88%), improved seeds (74.82%), and pesticides (73.18%). The level of food insecurity among farming households was very high (97.4%). Food security was significantly correlated with respondents' education, household size, membership of the cooperative society, farm income, extension services received/accessed, and technologies adopted. It was concluded that the level of food insecurity among farming households is high. The study recommended promoting the adoption of improved farming technologies among the farmers with the extension agency deepening its outreach services to farming households.

Introduction

Food has always been a basic requirement for human survival, as such it becomes practically impossible to over-estimate the food need for human existence (Wilson et al., 2021; Chiemela, et al, 2022). In sub-Saharan African countries such as Nigeria, food insecurity is predominantly high, this is reflected in the high import dependence of the region for nearly all foods consumed.

Food inflation in Nigeria has increased rapidly from 33.9% in December 2023 to 35.1% in January 2024 (Nigeria Economic Summit Group, 2024). This, however, has worsened the food insecurity level in the country. Food insecurity exists when there is poor or no access to enough food, which may be attributed to certain physical, social, and economic factors (Onoja et al., 2022). Several factors have been blamed for the current food insecurity situation in Nigeria, some of these include poor agricultural infrastructure (Agbugba et al., 2022), problems asoociated with land aquisation and paucity information relating to agriculture (Iwuchukwu, et al., 2022), poor budgetary allocation for the agricultural sector (Ike, 2024), poor production output of farmers (Onyemekonwu et al., 2023). Others include fear of herdsmen attack, flooding, poor extension contact, fear of kidnappers, and limited knowledge of the application of improved agricultural practices (Ehiwario et al., 2023).

In Nigeria, the governments at various levels have initiated several programmes, projects, and strategies to combat food insecurity in the country and alleviate poverty (Faleke et al., 2022). Irrespective of these various approaches, the food insecurity situation is on the increase suggesting that these various programmes, projects, and policies have not been able to critically and adequately analyze the food security situation at the federal, state, and local government levels. However, previous studies in Delta State, have neglected the relevance of socio-economic and technological factors affecting food security among farming households irrespective of their importance to food production; they however, the status of Urban areas on food security (Akande, and Oghenetega, 2022), the effect of flood on the food security status of flood-prone areas (Week and Wizor, 2020), and the economic implication of food insecurity on crop production (Emaziyi, et al., 2022). None of these studies modeled the socio-economic and technological factors affecting food security among farming households. This research gap was addressed in the study with the following objectives;

i. determine the status of the farming households on food security in the study area;
ii. ascertain the improved farming technologies adopted by farming households; and
iii. examine the determinants of the farming household food security.

Research hypothesis

Ho:There is no significant relationship between the socio-economic and technology characteristics of farmers and their food security status in the study area.

Methodology

The study was carried out in Delta and Edo States of Nigeria.The states lie between latitude 5º00 and 6º30N of the equator and longitude 5º00 and 6º45E of the Greenwich

Meridian. Edo State is found between latitude 6^0 44'N and 6^0 21'N and longitude $5^0$35'E and 5^0 44E of the Greenwich Meridian (Nigeria Galleria, 2022).

The subjects of the study comprised registered farming households in the study area. Data from the Ministry of Agriculture and Natural Resources shows that the registered lists of farmers in the two states were 283 (Delta State) and 209 (Edo State) totalling 492 registered farmers. Multi-stage sampling system was used in the selection of respondents. In stage 1, purposive selection of two agricultural zones from each of the surveyed states namely, Delta North and Delta Central agricultural zones from Delta State, and Edo South and Edo Central agricultural zone from Edo State was done. Their selection was guided by their being the most rural and therefore having the most farming households and prevalence of farming activities. Stage 2 entailed random sampling of 50% of the Local Government Areas from each of the selected zones to give a total of 16, at the rate of 9 from Delta State and 7 from Edo State. In stage 3, proportional random sampling was applied to sample the farming households in the selected LGAs. The sample size was determined using the Table of sample size proportion (Adam, 2020). In this study, the sample size determination was applied to the population of the selected LGA. The target sample size was 447, comprising 262 from Delta State, and 185 from Edo State. At the end of the data collection process, only 425 copies of the instruments (246 and 179 data instruments) from Delta State and Edo State respectively were collected and/or found useful for data analysis. This represents a response rate of 95%.

Data for the study were generated from primary source, which include members of farming households. Secondary data such as journals and periodicals were used to complement the findings obtained from the primary source. Questionnaires and interview schedules were used for data collection. The questionnaire was administered to the literate respondents, while a structured interview schedule was administered to the non-literate respondents. The face validity of the instrument was ascertained by consulting with experts in the field of Agricultural Extension for corrections, suggestions, and criticisms. The reliability of the instrument was ascertained using the Test-retest method, which yielded a correlation coefficient of 0.866 which exceeds the 0.70 benchmark considered a good indication of reliability (Schiffer, 2023). The instrument was personally administered to the respondents by the researcher. Trained enumerators were equally used to elicit information from the respondents, under the supervision of the researcher. Frequency, percentage, mean, standard deviation, and Logit regression were used to analyze the data collected.

Measurement of variables

Food insecurity status of households.

The measurement of food security or insecurity in this study was guided by the FANTA/CORNELL validated instrument i.e. the Household Food Insecurity Access Scale (HFIAS) developed by the project with support from USAID. The scale (questionnaire) consists of two sub-questions;

- The first group of questions is called the nine '***occurrences'*** that represent an increase in severity of food insecurity level (access) with binary response options of "yes" or "no" (where no = 0 and yes = 1).
- The second group of questions refer to the nine **'*frequency of occurrence'***; these questions are a follow-up to each occurrence question to determine how often the

condition occurred and are coded ‘1’ for ‘never’, ‘2’ for ‘sometimes’ and ‘3’ for ‘often’

These two sets of questions were used to determine the household food security Access (HFIA) prevalence of the households. The HFIA prevalence grouped households into four categories of food insecurity level. (access): and reflects increasing food insecurity as households respond affirmatively to more severe conditions and, or experience those conditions more frequently. The four categories include food secure household, mildly food insecure, moderately food insecure and severely food insecure.

Results and Discussions

Extension Characteristics of Respondents

Table 1 shows that 52.71% of the respondents had contact with extension agents in the last year, while 47.29% of them did not. On the frequency of the extension contact, of the 224 respondents who had contact, 20.94% had contact once in the last year, and 27.76% had contact quarterly. The mean extension contact was 1.4 times. The result suggests poor or low contact between the farming households and the extension agents in the study area which may limit the transfer of technologies and information to farming households and more likely to affect their food security. This result is in line with Abubakar et al., (2024) a higher proportion (66.3%) of farmers having extension access to extension services. However, the result disagrees with Abubakar et al., (2024) who reported that a higher percentage (21.9%) of the farmers had contact with extension agents on a monthly basis in Gombe State, Nigeria

Table 1: Respondents contact with extension workers

Variables	% (n=425)	Mean
Contact with extension workers (last 1 year)		
Had no contact at all	47.29	
Had contact	52.71	
Frequency of extension contact in the last one year(n=224)		
Once a year	20.94	
Quarterly	27.76	1.4 times
Once every 2 months	2.59	
Once every month	1.41	

Field survey data, 2023

Table 2 reveales that the only extension services frequently accessed by the farming households in the study area were improved farming materials (M = 2.77) and information about modern farming practices (M =2.65). This is an indication that the farmers may not have the required extension information for optimum production. Therefore, the production capacity of the farmers may be negatively affected. This result agrees with that of Onyemekonwu et al., (2021) that farmers are not exposed to the required extension information for optimum production.

Table 4: Extension services accessed

Services	Mean	SD
Improved farming materials	2.77*	1.0
Information about modern farming practices.	2.65*	.9
Linkage to input supplies	2.31	.7
Market information on prices of products.	1.92	.9
Mobilising or organizing farmers into farm groups	1.43	.7
Farm training	1.38	.7

*Regular (mean ≥ 2.50).Field survey data, (2023)

Farming Technologies Adopted

Table 5 shows that the major farm technologies adopted by the respondents were herbicides (94.82%), fertilisers (93.88%), and improved varieties of crops (74.82%). The general result revealed that only four (4) technologies such as the use of herbicides (94.82%), application of fertilizers (93.88%), use of improved varieties (74.82%) and use of pesticides (73.18%) out of eight (8) technologies were highly (>70%) adopted by farming households in the study area. The low adoption of other technologies could mean low productivity and income, which may threaten their food security. This agrees with Elemi et al., (2018), who reported low adoption of farm technologies among farmers in Nigeria. The result further agrees with Onyemekonwu et al., 2018 who reported low adoption among watermelon farmers in Delta State, Nigeria. This implies that the production output of the farmers is likely not to increase as the adoption level of farm technologies is low and this is likely to worsen the food insecurity level among the farming households.

Table 5: Farm technologies adopted

Technologies	%
Use of herbicides	94.82
Application of fertilizers	93.88
Used of improved varieties	74.82
Use of pesticides	73.18
Adoption of recommended spacing e.g. Im X 1m for cassava and maize intercrop, 75cm X 25cm for maize,	22.12
Ploughing (tilling)	18.82
Use of farm machines	8.0
Use of irrigation	3.53

Multiple responses
Field survey data, (2023)

Household Food Insecurity Prevalence (status)

Figure.1 reveales that 50.82% of the respondents were severely food insecure, 46.59% were moderately food insecure, 1.18% were mildly food secure and only 1.41% were food secure. The result suggests that the level of food insecurity among the farming households (97.41%) in the study area was high. Based on the response in the Table, the respondents were dichotomized as shown in Figure.2. The results showed that 97.41% of the households were food insecure while 2.59% were food secure. This aligns with the findings of Oladeji, et al., (2024), who reported a high level (60.00%) of food insecurity among rural farming households in Oyo State, Nigeria.

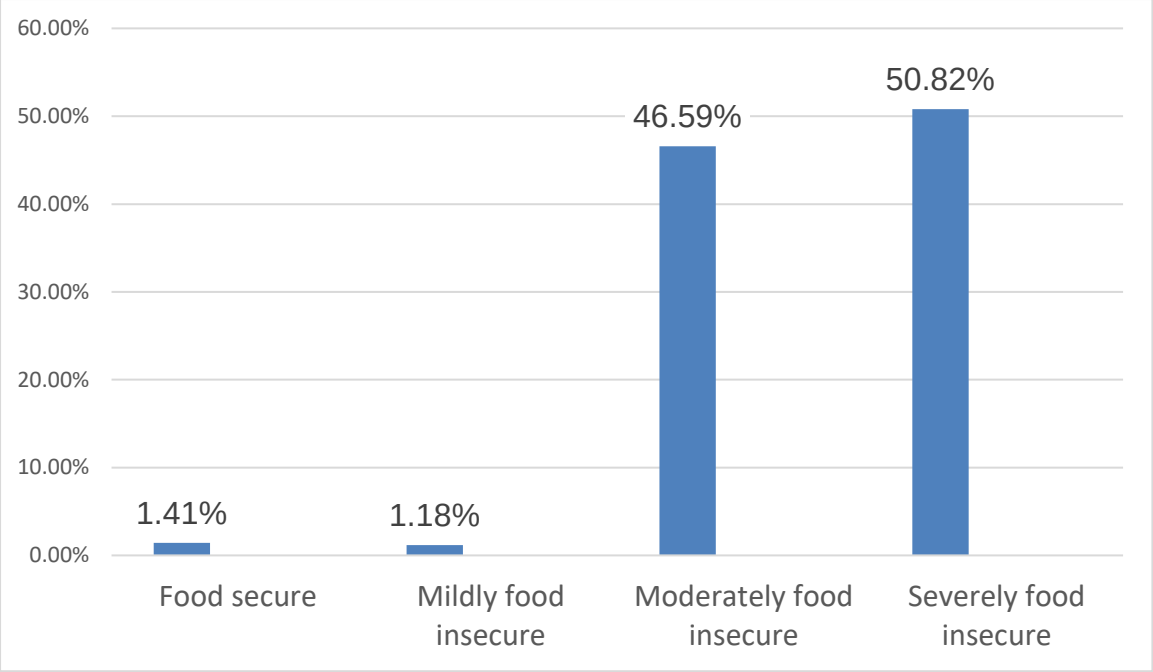

Figure. 1: Classification of respondents based on food insecurity

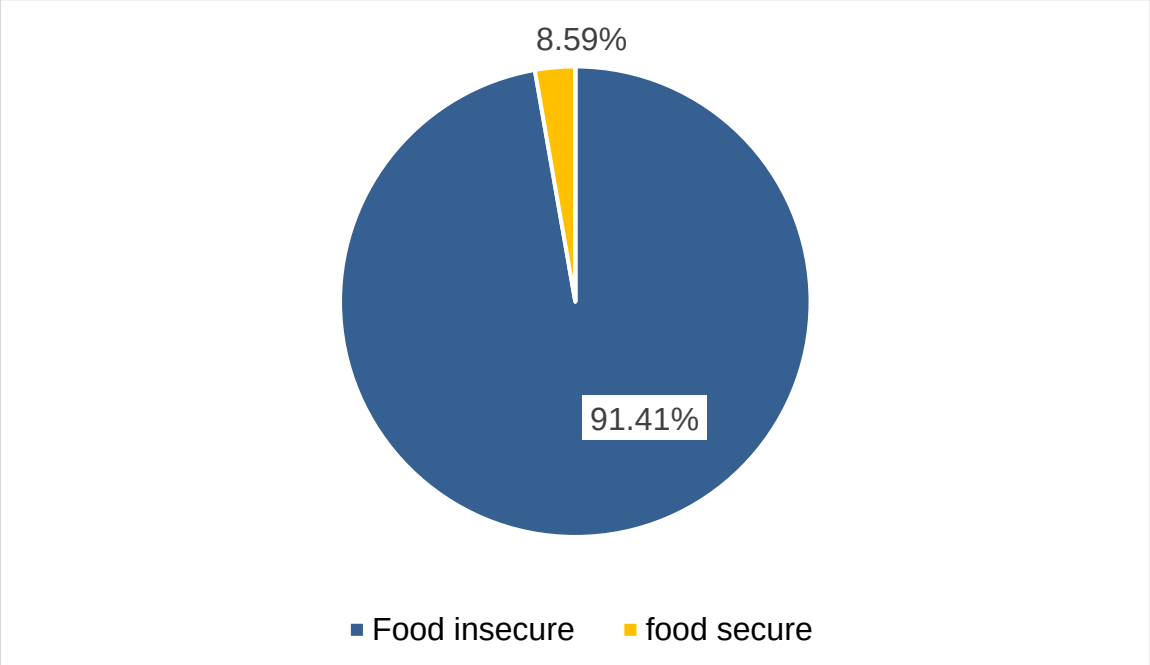

Figure.2: Household's food security status

Determinants of Household Food Security

Table 7 shows that the likelihood ratio or model Chi-square was significant (Chi-square = 58.46, df = 12), indicating that the independent variables have a significant influence on the farming household food security status. The goodness-of-fit test (χ^2 = 93.84; df = 301) is not significant, which means that the model is a good representation of the data.

The coefficient of determination (R-square = 0.602) indicates that the independent variables in the model explain 60.2% of variation observed in the farming household's food security status. Based on the t-statistics, four of the independent variables have significant influence on farming households' food security status, namely; age of the respondents, farm income, non-farm earnings and frequency of extension contact. These are discussed below.

The negative coefficient for age (b = -0.155), means that household with younger household heads are more likely to be food secure compared to households with older household heads. The odd ratio (0.856) suggests that younger household heads were 17% more likely to be food secure compared to older household heads.This is expected because as age increases farmers are likely to become less productive and have less energy to cultivate larger-size farms. Similar findings have been reported by Seid and Biruk, (2019).The study further agrees with Oladeji et al., (2024) reported a significant relationship between farmers' age and their food security status.

The negative coefficient for farm income (b=-2.706), means that farming households with lower income had a higher probability of being food secure relative to those with higher income. The odd ratio (0.067) suggests that households with lower income are about 15 times more likely to be food secure compared to households with higher income. This is contrary to expectation because increased income is presumed to lead to increased access to food. The likely reason for this negative coefficient may be because farming households with higher income may have other financial responsibilities and commitments which they divert their income for other uses than family feeding (Seid and Biruk, 2019). However, the study agrees with Onoja, et al., (2022) who reported a significant relationship between income and food security status.

The positive coefficient for non-farm earnings (b = 2.011; odd ratio = 7.4), means that respondents with higher non-farm income earnings were more likely to be food secure by a magnitude of 7 times relative to those with lower farm income. The result is expected as higher income levels are expected to enhance food security. This result supports the finding of Etea et al., (2020), who reported a significant relationship between non-farm income earnings and food security of rural farmers but disagrees with the finding of Oladeji et al. (2024) who found no relationship between the non-farm earning of farmers and their food security status.

The negative coefficient for frequency of extension contact (b = -3.494; odd ratio = 0.03), means that farmers with less extension contact were 33 times (1/0.03) more likely to be food secure than farming households with more contact with extension workers. This finding is unexpected since more frequent contact with extension workers is expected to lead to higher technology adoption, productivity and food security (Abubakar, et al., 2024). The finding though unexpected was not surprising, the result on the frequency of farmers' contact with extension agents (earlier reported) revealed that almost half of the respondents had no contact with extension agents (47.29%), only about a quarter (27%) had quarterly contact i.e. about 3 times a year while 21% had only a single contact with extension agents in one year. This is far from the recommended minimum of six times a year. Thus, the level of contact between the farmers and the extension service was very low. The aligns with a previous study which found a significant relationship between extension contact and the food security status of farmers (Oladeji et al., 2024).

Table 7: Determinants of household food security

Parameters	Coefficient (b)	Std. Error	Wald χ^2	Df	Prob. level.	Odd ratio
Constant	17.54	4.788	13.432	1	0.000	
Age years	-0.155*	0.072	4.676	1	0.031	0.856
Education	0.698	0.410	2.901	1	0.089	2.01
Gender of household head	23.46	0.000	0.00	1	0.997	
Household size	-0.174	0.186	0.869	1	0.351	0.841
Farming experience	-0.086	0.048	3.148	1	0.076	0.918
Membership of cooperatives	0.123	0.884	0.019	1	0.889	1.13
Farm income	-2.706*	1.005	7.253	1	0.007	0.067
Non-farm earnings	2.011*	1.019	3.893	1	0.048	7.47
Credit access	0.094	0.945	0.010	1	0.921	1.10
Frequency of Extension Contact	-3.494*	1.196	8.531	1	0.003	0.03
Extension services received/ accessed	-0.330	0.204	2.607	1	0.106	0.719
Technologies adopted	0.591	0.566	1.091	1	0.296	1.81

-2 Log Likelihood (χ^2) = 58.46; df = 12; p < 0.01; Goodness-of-Fit (χ^2)=93.84; df = 301; p > 0.01; Pseudo R-Square = 0.602

Source: field survey data: 2019

Conclusion and Recommendations

The level of food insecurity among the farming households was high. This is probarbly due to the low level of extension contact among the farming households resulting to poor adoption of improved production technologies. Agricultural and rural development agencies and other non-governmental organizations involved in promoting food security through extension agents, should encourage farmers to adopt improved farming technologies. This will help to boost their production output and make more food available.

Extension service providers should improve on the farmers–extension-agent's interaction and contact. This will improve the farmers' capacity to produce and in turn, enhance food availability.

Farming households in the study area should be encouraged to join cooperative societies to enhance access to farm credit to expand their farm business. Also, the farmer should be linked to sources of affordable credit such as microfinance banks and banks which the madeates of funding agricultural enterprises.

References

Adam, A. M. (2020). Sample Size Determination in Survey Research. Journal of Scientific Research & Reports 26(5): 90-97. doi.org/10.9734/JSRR/2020/v26i530263

Agbugba, I., Agbuma, K. S. Anumudu, C. and Onyeka, H.(2022) The evolving state of food security in Nigeria amidst the COVID-19 pandemic – A review. *Open Agriculture* 7(1):899-909. https://doi 10.1515/opag--0149

Abubakar, U., Abdullahi, S. and Garba, M. (2024). Factors influencing maize farmers' level of awareness of flood disaster adaptation strategies in Gombe State, Nigeria. *Nigerian Journal of Agriculture and Agricultural Technology* 4 (1): 235-244.

Akande, A. A., & Oghenetega, O. (2022). An empirical investigation of food security status in urban households in Niger Delta, Nigeria. *The International Journal of Business &Management 10(2)* https://doi.org/10.24940/theijbm/2022/v10/i2/BM2202-040

Chiemela, S. N., Chiemela, C. J., Apeh, C . C. and Ileka, C. M. (2022). Household food and nutrition security in Enugu, State, Nigeria. Journal of Agricultural Extension, 26 (2): 12-25.

Ehiwario, F. A., Onyemekonwu, R. C. and Onemolease E. A (2024). Food security challenges and coping strategies offarming households in selected States in Niger Delta, Nigeria. *Production Agriculture and Technology Journal*. 19 (1): 58-63

Elemi, G. F., Idiku, F. O. and Eta, H. C. (2022). Adoption of sustainable land use practices among farmers in Cross River State, Nigeria. Proceeding of the 27th Annual Conference of Agricultural Extension Society of Nigeria, held in Awka,26-29 September, 75-88

Emaziye, P. O., Emaziye, O.&Udonadi, I. J. (2022). Economics implications of insecurity on food crop production in Delta State Nigeria. *Journal of Basic and Applied Research International*, *28*(3), 44–50. https://doi.org/10.56557/jobari/2022/v28i37803

Etea, b. G., Zhou, D., Abebe, K. A. and Sedebo, D. A. (2019). Household Income Diversification and Food Security:Evidence from Rural and Semi-Urban Areas in Ethiopia. *Sustainability* 11(12): 1-16. DOI:10.3390/su11123232

Faleke, S. A., Nwabeze, G. O. and Buhari, H. L. (2022). Benefit of the west Africa agricultural productivity programme on fishersfolks in Kanji Lake Basin, Nigeria. *Journal of Agricultural Extension,* 26(1), 1-9. http://dx.doi.org/10.4314/jae.v26i1.1

Ike, P. C. (2024). National food crises: The nexus of public capital expemdiure and Nigeria's budgetary allocation to agriculture. 2nd Inaugural lectures, Dennis Osadabay University, Asaba

Iwuchukwu, J. C., Obazi, S. A. Oputa, P. I. and Madukwe, M. C. (2022). Factors influencing organic fertilizer use among rice farmersin Eboyi State, Nigeria. *Journal of Agricultural Extension,* 26(1), 25-32. https://dx.doi.org/10.4314/jae.v26i1.4

Nigeria Economic Summit Group (2024). NESG Issues a Policy Brief on the Status of Food Security in Nigeria. https://www.nesgroup.org/blog/NESG-Issues-a-Policy-Brief-on-the- Status-of-Food-Security-in-Nigeria

Nigeriagalleria, (2022). Brief history of Delta State. https://www.nigeriagalleria.com/Nigeria/States_Nigeria/Delta/Brief-History-of-Delta-State.html

Oladeji, S.O., Olatunji, A. T., Jamiyu., A. G. Ibirogba, O. R. and Ogunola, A. A. (2024). Socio-economic drivers of food security among smallholder rural household maize farmers in Ido Local Government Area of Oyo State, *Nigeria. Nigerian Journal of Agriculture and Agricultural Technology* 4 (1): 69-176.

Onoja, M. N., Onoja, I. B., Opeyemi, G. Onoja., P. O., Okeke., J. I., OJih, S. E. U., Uzugbo, A. P. Onoja, A. E. (2022). Food security and dietary diversity of HIV/AIDs patients in Abuja Metropolis. Implication for nutrition awareness campaign. Proceeding of the 27th Annual Conference of Agricultural Extension Society of Nigeria, held in Awka,26-29 September, 97- 107.

Onyemekonwu, R. C., Chisonum, M. and Onyemekihian, F.(2023) productivity factor and constraints associated with yam production in Delta State, Nigeria. *Nigerian Journal of Agriculture and Agricultural Technology*, 3 (2): 110 – 118.

Onyemekonwu, R. C., Onemolease E. A. and Ehiwario, F. A. (2021). Determinants of Technology Adoption among Watermelon Farmers in Delta State, Nigeria. *International Journal of Agriculture and Biosciences.* 10(1): 33-39

Seid, S. and Biruk, K. (2019). Analysis of households Food insecurity and its coping mechanisms in Western Ethiopia. *Agricultural and Food Economics*, 5(7) 1-20

Schiffer, M. E. (2023). Test-Retest Reliability | Definition, Importance & Examples. https://study.com/academy/lesson/test-retest-reliability-coefficient-examples-lessonquiz.html#:~:text=A%20test%2Dretest%20reliability%20coefficient,0%20to%20be%20considered%20acceptable.

Week. D. A. and Wizor, C. H. (2020). Effects of Flood on Food Security, Livelihood and Socio-economic Characteristics in the Flood-prone Areas of the Core Niger Delta, Nigeria. *Asian Journal of Geographical Research*, 3 (1): 1-17 DOI:10.9734/ajgr/2020/v3i130096

Wilson, C. K., Anne, C. N. Chiyere, C. O. and Elisha, C. A. (2021). food security status of and factors affecting household food security in Enugu State, *Nigeria. Journal of Health Care for the Poor and Underserved* 32 (1): 565-581. DOI: 10.1353/hpu.2021.0041