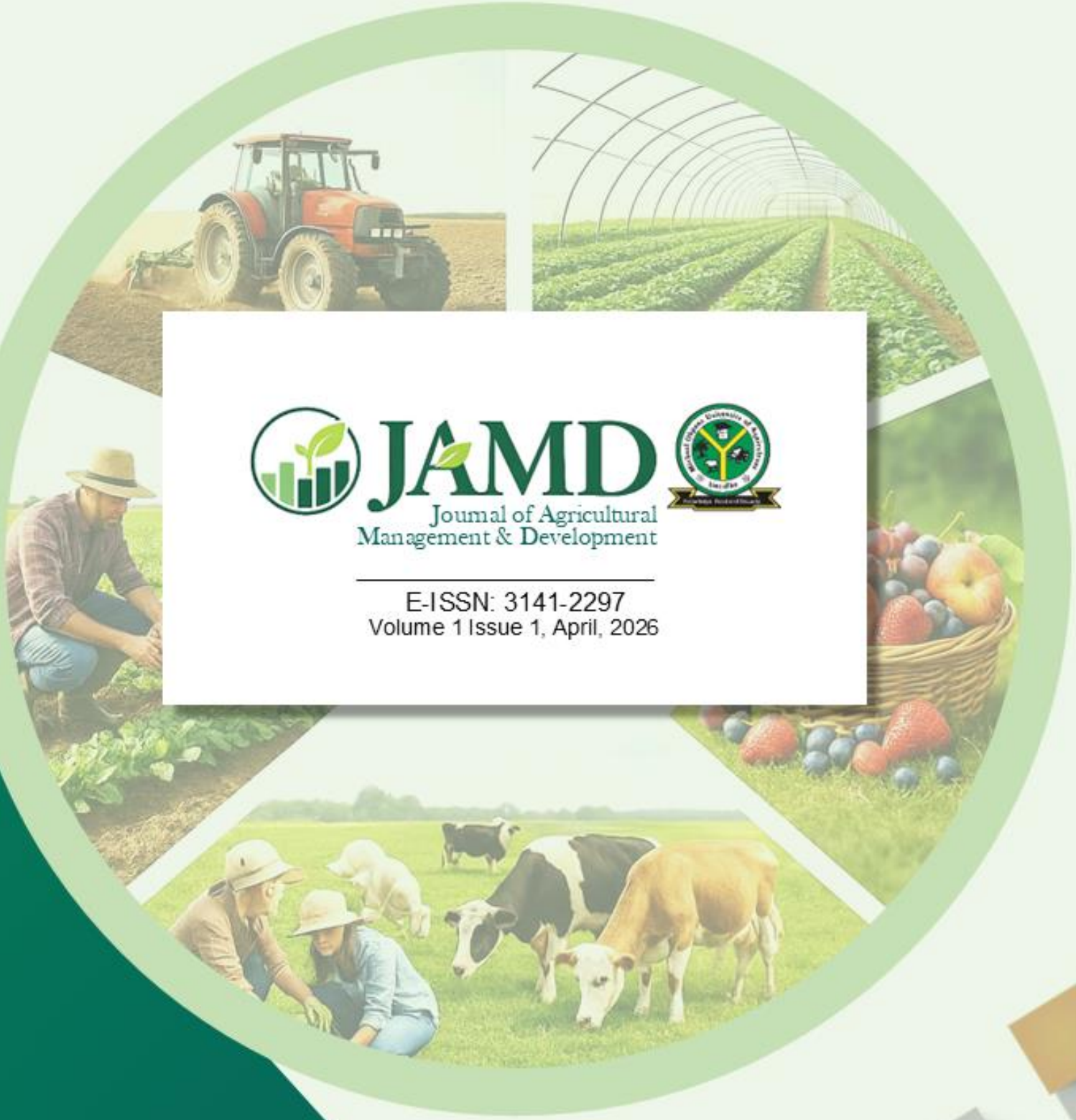

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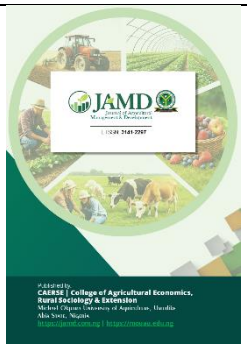

Can Climate Change Adaptation Strategies Enhance Poverty Status? A Comparative Study of Male and Female Small Ruminant Farmers in Abia State, Nigeria

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ABSTRACT

This study explores whether climate change adaptation strategies (CCAS) can enhance poverty status among male and female small ruminant farmers in Abia State, Nigeria. A multi-stage sampling procedure was used to collect data from 80 (40 males and 40 females) small ruminant livestock farmers using questionnaire and interviews. Descriptive statistics was used to describe the socio-economic characteristics of the respondents, climate change adaptation strategies adopted and livestock production constraints in the face of the changing climate. Results showed that female farmers had a higher mean age (46.45 years) and household size (6.75) compared to males (43.43 years; 5.40, HH). Both groups had an average of seven years of livestock farming experience. Farmers adopted various CCAS, including matching livestock stocking rate with pasture production, altering pasture rotation, modification of grazing time, and integration within livestock/crop systems to mitigate climate change. The MPCHE was N9, 233 for male and N6,101 for females, with 70% of female farmers classified as poor compared to 47.5% of males. The study showed that CCAS reduced poverty vulnerability (3.05 and 3.22), influence human security (2.85 and 3.02), and increased poverty variability (2.87 and 3.15) for both groups. Major constraints include high cost of labour, inadequate capital, price fluctuation of input materials, unavailability of veterinary services, and poor access to credit. Also, significant negative relationship was found between CCAS and poverty status. The study recommends the implementation of gender-sensitive agricultural support programs to enhance farm income and encourage wider adoption of climate adaptation strategies.

Introduction

Climate change has become one of the most pressing global challenges, with significant implications for agriculture and rural livelihoods, particularly in sub-Saharan Africa (Intergovernmental Panel on Climate Change [IPCC], 2021; Omotoso, et al., 2023). The livestock sector, which plays a crucial role in food security, income generation, and employment in Nigeria, is particularly vulnerable to climate-induced shocks such as extreme temperatures, drought, flooding, and disease outbreaks (Ozor et al., 2020). In Abia State, Nigeria, livestock farming remains a critical livelihood source by providing income, food, and

employment opportunities especially for rural households that depend on cattle, goats, sheep, and other animal husbandry for subsistence and commercial purposes (Nwajiuba & Onyeneke, 2022).

To mitigate the adverse effects of climate change, small ruminant livestock-dependent households adopt various adaptation strategies, including improved animal housing, feed supplementation, rotational grazing, and access to veterinary services (Ojo & Baiyegunhi, 2019). However, the extent to which these strategies enhance livelihood resilience varies significantly based on geography and household characteristics, particularly gender. Studies indicate that male farmers often have better access to resources, credit, and extension services than female farmers, potentially influencing their adaptive capacity (FAO, 2021). Understanding these gendered differences is essential for designing targeted interventions that strengthen the resilience of all small ruminant livestock farmers in Abia State.

Despite the growing body of research on climate change and agriculture, there is limited empirical evidence comparing the effectiveness of adaptation strategies between male and female small ruminant livestock farmers in Nigeria. This study seeks to bridge this gap by assessing how different adaptation strategies impact livelihood resilience across gender lines in Abia State.

Climate change poses a severe threat to livestock farming in Nigeria, with rising temperatures, erratic rainfall, and increased frequency of extreme weather events leading to feed scarcity, water shortages, and disease outbreaks (Ezeh et al., 2021). These challenges significantly undermine the productivity and sustainability of livestock farmers, making them more vulnerable to poverty and food insecurity (United Nations Development Programme [UNDP], 2020).

While various adaptation strategies have been adopted to mitigate these risks, the effectiveness of these strategies is not uniform across the different genders. Research suggests that male farmers generally have better access to resources such as land, finance, and extension services, enabling them to adopt more effective adaptation measures (Adamu & Umar, 2022). In contrast, female farmers often face systemic barriers, including limited access to credit, lower educational levels, and socio-cultural constraints that hinder their ability to adopt climate change adaptation practices (World Bank, 2021).

In Abia State, where livestock farming supports thousands of farming households, it is unclear whether existing adaptation strategies adequately enhance resilience among all livestock farmers, particularly female farmers. Failure to address these disparities may lead to increased vulnerability, reduced livestock productivity, and deeper levels of poverty among certain demographic groups. Therefore, a comparative analysis of male- and female- small ruminant livestock farmers is necessary to identify gaps in adaptation efforts and inform policies that promote inclusive climate resilience in the livestock sector. Therefore, the study tends to; describe the socio-economic characteristics of the respondents in the study area by gender; identify the climate change adaptation strategies adopted by the farmers; determine the effect of climate change adaptation strategies on the poverty status of the respondents; and identify the constraints to livestock production in the face of the changing climate. The null hypothesis states that: There is no significant relationship between climate change adaptation strategies and poverty status of farmers.

This study is critical for several reasons. First, it contributes to the growing body of literature on climate change adaptation in Nigeria's livestock sector by providing empirical evidence on the differential impacts of adaptation strategies across gender lines. Understanding these differences will help policymakers, agencies, and agricultural extension services design more inclusive and effective adaptation programs.

Second, the study aligns with Nigeria's commitment to achieving Sustainable Development Goals (SDGs), particularly SDG 1 (No Poverty), SDG 2 (Zero Hunger), and SDG 13 (Climate Action). By identifying effective adaptation strategies and addressing gender-based constraints, the research supports efforts to enhance the resilience of vulnerable livestock farmers in Abia State (United Nations, 2022).

Third, the findings will be useful to local and international organizations working on climate resilience, gender equality, and agricultural sustainability. Development agencies such as the Food and Agriculture Organization (FAO), International Fund for Agricultural Development (IFAD), and the Nigerian Agricultural Insurance Corporation (NAIC) can use the insights to refine their interventions and funding priorities for climate adaptation programs.

Finally, the study has practical implications for farmers, policymakers, and researchers. By identifying successful adaptation strategies, livestock farmers can adopt best practices to enhance their resilience. Policymakers can leverage the findings to develop gender-sensitive policies that promote equal access to resources and support services. Additionally, researchers can build on this study to explore further dimensions of climate change adaptation in Nigeria's agricultural sector.

Therefore, this research is timely and essential for addressing the growing challenges posed by climate change on livestock farming in Abia State. By focusing on gender disparities in adaptation and resilience, it will generate valuable insights that can inform sustainable agricultural policies and improve the livelihoods of rural livestock farmers.

Methodology

This study was carried out in Abia State, a state in the south eastern part of Nigeria with seventeen (17) Local government areas (LGAs). Abia was carved out of the former Imo State in 1991. The name "Abia" is an abbreviation of four of Abia state's densely populated regions Aba, Bende, Isuikwuato, and Afikpo. The state is primarily inhabited by the Igbo tribes and it is bounded on the East by the Cross River and Akwa Ibom Sates, on the North by Ebonyi and Enugu States, on the West by Imo State and on the South by Rivers State. Abia consists of three agricultural zones, namely; Aba, Umuahia and Ohafia. The population of Abia State is around 2, 833, 999 with about 1, 434, 193 males and 1, 399, 806 females. This population consists of people in all walks of life with about 65 percent of them engaged in agriculture. The annual rainfall ranges from 200-250mm while the temperature ranges from 22^0c to 35^0c. Farming is done at- subsistence level. The state is endowed with rich fertile soil that supports the growth of crops like Yam, cassava, cocoyam, melon, maize, oil palm, garden egg, cocoa, to mention but a few. Poultry, goat, pigs and sheep are the major livestock kept. It has co-ordinates of 5°25′N and 7°30′E and occupies a total area of 6,320km^2 (2,440 sq mi), a population of 4,112,230, a density of 650/km^2 (1,700/sq mi) (McCall, 1992).

This study adopted a multistage sampling procedure. In the first stage, two out of the 3 agricultural zones were purposively selected for the study (Ohafia and Umuahia). In the second stage one local government area was randomly selected from each of the zones (Bende and Umuahia south) to give a total of two local government areas. In the third stage, a simple random sampling technique was used to select two communities each from the sampled LGA's, giving a total of 4 communities. In the last stage, a snowballing technique was used to locate 20 respondents from each from the selected communities, giving a total sample size of 80 respondents. Data were collected with the aid of a well-structured questionnaire which was supported with oral interviews in cases where the respondent is not be able to read and write.

Objectives I, II and IV were analyzed using descriptive statistical tools such as means, frequencies and percentages.

In objective III, the Foster, Greer and Thorbecke (FGT) Model was used to study the poverty status of the respondent. It is widely used because it is consistent and additively decomposable. A relative poverty line was constructed based on the Mean Per Capita Household Expenditure (MPCHE) of the farmers.

The MPCHE is given as:

$$\frac{\text{Total household expenditure}}{\text{Household Size}} \quad (1)$$

The general FGT poverty index (P_i) can be expressed as: $P\alpha_i = \frac{1}{n}\sum_{i=1}^{a}(\frac{z-y_i}{z})$ (2)

Where;

a = 0; i.e. poverty incidence or head count: $P_0 = \frac{1}{n}\sum_{i=1}^{a}\left(\frac{z-y_i}{z}\right)^0 = \frac{q}{n}$ (3)

a = 1; poverty gap or depth: $P_1 = \frac{1}{n}\sum_{i=1}^{a}\left(\frac{z-y_i}{z}\right)^1$ (4)

a = 2; poverty severity: $P_2 = \frac{1}{n}\sum_{i=1}^{a}\left(\frac{z-y_i}{z}\right)^2$ (5)

Where;
α = degree of poverty aversion (0, 1, and 2)
n = number of farmers in a group
y = income of the farmer
q = the number of poor farmers
z = poverty line (two-third of Mean Per Capita Household Expenditure (MPCHE of the farmers).

Then to estimate the perceived effect of climate change adaptation strategies on poverty status of the farmers, the Likert eating scale was adopted. The scale used is represented as; Strongly Agree (4), Agree (3), Disagree (2), and Strongly Disagree (1). To get the mean value, the following equation was used:

$$\text{Mean} = \sum fn/N \quad (6)$$

Where;
Mean = Likert mean score
$\sum$ = Summation
f = frequency
n = Likert nominal scale
N = Number of respondents
$\text{Mean} = \frac{1+2+3+4}{4} = 2.5$

The hypothesis was tested with the use of Pearson correlation coefficient equation. The model is given as;

$$r = \Sigma[(x - \bar{x})(y - \bar{y})] / (\sqrt{\Sigma(x - \bar{x})^2} * \sqrt{\Sigma(y - \bar{y})^2}) \quad (7)$$

Where;
r is the correlation coefficient
x = climate change adaptation strategies
y = poverty status of the respondents
$\bar{x}$ and $\bar{y}$ are the means of the two variables
Σ denotes the sum of the values

Results and Discussion

Socio Economic Characteristics of the Farmer in the Study Area

The results in Table 1 showed that the mean age of the female (46.45 years) livestock farmers is higher than the mean age of the male (43.43 years) livestock farmers. However, the mean age of the pooled population implied that both groups are within the productive age, therefore, they are expected to be active on the farm business and responsive to agricultural extension innovations that will improve livestock productivity. This could also lead to a boost in agricultural activities as Anyanwu *et al.,* (2011), and Masi, *et al* (2022) recognized that young people are more likely to be energetic and productive, and have more willingness to adopt new innovation.

It was also seen that the average household size of the male farmers (MF) is 5.40 and the average household size of the female farmers is 6.75 persons. The larger household size from the female farmers (FF) can be attributed to the higher mean age for FF which shows that older people are likely to have larger household size than younger people. This can lead to a reduced labour cost for the FF. This finding agrees with Ezeibe *et al.* (2015); and Ayaz and Mughal, (2022), who started in their separate works that family size is an important source of farm labour since it implies a reduction in the cost of labour. Therefore, it is safe to assume that production tends to increase if there are more members in the household unit; this can also influence the adoption of climate change adaptation strategies (CCAS).

The average number of farming experience in years for both the MF and FF were approximately about 7years of livestock farming experience, and the average number of animals in stock was about 23 and 24 for the MF and FF respectively. The farmer's experience determines the level of his exposure to risks and use of CCA strategy. A farmer who have an average of 7years farming experience as seen in the study area is expected to have gained more knowledge and have the willingness to reinforce CCAS adoption. However,

the average flock size of the respondents showed that the farmers are still operating at small scale and as such they may lack the capacity to adopt and implement CCAS. This is evident in the number of extension contacts in a year, which is less than 1 on average as seen in Table 1 (0.85 and 0.45 respectively), which may have negative effects to the farmers. According to Okoye, (2018); and Lai-Solarin, *et al.,* (2024), low number of extension contact indicate relatively low probability of access to information about new and modern agricultural practices from the extension agents.

The results also showed that a good number of the respondents had both primary and secondary education, but only about 6.25% of the total respondents had tertiary education. The results implied that both MF and FF had at least an average level of formal education. According to Okoye *et al.,* (2020), having basic education is expected to enhance the overall quality of the farmer by providing him/her with basic numeric and literacy skills and the ability to make good farming decisions. Therefore, increased participation in climate change adaptability strategy in agriculture is highly expected among the rural livestock farmers in the study area. This result is also consistent with Ayenew and Tilahun (2022). The disparity in the level of formal education attained between the Male and Female small ruminant livestock farmers in the study area show the priority families in this geographic region give in training their children which is more favorable to the male child.

Accordingly, the role of formal education in income generation is also evident as the MF were observed to have a higher average income level than their FF counterparts as shown in Table 1. However, this income levels obtained from the study implied that the income of the farmers were generally low, and this may affect their ability or willingness to adopt CCAS.

Most of the farmers belong to cooperative societies (65.00% and 77.50%), By implication, this could foster networking and mutual support opportunities among rural farmers, both of which are critical for the long-term viability of businesses and their ability to adopt CCAS. This is because cooperative societies often provide relevant information to their members, foster collective bargaining power, increase access to financial services, and shared knowledge or training. Okoye *et al.,* (2020) noted that belonging to cooperative organization ensure cooperation among farmers in the use of scarce and communal resources.

The study also revealed that goat rearing was dominant among all small ruminant husbandry in the study area. This might be due to the significant role goat plays in the socio-cultural aspects of the people in the study area (such as marriages, land purchases and church activities etc.). It also helps to balance human nutrition, Adam *et al.* (2010). According to Offor *et al.* (2018), in difficult situations, such as crop failure or family illness, sheep and goats can be sold to augment the family income and cover for some expenses. More so, the higher percentage of female farmers stocking goat showed how eager the women are in taking up responsibility when it come to family income. The study also opined that dairy goats are good species for combating poverty and fostering economic development in developing countries. The study also showed that majority of the farmers do not have access to credit and this explains the low level of annual capital investment. The fewer number of the respondents with access to credit may be as a result of unavailability of credit facilities to farmers in the study area, and might discourage the adoption of CCAS practices.

Climate Change Adaptation Strategies (CCAS) Adopted by the Households

From Table 2, it can be seen that both MF and FF have high adoption of most of the CCAS strategies studied in the area, this include the matching livestock stocking rate with pasture production (100.00% and 87.50%), altering pasture rotation (92.50% and 100.00%), modification of grazing time (100.00% and 97.50%), and integration within livestock/.crop systems including the use of adapted forage crops. Re-assessing fertilizer applications on planted forage (100.00% and 95.00%), diversifying into crop and livestock production (80.00% and 95.00%), using species resistant to pest and diseases (100.00% and 77.50%), animal health management (70.00% and 87.00%) and improving quarantine capabilities and monitoring (95.00 each) for male and female farmers respectively. This finding corresponds to the expected effects of their educational level.

However, there was a moderate adoption rate for the alteration/change of forage and animal breeds/species (75.00% and 62.50%), and fewer adoption rate for the use of supplementary feeds and concentrates to increase productivity (27.50% and 20.00%) for both the MF and FF.

Perceived Effect of Climate Change Adaptation Strategies on the Poverty Status of the Household Heads Unit

Poverty Status of the farmers

The results in Table 3 showed the distribution of poverty status of the male and female farmers in the study area. The total expenditure of households on food with income consideration was used in classifying them into poor and non-poor. The mean per capita household expenditure per month (MPCHHE) was N9, 233 and N6, 101 for male farmers households and female farmers households respectively which were further used as the poverty line. On this basis, those below the MPCHHE poverty line were regarded as being poor households while those with per capita expenditure above the mean were considered to be non-poor.

The study showed that more than half (52.50%) of the male farmers households were non poor, while about (30.00%) of the female farmers households were non-poor. The implication is that the male farmers households have greater access to resources and capacity to generate more income for the family expenditure through various means that may not be available for the female farmers households. The low poverty line of (N9233 and N6101) found in the study area in this prevalence high cost of living corroborates with the findings of Ademola *et al.* (2021) who also observed a very low poverty line (N1, 949.12) among rural farm families In Akwa Ibom State, Nigeria. However, this significantly suggests the need to implement poverty alleviation programs in the country that targets farmers in rural areas, establish appropriate policy instruments and introduce sustainable approaches fashioned to lift farming household out of poverty.

Effect of climate change adaptation strategies on the poverty status of the farmers

The results in Table 4 presented the Likert analysis of effect of climate change adaptation strategies on the poverty status of the farmers. From the table, it can be seen that for the MF, climate change adaptation strategies helped to reduce their poverty vulnerability, regulates food prices and reduces climate volatility. This was in tandem with the findings by Abur (2014); and Tchonkuang, *et al.,* (2024). The table also showed that for the FF, climate adaptation strategies also helped to reduce poverty vulnerability, influences human security on the environment, contributes to poverty variability, influences livelihood and leads to reduction of climate volatility.

This explained the importance of adoption of CCAS by both the Male and Female small ruminant livestock farmers in the study area which integrates stability, access to food, availability of nutritionally adequate food and the biological utilization of food (Abur, 2014).

Constraints to livestock production in the face of the changing climate

The results in Table 5 showed that high cost of labour (85.00% and 80.00%), inadequate capital (87.50% and 97.50%), price fluctuation of input materials (95.00% and 100.00%), poor access to credit (87.50% and 90.00%), inadequate market access and information (75.00% and 82.50%), inadequate policy support and institutional framework for small ruminant farming (95.00% and 75.00%) and inadequate extension supports (75.00% and 100.00%) were the major constraints militating against livestock production in the face of the changing climate for male and female farmers respectively.

The high cost of farm labor significantly influences climate change adaptation strategies (CCAS) among small ruminant farmers, as labor-intensive farming practices are heavily impacted. This, in turn, affects the scale of operation and ultimately reduces production levels (Huffman and Orazem, 2007). However, households bear the brunt of labor transaction costs, (Roumasset and Lee, 2007). Insufficient capital, limited access to credit, and high input costs are additional constraints faced by small ruminant producers (Ajala and Adesehinwa, 2008; Zanou et al., 2023).

Nigeria's agricultural sector is hindered not by production issues alone, but also by inadequate infrastructure, including poor market linkages, insufficient storage and processing facilities, and limited access to market information (Amusa et al., 2011). These challenges affect production rates and CCAS adoption among small ruminant farmers. Effective market information is crucial for transforming small-scale farmers into commercial producers, as it provides incentives for income growth (Offor et al., 2018). Inadequate market information and price fluctuations lead to traders selling animals at lower prices, further constraining farmers (Zanou et al., 2023).

Moreover, the study also found others constraints such as; lack of access to improved breeding stock (50.00% and 80.00%), difficulty in applying technology (35.00 and 70.00%), feed scarcity (25.00% and 72.50%), high

cost of transportation (62.50 and 50.00%), and environmental/crises and unfavorable weather conditions (50.00% and 80.00%) for male and female farmers respectively.

Less than half of the respondents responded that Seasonality of income from the livestock business (10.00% and 47.50%), losses due to predation by wild animals (0.0% and 30.00%), land tenure issues (0.00 and 62.50%) were constraints militating against livestock production in the face of the changing climate for male and female farmers respectively.

Ho: There is no significant relationship between climate change adaptation strategies (CCAS) and poverty status (PS) of the household units.
The results showed that there was a negative (r = 0.3382) correlation between climate change adaptation strategies and poverty status of the household units for female farmers at 1% level of probability. It implies that increase in CCAS will lead to a decrease in PS by approximately 34% and vice versa. Also, the results showed that there was a negative (r = 0.2049) correlation between change adaptation strategies and poverty status of the household units for male farmers at 1% level of probability. It also implied that increase in CCAS (female) will lead to a decrease in PS (male) by approximately 20% and vice versa.

Conclusion and Recommendations
This study explores whether climate change adaptation strategies enhance poverty status among small ruminant livestock farmers in Abia State, Nigeria, with a comparative focus on male and female farmers. The results show that climate change adaptation strategies have a positive impact on livelihood resilience, however, female farmers face more challenges in adapting to climate change. The study identified various constraints militating against livestock production, including high cost of labour, inadequate capital, and poor access to credit. The study recommends that policymakers and stakeholders should prioritize the needs of female livestock farmers in their climate change adaptation strategies and programs. Targeted support, such as access to credit, training, and extension services, is needed to enhance the livelihood resilience of female farmers.

Furthermore, the study's findings suggest that climate change adaptation strategies should be integrated into existing agricultural policies and programs, with a focus on supporting small ruminant livestock-dependent households. This can help to ensure that these households have access to the resources and support they need to adapt to climate change and promote their livelihood resilience.

Generally, this study contributes to the growing body of research on climate change adaptation and livelihood resilience, with a focus on the gender dimensions of these issues. The study's findings and recommendations have important implications for policymakers, stakeholders, and development practitioners working to promote more equitable and sustainable development outcomes in the context of climate change.

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Appendix

Table. 1 Distribution of Socio-Economic Characteristics of the Farmer in the Study Area

Variables	Male	Female	Pooled
Mean values (Figures in parentheses are the standard deviations)			
Age	43.43(9.70)	46.45(9.4461)	44.94(9.65)
Household size	5.40(2.60)	6.75(2.7339)	6.09(2.74)
Livestock experience	6.60(3.07)	6.7750(2.86)	6.69(2.95)
Off farm income	39700(17005.60)	41750(20619.57)	40725.00(18807.47)
Stock size	22.97(14.50)	23.83(13.29)	23.40(13.84)
Number of extension contact	0.85(0.44)	0.45(0.93)	0.64(1.07)
Amount sold per stock	8550.00(4105.65)	9362.50(5373.23)	8956.25(4768.83)
Capital invested	169500.00(87988.93)	156375.00(96330.01)	162937.50(91905.61)
Educational Level			
No formal education	3(7.50)	7(17.50)	10(12.50)
Primary	37(92.50)	33(82.50)	70(87.50)
Secondary	29(72.50)	21(52.50)	50(62.50)
Tertiary	4(10.00)	1(2.50)	5(6.25)
Income level			
Below N50,000	7(17.50)	12(30.00)	19(23.75)
N51,000-N100,000	11(27.50)	15(37.50)	26(32.50)
N100,000-N150,000	17(42.50)	11(27.50)	28(35.00)
N151,000-N200,000	4(10.00)	2(5.00)	6(7.50)
N201,000 and Above	1(2.50)	0(0.00)	1(1.25)
Dummy (Figures in parentheses are the Percentage values)			
Religion	40(100.00)	40(100.00)	80(100.00)
Marital status (married)	30(75.00)	34(85.00)	64(80.00)
Member of cooperative society	26(65.00)	31(77.50)	57(71.30)
Access to credit	8(20.00)	4(10.00)	12(15.00)
Interact with other farmers	27(67.50)	27(67.50)	54(67.50)
Received assistance from govt.	8(20.00)	3(7.50)	11(13.80)
Produced for market	21(52.50)	21(52.50)	42(52.50)
Keep Sheep	13(32.50)	4(10.00)	17(21.30
Produce Goat	27(67.50)	36(90.00)	63(78.80)

Source: Field survey, 2023

Table 2: Distribution of Farmers on the Climate Change Adaptation Strategies adopted by the Households

Item	Male	Female	Pooled
Matching livestock stocking rate with pasture production	40(100.00)	35(87.50)	75(93.50)
Altering pasture rotation	37(92.50)	40(100.00)	77(96.50)
Modification of grazing time	40(100.00)	39(97.50)	79(95.80)
Alteration/change of forage and animal breeds/species	30(75.00)	25(62.50)	55(68.80)
Integration within livestock/.crop systems including the use of adapted forage crops. Re-assessing fertilizer applications on planted forage	40(100.00)	38(95.00)	78(97.50)
Use of supplementary feeds and concentrates for increased productivity	11(27.50)	8 (20.00)	19(23.80
Animal health management	28(70.00)	35 (87.50)	63(78.80)
Diversifying into crop and livestock production	32(80.00)	38(95.00)	70(87.80)
Using species resistant to pest and diseases	40(100.00)	31(77.50)	71(88.80)
Improving quarantine capabilities and monitoring	38(95.00)	29(95.00)	67(83.80)

Source: Field Survey, 2023. Figures in parentheses are the percentage values

Table 3: Distribution of Poverty Status of the male headed and female headed Livestock households in the study area

Poverty Level	Male	Female	Pooled
Poor	19(47.50)	28(70.00)	47(58.75)
Non-poor	21(52.50)	12(30.00)	33(41.25)
Mean	9,233	6,101	7,667

Source: Field Survey, 2023. Figures in Parentheses are the percentage values

Table 4: Likert analysis of effect of climate change adaptation strategies on the poverty status of the Farmers

Perceived effect	SA	A	D	SD	Mean	Pooled
Male						
Reduces poverty vulnerability	10(40)	22(66)	8(16)	0(0)	**3.05**	3.14*
Shades food security	5(20)	25(75)	10(20)	0(0)	**2.87**	2.56*
Influences human security	2(8)	30(90)	8(16)	0(0)	**2.85**	2.94*
Leads to disaster risk reduction	0(0)	18(54)	12(24)	10	2.2	2.2
Increases poverty variability	7(28)	21(63)	12(24)	0(0)	**2.87**	3.01*
Regulates food prices	0(0)	40(120)	0(0)	0(0)	**3.00**	2.25
Influences livelihood vulnerabilities	15(60)	4(12)	14(28)	7(7)	**2.67**	2.93*
Reduces climate volatility	17(68)	23(69)	0(0)	0(0)	**3.42**	3.34*
Shapes the ecosystem	8(32)	9(27)	23(46)	0(0)	**2.62**	2.66*
Female						
Reduces poverty vulnerability	18(72)	15(45)	5(10)	2(2)	**3.22**	
Shades food security	1(4)	14(42)	19(38)	6(6)	2.25	
Influences human security	11(44)	22(66)	4(8)	3(3)	**3.02**	
Leads to disaster risk reduction	1(4)	13(39)	19(38)	7(7)	2.2	
Increases poverty variability	17(68)	15(45)	5(10)	3(3)	**3.15**	
Regulates food prices	0(0)	5(15)	10(20)	25(25)	1.5	
Influences livelihood vulnerabilities	21(84)	10(30)	4(8)	5(5)	**3.17**	
Reduces climate volatility	20(80)	15(45)	0(0)	5(5)	**3.25**	
Shapes the ecosystem	11(44)	10(30)	15(30)	4(4)	**2.70**	

Source: Field Survey, 2023. SA = Strongly Agree (4), A = Agree (3), D = Disagree (2), SD= Strongly Disagree (1).*= Variable in agreement; Acceptable mean =2.50 and above

Table 5: Constraints faced by livestock producers in the face of changing climate

Perceived Constraints	Male	Female	Pooled
High cost of labour	34(85.00)	32(80.00)	66(82.50)
Inadequate capital	35(87.50)	39(97.50)	74(92.50)
Price fluctuation of input materials	38(95.00)	40(100.00)	78(97.50)
Unavailability of veterinary services	20(50.00)	32(80.00)	52(65.00)
Lack of access to improved breeding stock	30(75.00)	25(62.50)	55(68.70)
Difficulty in applying technology	14(35.00)	28(70.00)	42(52.50)
Feed scarcity	10(25.00)	29(72.50)	39(48.70)
High cost of transportation	25(62.50)	20(50.00)	45(56.30)
Environmental/crises and unfavorable weather conditions	27(67.50)	34(85.00)	61(76.30)
Poor access to credit	35(87.50)	36(90.00)	71(88.80)
Lack of technical know-how/ experience and support	20(50.00)	32(80.00)	52(65.00)
Seasonality of income from the livestock business	04(10.00)	19(47.50)	23(28.80)
Disease and pest management	16(40.00)	10(25.00)	26(32.50)
Inadequate market access and information	30(75.00)	33(82.50)	63(78.70)
Inadequate policy support and institutional framework for small ruminant farming	38(95.00)	30(75.00)	68(85.00)
Inadequate extension support	30(75.00)	40(100.00)	70()87.50
Losses due to predation by wild animals	0(0.00)	12(30.00)	12(15.00)
Land Tenure Issues	0(0.00)	25(62.50)	25(31.25)

Source: Field Survey, 2023. Figures in parentheses are the percentage values. Items with up to 70% rating were considered as major constraints

Table 6: Correlation Coefficient of relationship between climate change adaptation strategies and poverty status of the household units

Variables	CCAS(Female)	PS(Female)	CCAS(Male)	PS(Male)
CCAS(Female)	1.0000			
PS(Female)	-0.3382*	1.0000		
	(0.0056)			
CCAS(Male)	-0.0146	-0.0079	1.0000	
	(0.8680)	(0.9288)		
PS(Male)	-0.2049*	0.0049	-0.0135	1.0000
	(0.0010)	(0.9587)	(0.1011)	

Source: STATA 13 Results