International Journal of Climate Change-Action and Environmental Studies (IJCCAS)
ISSN2245-1800(paper) ISSN 2245-2943(online)
4(7)1-800; November.2025; pp22-31

www.saerem.com

Building Resilience against Climate Change for Sustainable Agricultural Practices among Small-Scale Yam Farmers in Ondo State, Nigeria

[1]Ibidapo, I. and [2]Ale, A. B.
Department of Agricultural Science, Adeyemi Federal University of Education, Ondo
[1]E-mail: ibidapo68@gmail.com; https://orcid.org/0009-0006-6725-4234
[2]E-mail: alesefunm@gmail.com; https://orcid.org/0000-0002-9491-8300

Abstract

This study investigated effect of building resilience against climate change for sustainable agricultural practices among small-scale yam farmers in Ondo State, Nigeria. Three hundred and five small-scale yam farmers were selected through multistage random sampling procedure. Information were collected on socio-economic characteristics, resilience building strategies, challenges of building resilience by yam farmers with the aid of structured questionnaire. The descriptive statistics-mean, standard deviation, independent t-test analysis, Cohen's d and logistic regression analysis were the analytical tools employed for data collected. The result showed 69.1% of yam farmers built resilience strategies against climate change with 48.6±7.5years as mean age of yam farmers with male household heads dominant and with primary education. The resilience building strategies in yam production included intercropping, crop rotation, weeding, and pests/diseases control, among others. Finding also revealed significant difference in yam production after building resilience against climate change. It was discovered that, age of yam farmers, household size, cultivated land size, access to climate information and credit were factors influencing resilience building among yam farmers in the study area. It was recommended that youth should be encouraged in yam production, training and education, access to credit and climate information should be encouraged among small-scale yam farmers in the study area.

Keywords: *Resilience building, climate change, small-scale farmers, intercropping.*

Introduction: Agricultural production in Nigeria like other nations of the world is negatively affected by climate change coupled with increasing environmental challenges. Climate change and its impact has become a source of concern in the rural areas most especially the small scale yam farmers in developing countries. Climate change is an inevitable and urgent global challenge with long-term consequences for the sustainable agricultural practices in all nations of the world. Climate change such as; extreme temperatures and rainfall, pests and diseases, flooding, and excess heat, among others has posed serious challenges on small scale yam famers who are the major producers of food and depend on rainfed agriculture but lacked climate adaptive capacity. Climate change remains the most critical challenge confronting sustainable production in agriculture in the world today with the effects are much daunting in developing countries.

Climate change is a cardinal factor causing weather variability that poses challenges to crop farmers, most especially the small-scale farmers who are the largest producers of staple food (Olufemi et al., 2022; Ibidapo and Ayansina, 2024). The variability and change in climatic factors has impacted greatly on yam production in rural area most especially in developing countries and Nigeria in particular. These have seriously undermined agricultural productivity in various agro-ecological zones of the rural areas (Adebayo and Ojogu, 2019). The challenges of climate change to crop farmers in the sub-Saharan Africa, most especially small-scale farmers who are the largest producers of staple food cannot be underestimated (Nwalem *et al*., 2019; Izuogu *et al*., 2021; Akinkuolie et al., 2025). Hence, addressing climate change through adaptation practices or building resilience in yam production could guide against the devastating effects of climate change.

Resilience entails the ability of the different people, households and systems to adapt, mitigate and recover from various forms of shocks and stresses in a way that reduces the chronic vulnerability in climate and facilitates inclusive growth (Mayanga et al., 2023; Béné *et al*. 2017). It entails the means by which someone predict, manage, bear and survive the consequences of devastating occurrences in an efficient and timely manner through the adoption of long lasting measures of its crucial functions and structure (IPCC, 2009). Climate resilience strategies could often be termed as adaptive capacity or buffer capacity to mitigate the effect of climate change (Acevedo *et al*., 2020; IPCC, 2009; Olufemi et al., 2022). It therefore consists of building adaptation or adjustment in human or natural systems through the adoption of innovation or changing environmental conditions to cushion the effect of climate change (IPCC, 2009; Ashfaq and Jan, 2019). In yam production, building resilience consist of adoption of various climate adaptation mechanisms/practices by yam farmers to reduce possible effects of climate change and cope with the outcomes to enhance sustainability in yam production in the rural areas. This is crucial due to the fact that the impact of climate change is mostly experienced by the small-scale farmers, who are the major producer of food crops and are highly dependent on erratic rainfall and other climate-sensitive conditions.

Yam (*Dioscorea spp*) is one of the major staple food crops that is widely cultivated and massively consumed by the people in Nigeria. Nigeria is accounted as the largest producer of yam in Africa with about 36.72 million metric tonnes production annually (Odinwa et al.2016). Nigeria contributes about two-thirds of yam production globally each year. Yam cultivation has being one of the dominant food crop livelihood activities of the people and mainstay of the economy of the rural areas in developing countries. It is major source of food, income and raw materials for the industries. However, despite the significance yam to the household economy, there has been a decline in yam production which could be attributed to several challenges facing yam production such as pests, diseases infestation, poor soil fertility, inadequate inputs, among others (Izuogu et al., 2021). Climate shocks could adversely affect yam production, household's economy and wellbeing, food security status and ultimately culminate into poverty.

Studies have documented several negative consequences of climate change has been reported on yam production in Nigeria (Odinwa et al., 2016; Atube et al., 2021). Twongyirwe et al. (2019) submitted that farmers acknowledged the impact of climate change results in reduced agricultural production while Funk *et al.* (2020) indicated that climate change led to agricultural production losses ranging from 5% to 20% in Indonesia. Atube et al. (2021) reported that famers lack information and adaptive capacity such as access to weather forecast, constant extension agent's information on resilience to climate change, and technology to mitigate climate variability (Adeagbo *et al*., 2021). Despite the plethora of studies on climate change and yam cultivation, however, there is dearth of empirical evidence on building resilience to climate change in yam production for household sustainability in Ondo State. Findings of this study will contribute to knowledge and bridge the gap while identifying the resilience strategies adopted by yam farmers against adverse effect of climate change. Hence, this study assessed the resilience building mechanism in mitigating the effect of climate change for sustainable agricultural practices in Ondo State, Nigeria. Specifically, the study seeks to;

- profile the socio-economic characteristics of small-scale yam farmers in the study area;
- identify the resilience building strategies adopted by small-scale yam farmers in the study area;
- identify challenges facing small-scale yam farmers in building resilience against climate change in the study area;
- identify if difference exist between farmers income before and after building resilience against climate change; and
- determine factors influencing the choice of resilience strategies adopted by small-scale yam farmers in the study area.

Materials and Methods: This study was conducted in Ondo State, Nigeria. Ondo State has eighteen local government areas with an estimated population of 7,930,787 people (National Population Commission of Nigeria, NPC, 2021). The state lies on latitude 5^0 45^1 and 8^0 15^1 North and longitude 4^0 45^1 and 6^0 East of the equator. Ondo State is characterised agrarian vegetation and farming is the major occupation of the people in the study area. The study area supports the cultivation of cocoa, kola, maize, and yam, among other crops. The 300 small-scale yam farmers which constituted the sample for the study were selected through the multistage sampling procedure. Stage one consisted of the purposive selection of three (3) local government areas (Akoko-South-West, Ondo-East, and Okitipupa) in the state. The purposive selection of the local government areas was based on fact that they are among the major yam producing local government areas in the state. Second stage, comprised random selection of five (5) communities from each of the selected local government areas given a total of fifteen communities while the final stage consisted of random selection of small-scale yam farmers based on probability proportionate to the size of small-scale yam farmers in the selected communities. A total of three hundred (300) small-scale yam farmers were selected for the study. Primary data were gathered through structured questionnaire with interviews schedule. Information was gathered on the socio-demographic and farm characteristics, climate change features, income and challenges of building resilience and climate resilience adaptive strategies, among others. Data collected were analysed using descriptive statistics such as frequency distribution counts, mean and standard deviations, t-test of independent sample, Cohen's *d* and logistic regression analysis. The independent t-test was used to test if there is significant difference in small-scale yam farmers production before and after building resilience against climate change while the logit model was employed to determine factors influencing resilience building mechanisms adopted by the small-scale yam farmers. The independent t-test analysis is specified as follows;

$$t = \frac{\bar{x}_1 - \bar{x}_2}{\sqrt{\frac{S_1^2}{n_1} + \frac{S_2^2}{n_2}}} \qquad 1$$

Where, t = student t – test; $\bar{x}_{1,2}$ = means for before and after building resilience mechanisms, s^2 = variance, $n_{1,2}$ = numbers of small-scale yam farmers. The degree of freedom is given as $(n_1 + n_2) - 2$. The Cohen's *d* was used to determine the effect of size that is the magnitude of difference in resilience building on small-scale yam farming in the study area. The Cohen's *d* was determined using;

$$d = \frac{\bar{X}_1 - \bar{X}_2}{Sp} \qquad 2$$

$$Sp = \sqrt{\frac{S_1^2 + S_2^2}{2}} \qquad 3$$

where, d is the Cohen's d, $\bar{X}_1$, $\bar{X}_2$ are the means income from yam production for before and after building resilience in yam production, and Sp is pooled standard deviation. The logistic regression function of small-scale yam farmers' likelihood of adoption of resilient mechanism against climate can be expressed as;

$$Logit\ (P) = log\left(\frac{p}{1-p}\right) \quad 4$$

Let, $P_i = Pr\left(\frac{Y=1}{X=X_i}\right)$; 5

then this model can be written as;

$$Pr = \left(y = \frac{1}{y}\right) = \frac{exp^{xb}}{1-e^{xb}} = log\left(\frac{P}{1-P_i}\right) \quad 6$$

$$= Logit\ (Y_i) = \beta_0 + \ldots + \beta_i X_i + ui \quad 7$$

where, P_i is the probability of small-scale yam farmers building resilience mechanism, X_i represents the explanatory variables, β_0 is the model intercept, β_i denotes the regression coefficients for the explanatory variables and u_i is the error term in the model. Hence, $P_i = 1$ small-scale farmers build resilience against climate change; 0 = otherwise, explanatory variables are X_1 = age (years); X_2 = gender (1=male; 0=otherwise); X_3 = education (completed years of formal schooling); X_4 = marital status (1 = married; 0 = otherwise); X_5 = household size (numbers); X_6 = farming experience (years); X_7 = distance to farm centre (kilometers); X_8 = cultivated far size (hectares); X_9 = income realised (₦); X_{10} = access to climate information (1= yes; 0 = otherwise); X_{11} = contact with extension agents x_{12} = non-farm income (₦); X_{13} = access to credit (1= yes; 0 = otherwise);

Results and Discussion : The socio-economic characteristics of small-scale yam farmers (Table 1) play significant roles in agricultural practices, decision making, and adoption of innovation in rural areas. The results revealed that 69.1% of the small-scale yam farmers adopted climate change resilience mechanisms to combat the climate change outcomes in the study area. This indicates that majority of the yam farmers employed building resilience against climate change to guide against poverty and food insecurity. The mean age of the of the yam farmers was 48.6±7.5years. This implies that the yam farmers in the study area are within the economically active population age for agricultural production. This enhances their ability in adopting the various resilience building mechanisms in yam cultivation and that this age bracket is more responsive to innovations and modern technologies for agricultural production. This is similar to Bolarin et al. (2022) that reported a mean age of 45 years but contrary to finding by Sadiq *et al.* (2021) who reported a mean age of 50 years for yam farmers in Benue State, Nigeria. Male household head yam famers accounted for 72.5% in the study area. This implies that yam cultivation in the study area is mostly dominated by men. This finding is in line with Udemesue et al. (2017) who reported the prevalence of more male (75.0%) yam farmers in Anambra State, Nigeria.

The marital status of the small-scale yam farmers indicated that 81.4% were married coupled with average household size of 8.0 members within the yam farmer's household. This concurs with findings by Sadiq et al. (2021) and Udemesue et al. (2017) who reported that 77.5% and 66.9% married couples among yam farmers in Benue and Anambra States, respectively. The large family size enhances the availability or supply of more family labour for cultivation of yam farming. Anozie *et al*. (2014) revealed that resilience building strategies against climate change variability and unfavourable effects of the weather in the cultivation of yam is labour intensive hence; family labour supply will help to address labour shortage. This supports the finding of average household size of 7.0 members in Ethiopia by Tesfaye and Nayak (2022). Access to education is a major factor in agricultural production in the rural area. The mean years of completed education of the yam farmers revealed an approximately 6.12 years. This indicates that most yam farmers completed primary school. However, this low level of education could have impact on yam farmers' ability to understand and interpret climate change information and adopt climate change resilience innovations. The result revealed that yam farmers cultivated an average of 2.58 hectares of land for yam production which supports the submissions by Federal Office of Statistics (1999) and Girei et al. (2016) who reported an average cultivated land size for small-scale farmers to be between 0.1 – 4.99 hectares of land but at variance with Ogbonna et al. (2011) and Udemesue et al. (2016) and who found an average of 1 hactares and 1.54 hactares of cultivated land size, respectively among yam farmers in Abia and Anambra States. On access to farm inputs, was observed to be low among the yam farmers which accounted for 46.3%. Input acquisition constituted a major challenge facing the farmers thus exacerbated by climate change. Hence, building resilience to climate change could boost productivity in the absence or poor supply of inputs. The average years of experience of yam farmers was approximately 13 years and this was found to have impacted much on yam farmers adoption of resilience building mechanisms. This is consistent with finding by Ibidapo (2017) that more years of experience promotes better understanding of climatic variability and the mitigation strategy in yam production.

Access to credit and contact with extension agents (Table 1) among the yam farmers, 49.1% indicated their access to credit facilities which was observed to be very low and have significant negative effects on access to inputs, adoption of innovation and technology, and access adequate training on climate resilience building strategies. The result showed an average of 5 contact periods with extension officers per annum. This may be attributable to the increase in the numbers of adoption of resilience building innovation practices among yam farmers. However, this is low considering the importance of information on climate change and the need to keep farmers abreast of consequences on agricultural production. The finding is inconsistent with Nahid et al. (2021) that reported average of 12 contact periods with the extension officers. The result on income revealed that, yam farmers realised more income after building resilience mechanisms to mitigate the effect of climate change on yam production in the study area.

Table 2 shows the resilience building mechanisms adopted by small-scale yam farmers in the study area. The results revealed that 80.3% of the farmers adopted crop rotation while organic farming practices were employed by 92.7% as resilience against climate change. This conforms to the submission by Food and Agricultural Organisation (2017) that there is need for combined strategies in resilience building to mitigate the effect of climate change in sub-Saharan Africa. The adoption of mulching, planting of resistant yam varieties and alteration in planting period accounted for 55.3%, 86.0% and 69.3%, respectively. In the same vein, the use of indigenous practices, crop diversification and inter-cropping was represented by 89.3%, 72.7% and 73.0%. This finding agrees with Rwangire and Muriisa (2019) that indigenous practices and crop diversification help to combat climate variability and prolong soil improvement for enhanced productivity. Furthermore, Abiola et al. (2016) and Aluma (2024) indicated that inter-cropping and organic farming practices serve as insurance and protect the soil and build resilience against climate change most especially among the peasant farmers in the developing countries.

On the challenges of building resilience by small-scale yam farmers, results showed that lack of weather forecasts and meteorological orientation and poor access to climate-information constituted serious challenge to the yam farmers. This was attributed to the inadequate awareness and information among the farmers populace. Irregular weeding of farm (70.3%) was also identified as a challenge to yam farmers which could account for the poor yield and proliferation of pests and diseases infestation due to climate change (Rwangire and Muriisa, 2019). Inadequate adaptive capacity and poor adoption of innovation or technology accounted for 88.0% and 89.3%, respectively. This corroborates the finding by Njogenhenle et al. (2021) which indicate that farmers in the developing countries lack the adaptive capacity in building resilience against climate change.

The independent sample t-test analysis was employed to show if there is statistically significant difference in building resilience by small-scale yam farmers in the study area. The income realized before building resilience and after building resilience revealed that there is statistically significant difference in the income. The result (Table 3) shows a higher mean income after building resilience ($\bar{X}_1 = 76548.07$; SD = 22045:60) than income before building resilience ($\bar{X}_2 =$ 4567.28; SD = 13515.21), the calculated t-value of 6.540 and a p-value of .037, and Cohen's *d* value of 0.84 testing at an alpha level of 0.05 level of significance ($t_{298} = 6.540$; df = 298; $p < 0.05$; $d = 0.84$). Since the p-value is less than the alpha level, the null hypothesis which states that "there is no significant difference between the income realized before building resilience and income realized after building resilience by small-scale yam farmers" is rejected. Hence, there is a significant difference between the income realized before building resilience and income realized after building resilience by small-scale yam farmers. Result of the Cohen's *d* shows that the effect of resilience building against climate change by small-scale yam farmers was large (0.84). This suggests that building resilience against climate change has resulted in increase in productivity of the farmers, hence the increase in income realized.

The result of the logit regression analysis (Table 4) on factors influencing resilience building against climate change by small-scale yam farmers revealed that the LR Chi^2 was 189.09, the probability chi^2 was 0.000 and the Pseudo R^2 accounted for 0.6758. The result revealed that the fitness of the model and the hypothesized variable are joint predictors of the dependent variable (resilience building mechanism). Thirteen (13) explanatory variables were hypothesized to influence resilience building mechanism by yam farmers out of which nine (9) were significant. Age was significant with positive coefficient at 5% level of significance. This implies that increase in age increases the likelihood of small-scale farmers in building resilience against climate change in yam production by 0.041. This could be attributed to the fact at advanced age yam farmers need to produce more for the family and more income. The coefficient for gender was positive and significant which implies that being male increases yam farmers resilience building resilience against climate change. This contradicts the assertion by Adepoju and Obayelu (2013) who reported a more female participation in livelihood activities diversification compared to men in the rural areas.

Education showed negative coefficient and significant at 5%. This implies that increase in yam farmers years of schooling or more education will affect participation in yam cultivation by -0.085. However, despite that education is vital for small scale farmers for enhanced productivity, yet increase in education decreases the likelihood of building resilience against climate change among small scale yam farmers. This is inconsistent with Zakari et al. (2022) that reported positive coefficient for education in building resilience against climate change. Family size and years of experience of small-scale yam farmers had positive and significant coefficients at 1% level of significance. This implies that increase in household and years of experience increases the likelihood of yam famers building resilience against climate change by 0.104 and 0.095, respectively. Hence, a member/a year increase in household size/farming experience will increase resilience building against climate change among yam farmers in the study area.

Also, cultivated land size and farm income realised showed significant and positive coefficients at 1% levels. This indicates that a hectare increase in cultivated land size increases the probability of building resilience against climate change in yam production by 0.073 while increase in income from yam production by one naira increases the likelihood of resilience building to curb climate change among small-scale yam farmers in the study area. The coefficients of access to climate information and credit were positively significant at 5% levels. This implies that having access to information and credit will enhance yam farmers' resilience building mechanisms. This suggests that access to climate change information coupled with credit availability will provide information and financial empowerment that help in yam production, pest and disease management thus boost productivity of yam in the study area.

Conclusion and Recommendations: The study explored resilience building against climate change as sustainable agricultural practices among small-scale yam farmers in Ondo state, Nigeria. Various agricultural practices such as crop rotation, intercropping, mulching and use of indigenous practices were among the resilience building mechanisms employed by the yam farmers. Resilience building was found to bring about increase in income of the farmers in the study area. Resilience building was found to be constrained by poor adoption of technology, inadequate adaptive capacity, pests and diseases, while age of farmers, education, cultivated land size and access to inputs, among others were the drivers of resilience building against climate change among yam farmers in the study area. Hence, it was recommended youth should be educated about resilience building against climate change, training and awareness about climate change, more land should be made available for yam cultivation in the study area.

References

Adebayo, A. E. and Ojogu, E. O. (2019). Assessment of the Use of Climate Smart Agricultural Practices among Smallholder Farmers in Ogun State Acta Scientific Agriculture 3(6): 47 – 56

Adeagbo, O.A., Ojo, T. O. and Adetoro. A. A. (2021). Understanding the determinants of climate change adaptation strategies among smallholder maize farmers in South-west, Nigeria. Heliyon., 7 (2021): e06231. https://doi.org/10.1016/j.heliyon. 2021.e06231

Acevedo, M., Pixley, K., Zinyengere, N., Meng, S., Tufan, H., Cichy, K., Bizikova, L., Isaacs, K., Ghezzi-Kopel, K. and Porciello, J. A.. 2020. Scoping Review of Adoption of Climate-Resilient Crops by Small-Scale Producers in Lowand Middle-Income Countries. Nat. Plants, 6: 1231–1241.

Adepoju A. O. and Obayelu, O. A. (2013). Livelihood diversification and welfare of rural households in Ondo State, Nigeria *Journal of Development and Agricultural Economics* 5(12): 482 – 489

Akinkuolie, T. A., Ogunbode, T. O. and Adekiya, A. O. (2025) Resilience to climate-induced food insecurity in Nigeria: a systematic review of the role of adaptation strategies in flood and drought mitigation. *Frontiers in Sustainable Food System* 8:1490133. doi: 10.3389/fsufs.2024.1490133

Aluma, J. (2024). Sustainable Agriculture and Rural Livelihoods: Local Knowledge Innovations in Developments, in Indigenous Knowledge: Local Pathways to Global Development, Knowledge and learning group. African Region. Washington DC: The World Bank.

Anozie, R.O., Anozie, S. N., Usanga, U. J. and Okelola, O. F. (2014). The State of Adoption of Yam Minisett Technique in Imo State, Nigeria. Asian J. Agric. Ext. Econ. Sociol., 3(6):562-568. https://doi.org/10.9734/AJAEES/2014/6916

Ashfaq, M. and Jan, I. (2019). Effects of climate change on productivity of maize crop in Khyber Pakhtunkhwa. Sarhad Journal of Agriculture 35(3): 925-932.

Atube, F.,Malinga, G. M., Nyeko, M., Okello, D. M., Alarakol, S. P. and Okello‑Uma, I. (2021). Determinants of smallholder farmers'adaptation strategies to the effects of climate change: Evidence from northern Uganda *Agriculture and Forestry (10)6:1 – 14*

Béné C, Chowdhury FS, Rashid M, Dhali SA & Jahan F, 2017. Squaring the circle: Reconciling the need for rigor with the reality on the ground in resilience impact assessment. *World Development* 97: 212–31

Food and Agricultural Organisation (FAO, 2017). Change the future of migration. Invest in food security and rural development. FAO Publications

Federal Office of Statistics (FOS, 1999). Poverty and Agricultural Sector in Nigeria, Abuja, Federal Office of Statistics Vol. 111, Population, Distribution by Sex, State, LGA & Senatorial District, National Population Commission, Abuja, Nigeria, Pg. 53.

Funk, C., Sathyan, A. R.., Winker, P. and Breuer, L. (2020). Changing climate—Changing livelihood: Smallholder's perceptions and adaption strategies. *Journal of Environmental Management* 259, 109702.

Ibidapo, I. and Ayansina, E. S. (2024). Determinants of climate adaptation practices among Tomato farmers in Ondo State, Nigeria Unpublished B. Ed project submitted to the Department of agricultural Science, Adeyemi College of Education, Ondo.

IPCC, 2009. Climate change 2009: Synthesis report summary for policymakers. Workgroup contribution to the fourth Assessment Report at IPCC Plenary, Valencia, Spain. *International Institute of Environmental Development.*, 22: 12–17..

Izuogu, C.U., R.U. Onyeneke, L.C. Njoku, G.C. Azuamairo and M.C. Atasie, 2021. Repositioning Nigeria's agricultural extension system towards building climate change resilience. *Sarhad Journal of Agriculture* 37: 180-189.

Girei, A. A., Suleiman, N. H. and Ohen, S. B. (2016) Socio-Economic variables and rural women participation in yam production in Gwagwalada area council, Federal Capital Territory (FCT), Abuja, Nigeria *Scientific Papers Series Management, Economic Engineering in Agriculture and Rural Development* 16(4):111 – 120

Khan, N. A., Shah, A. A., Chowdhury, A., Wang, L., Alotaibi, B. A. and Muzamil, M. R. (2024). Rural households' livelihood adaptation strategies in the face of changing climate: A case study from Pakistan *Heliyon* 10. 1 - 14

Khumalo, T. A., Chakale1, M. V., Asong, J. A., Aremu, A. O. and Amoo, S. O. (2025). Indigenous farming methods and crop management practices used by local farmers in Madibeng local municipality, South Africa Scientific Reports 15, 8918

Manyanga, M., Murendo, C., Pedzisa, T., Mutyasira, V and Ndou, R. (2022). Resilience capacities and implications for food security in Zimbabwe *African Journal of Agricultural and Resource Economics* 17(4): 298–312

Nnadi, E. O., Nwachukwu, C. M., and Okafor, P. I. (2019). Investment in research and development for climate-resilient agricultural technologies: policy implications for Nigeria. *Agric. Policy Rev.* 21, 189–204. doi: 10.1016/j.agpol.2019.05.007

Njongenhle, M. B. N., Stefan, G., Emma, A. and Robyn, H. (2021). Perceived impacts of climate change on rural poultry production: a case study in Limpopo Province, South Africa, Climate and Development, DOI: 10.1080/17565529.2021.1929803

Nwalem, M.P., Asogwa, B. C. and Aye, G. C. (2019). Analysis of climate change manifestations among sesame farmers in Benue State, Nigeria *Journal of Science Research and Repository* 22(2): 1-7.

Odinwa, A. B., Emah, G. N. and Alberth, C. O. Analysis of Rural Farmers Participation in Yam Production in Ogba/Egbema/Ndoni Local Government area of Rivers State *International Journal of Agriculture and Earth Science* 2(6): 1-10

Ogbonna, M.C., Korieocha, D. S., Onyenobi, V. O. and Njoku, S. C. (2011). Profitability of Minituber Seed-Yam Production Technique in South-East Agro-Ecological Zone: evidence from Abia State, Nigeria. *Journal of Agriculture and Social Research.*, 11:113–119.

Olufemi, B., Sijuade, A. A. and Komolafe, S. E. (2022).Resilience Building Mechanism to Mitigate Effects of Climate Change by Yam Farmers in Benue State, Nigeria *Sarhad Journal of Agriculture* 38(4): 1279

Rwangire, M. and Muriisa, R. K. (2019) Integrating Indigenous Agricultural Knowledge into Modern Agricultural Practices for Sustainable Rural Household Food Security in Uganda DOI: 10.24940/ijird/2019/v8/i7/JUL19058

Twongyirwe, R., Mfitumukiza, D., Barasa, B., Naggayi, B. R., Odongo, H., Nyakato, V. and Mutoni, G. Perceived effects of drought on household food security in South-western Uganda: Coping responses and determinants. *Weather Climate Extreme.* 2019;24:100–201.

Udemezue, J. C., Kanu, N. A. and Colley, N. (2017). Socio- Economic Determinants of Yam Production among Small Scale Farmers in Anambra State, Nigeria *Merit Research Journal of Agricultural Science and Soil Sciences* 5(12): 215 – 221

Zakari, S.; Ibro, G.; Moussa, B.; Abdoulaye, T. (2022) Adaptation Strategies to Climate Change and Impacts on Household Income and Food Security: Evidence from Sahelian Region of Niger. *Sustainability* 14, 2847. https://doi.org/10.3390/su14052847

Table 1: Descriptive Statistics of the socio-economic characteristics of yam farmers
n = 300

Variables	Percentage	Mean/SD
Adoption of Climate Resilience Mechanism	0.691	
Age		48.56±7.52
Sex (Male)	0.725	
Marital Status	0.814	
Household Size		8.0±3.0
Education of Household Head		6.12±3.06
Cultivated Land Size		2.58±0.89
Access to Farm Inputs (Yes)	0.463	
Years of Farming Experience		12.78±4.23
Access to Credit	0.491	
Contacts with Extension Officers		6.03±2.43
Income from Yam Production		
Before Building Resilience Mechanism		456720:28± 13155.21
After Building Resilience Mechanism		765489:07±22345:60

Source: Author's Computation, 2025

Table 2: Resilience Building Strategies and Challenges of Small-scale Yam Farmers

Resilience Building Strategies	Frequency	**Percentage (%)
Crop rotation	241	80.3
Organic farming practices	278	92.7
Mulching	166	55.3
Planting resistant yam varieties	258	86.0
Application of irrigation	189	63.0
Alteration in planting period	208	69.3
Use of indigenous practices	268	89.3
Crop diversification	218	72.7
Inter-cropping system	219	73.0
Challenges of Building Resilience in Yam Production		
Lack of Weather/Meteorological Orientation	225	75.0
Irregular weeding of farm	239	79.7
Use of local Pests/Diseases control	211	70.3
Inadequate adaptive capacity	264	88.0
Poor adoption of technology	268	89.3
Poor access to climate-change information	273	91.0

Source: Field Survey, 2025 ** *multiple response*

Table 3: Independent Sample t-test Analysis

Income	Mean	Std. Dev.	Df	T	Sig.	Cohen's *d*
Before Resilience (X_1)	45670:28	13515.21	298	6.540	0.037	0.84
After Resilience (X_2)	76548:07	22045:60				

α = .05

Table 4: Drivers of climate change resilience building mechanism by yam farmers

Variables	Coefficient	P>/z/	$\frac{dy}{dx}$
Age (years)	0.252(0.107)	0.01	0.041**
Gender (1=male; 0=otherwise)	1.109(0.263)	0.000	0.139***
Education (completed years of schooling)	-0.678(0.294)	0.021	-0.085**
Marital status (1 = married; 0 = otherwise)	-0.444(0.678)	0.512	-0.056
Family size (numbers)	0.827(0.311)	0.008	0.104***
Years of farming experience (years)	0.760(0.273)	0.005	0.095***
Distance to farm centre (kilometers)	-0.123(0.205)	0.549	-0.155
Cultivated far size (hectares)	0.421(0.123)	0.001	0.073***
Income realised (₦)	0.455(0.145)	0.002	0.053***
Access to climate information (1= yes; 0 = no)	0.774(0.373)	0.038	0.097**
Number of contacts with extension agents	0.316(0.447)	0.479	0.039
Non-farm income (₦)	-0.300(0.239)	0.209	-0.037
Access to credit (1= yes; 0 = otherwise)	0.072(0.032)	0.026	0.012**
Constant	-15.339(5.397)	0.004	

Source: Author's Computation, 2025 Obser = 300; Log Likelihood = -117.8452; LR Chi^2 (13) = 189.09; Prb>Chi^2 = 0.000; Pseudo R^2 = 0.6758. *** and ** significant @ 1% and 5%.