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Building Climate Resilience through Skills Acquisition in Rural Communities of Plateau State, Nigeria

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ABSTRACT
Building climate resilience through skills acquisition in rural communities of Plateau State, Nigeria has been investigated. The study underscore how climate change threatens rural livelihoods in Plateau State, Nigeria, affecting agricultural productivity, income stability, and food security. This empirical study investigates the effect of targeted skills acquisition programs on climate resilience in rural communities. Using a mixed-methods approach with 600 participants, the study employed structured questionnaires, focus group discussions (FGDs), and key informant interviews (KIIs). Quantitative data were analyzed using descriptive statistics, t-tests, Pearson correlation, and multiple regression, while qualitative data underwent thematic content analysis. Results indicate that participants in skills programs scored significantly higher in income diversification (M=3.9, SD=0.8) than non-participants (M=3.1, SD=1.0; t=8.12, p<.005), food security (M=4.0, SD=0.7 vs M=3.2, SD=0.9; t=9.05, p<.005), and climate awareness (M=4.3, SD=0.6 vs M=3.1, SD=1.0; t=11.2, p<.005). Skills acquisition was strongly correlated with climate resilience (r=0.63, p<.005) and significantly predicted resilience in regression analysis (β=0.56, p<.001, R^2=0.38). These findings confirm that skills acquisition enhances adaptive capacity and support integrating vocational training into climate adaptation policies.

Keywords: climate resilience, skills acquisition, rural communities, Plateau State, Nigeria

I. INTRODUCTION

Climate change is one of the most pressing global challenges of the 21st century, with severe implications for rural livelihoods, food security, and sustainable development (IPCC, 2014). Rural populations in developing countries are disproportionately affected due to their dependence on agriculture, forestry, and natural resource-based activities (Odjugo, 2010; Nwafor, 2007). Plateau State, Nigeria, with its historically favourable climate and fertile soil, has seen its agricultural systems destabilized by erratic rainfall, prolonged dry seasons, and flooding events (Ayoade, 2003; Eze et al., 2017).

Women and youth are particularly vulnerable due to limited access to land, credit, vocational training, and decision-making platforms (Dankelman, 2010; Odewumi& Falusi, 2013). Consequently, climate variability exacerbates socio-economic inequalities and reduces resilience. Skills acquisition in climate-resilient tradessuch as agroecology, renewable energy, water harvesting, and eco-friendly entrepreneurshipmay strengthen adaptive capacity, diversify livelihoods, and promote sustainable rural development (Nelson &Agbey, 2005; Agboola & Salawu, 2011).

Despite recognition of its potential, empirical studies linking skills acquisition to measurable improvements in resilience are scarce in Plateau State. This study addresses this gap by investigating whether vocational training enhances the adaptive capacity of rural households.

II. STATEMENT OF THE PROBLEM

Rural communities in Plateau State are increasingly vulnerable to the impacts of climate change, including reduced crop yields, livestock losses, soil degradation, and flooding (Eze et al., 2017). These environmental changes threaten food security, household income, and socio-economic stability. Vulnerable populationsparticularly women, youth, and marginalized householdsoften lack access to climate-resilient vocational training, which limits their ability to diversify their

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livelihoods and adapt effectively (Akinbami, 2011; Olsson et al., 2014).

Current adaptation interventions are often top-down, donor-driven, and poorly aligned with local socio-economic realities, reducing community engagement and sustainability. There is an urgent need for empirical evidence evaluating the effectiveness of skills acquisition in enhancing rural climate resilience, particularly with measurable outcomes at the household and community levels.

Objectives of the Study

i. To assess the vulnerability of rural households to climate change in Plateau State.
ii. To Evaluate the effectiveness of existing adaptation strategies.
iii. To Identify market-relevant, climate-resilient skills suitable for sustainable livelihoods.
iv. To test the effect of skills acquisition programs on adaptive capacity, income diversification, and climate resilience awareness.

Hypotheses

H_0: Skills acquisition programs have no significant effect on climate resilience among rural communities in Plateau State.

H_1: Skills acquisition programs significantly improve climate resilience among rural communities in Plateau State.

III. LITERATURE REVIEW:

The review is done under the following headings

Climate Change and Rural Vulnerability

Climate change affects rural communities by altering precipitation patterns, increasing drought and flooding events, and impacting soil fertility and crop yields (IPCC, 2014; UNEP, 2011). In Nigeria, rural livelihoods heavily depend on rain-fed agriculture, making them highly sensitive to climate variability (Odjugo, 2010). Plateau State has experienced delayed rainfall, early cessation of rains, and extreme weather events, resulting in food insecurity, income losses, and migration from rural areas (Ayoade, 2003; Eze et al., 2017).

Vulnerability is determined by exposure, sensitivity, and adaptive capacity (Adger, 2006). Rural households often exhibit high sensitivity and low adaptive capacity due to insufficient institutional support, inadequate infrastructure, and limited access to climate-smart technologies (Akinbami, 2011; Olsson et al., 2014). Women and youth face disproportionate challenges due to socio-cultural norms and limited decision-making authority (Dankelman, 2010; Odewumi& Falusi, 2013).

Skills Acquisition and Climate Resilience

Vocational and skills training enhances adaptive capacity by providing alternative, climate-resilient livelihoods, such as agroecology, renewable energy, water harvesting, agro-processing, and eco-friendly construction (Nelson &Agbey, 2005; Agboola & Salawu, 2011). Technical and Vocational Education and Training (TVET) programs aligned with local markets and environmental realities empower youth, promote self-reliance, and strengthen long-term resilience (Ijaiya, 2001; Oviawe, 2015; Ojo & Adebayo, 2012).

Despite evidence supporting skills acquisition as an adaptive strategy, few empirical studies link vocational training directly to measurable improvements in climate resilience in Nigeria, particularly in Plateau State. Further, community perceptions, socio-cultural determinants, and willingness to adopt new skills are understudied (Eze et al., 2017; Odewumi& Falusi, 2013).

IV. METHODOLOGY

Research Design: A mixed-methods design was adopted, combining quantitative surveys with qualitative FGDs and KIIs to capture statistical outcomes and contextual insights.

Study Area: Three LGAs in Plateau State were selected: **Mangu, Pankshin, and Bokkos**. These areas are agriculturally dependent and face significant climate-related challenges, including soil erosion, flooding, and drought.

Participants: The study engaged **600 participants**, including rural households, youth (15–35 years), women's groups, CBOs, NGOs, and local government officials.

Sampling Techniques:

- **Stratified Random Sampling:** Household surveys stratified by ward, occupation, and household type.
- **Purposive Sampling:** Key informants for FGDs and KIIs included community leaders, agricultural extension officers, and vocational trainers.
- **Snowball Sampling:** Additional knowledgeable participants identified for qualitative data collection.

Data Collection

- **Quantitative:** Structured questionnaires measured climate vulnerability, livelihood

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strategies, participation in skills programs, and resilience indicators.

- **Qualitative:** FGDs and KIIs explored perceptions, barriers, and experiences regarding skills acquisition and climate adaptation.

Data Analysis

- **Quantitative:** Descriptive statistics with means and standard deviations, t-tests, Pearson correlation, and multiple regression.
- **Qualitative:** Thematic analysis identified recurring patterns in community perceptions and strategies.

V. RESULTS

Demographic Characteristics:

The study engaged 600 participants from rural communities in Plateau State. The average age was **31.2 years (SD = 8.5)**. Gender distribution showed **45% male (n = 270)** and **55% female (n = 330)**. The average household size was **5.3 members (SD = 1.9)**, and participants had **8.1 years of formal education on average (SD = 3.4)**.

This demographic profile indicates a relatively young population with moderate educational attainment, which is important when considering the adoption of skills acquisition programs.

Climate Resilience Indicators

Descriptive Statistics: Participants were divided into two groups: those who had undergone **skills acquisition programs** (participants) and those who had not (non-participants). Three primary resilience indicators were measured: income diversification**,** food security**,** and climate **awareness**. Means and standard deviations are shown in Table 1.

Table 1: Demographic Characteristics of Participants

Variable	N	%	Mean (M)	SD
Age (years)	600	100	31.2	8.5
Male	270	45	-	-
Female	330	55	-	-
Household size	600	100	5.3	1.9
Years of formal education	600	100	8.1	3.4

Table 2: Climate Resilience Indicators by Skills Participation

Indicator	Group	Mean (M)	SD	t-value	p-value
Income Diversification	Participants	3.9	0.8	8.12	<.005
Income Diversification	Non-participants	3.1	1.0	-	-
Food Security	Participants	4.0	0.7	9.05	<.005
Food Security	Non-participants	3.2	0.9	-	-
Climate Awareness	Participants	4.3	0.6	11.2	<.005
Climate Awareness	Non-participants	3.1	1.0	-	-

Inferential Statistics

Hypothesis Testing

Hypothesis one: H_0: Skills acquisition programs have no significant effect on climate resilience among rural communities in Plateau State.

Demographics (N = 600)

Variable	N	%	Mean (M)	SD
Age (years)	600	100	31.2	8.5
Male	270	45	—	—
Female	330	55	—	—
Household size	600	100	5.3	1.9

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Years of formal education	600	100	8.1	3.4

Climate Resilience Indicators

Indicator	Participating (n=300)	Not Participating (n=300)	t-value	p-value
Income Diversification	M=3.9, SD=0.8	M=3.1, SD=1.0	8.12	<.001
Food Security	M=4.0, SD=0.7	M=3.2, SD=0.9	9.05	<.001
Climate Awareness	M=4.3, SD=0.6	M=3.1, SD=1.0	11.2	<.001

Correlation Analysis

Skills acquisition correlated strongly with climate resilience ($r = .63$, $p < .005$) and with each indicator: income diversification ($r = .58$, $p < .001$), food security ($r = .61$, $p < .005$), and climate awareness ($r = .65$, $p < .005$).

Hypothesis Two: H_1: Skills acquisition programs significantly improve climate resilience among rural communities in Plateau State.

A multiple regression was used to test the hypothesis, controlling for age, gender, and education revealed that skills acquisition significantly predicted climate resilience ($\beta = 0.56$, $p < .001$; $F(4, 595) = 92.8$, $p < .001$, $R^2 = 0.38$).

VI. DISCUSSION

The results support the hypothesis ($\mathbf{H_1}$) that skills acquisition improves climate resilience. Participants who engaged in training demonstrated higher income diversification, food security, and awareness of adaptive practices. The findings align with prior studies emphasizing the role of vocational training in building adaptive capacity (Nelson &Agbey, 2005; Ojo & Adebayo, 2012).

Women and youth participation in training programs significantly enhanced community resilience, highlighting the importance of inclusive adaptation strategies. These findings reinforce the need to integrate skills acquisition into national and local climate adaptation policies.

VII. CONCLUSION

Skills acquisition is a **practical, empirical pathway** to building climate resilience in rural Plateau State. The study confirms that vocational training in climate-resilient trades enhances adaptive capacity, income security, and awareness of climate-smart practices.

VIII. RECOMMENDATIONS:

1. Expand access to climate-resilient vocational programs targeting women and youth.
2. Integrate skills acquisition into government and donor-funded climate adaptation initiatives.
3. Provide market linkages, mentorship, and funding to sustain training programs.
4. Employ participatory approaches to identify priority skills and adaptation strategies.

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