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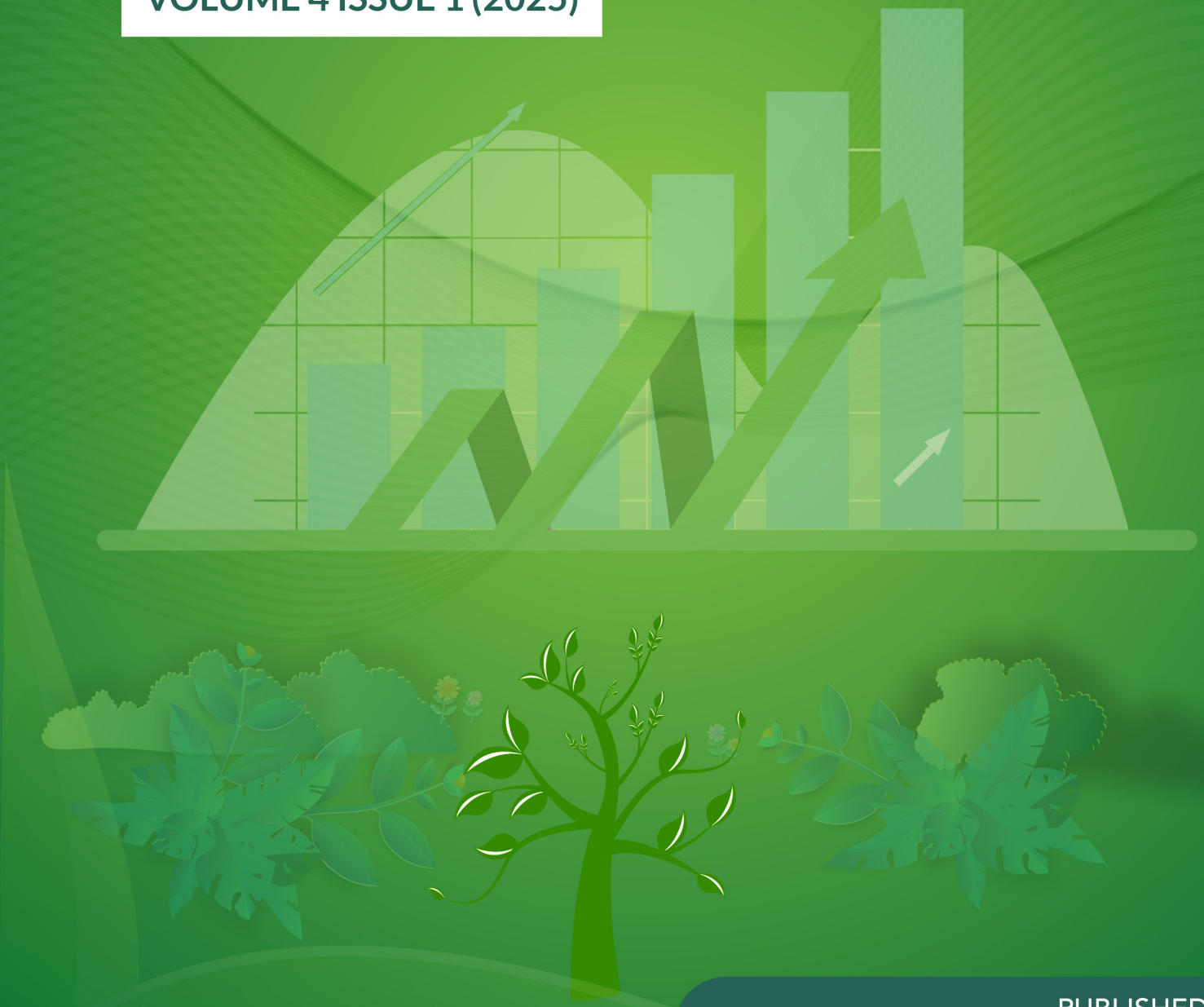

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Determinants of Climate Change Risk Management Strategies Among the Poultry Farmers in Ekiti State, Nigeria

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ABSTRACT

This study investigates the determinants of climate change and risk management strategies among poultry farmers in Ekiti State, Nigeria. A survey of 90 poultry farmers revealed that the majority perceived climate change impacts, with high humidity, drought, and solar radiation being the most reported factors. The most commonly adopted risk management strategies included vaccination, disease control measures, and improved bird breeds. Probit regression analysis showed that educational level, farming experience, and access to credit significantly influenced the adoption of risk management strategies. The study highlights the importance of education, experience, and financial access in shaping risk management decisions and recommends expanding credit access, strengthening extension services, and promoting climate adaptation programs to enhance poultry farmers' resilience and sustainability in Ekiti State.

INTRODUCTION

The agricultural sector faces numerous risks that significantly impact production and rural welfare, making risk management a national and global priority (Singh & Hlophe, 2017). Poultry production, a crucial sub-sector in Nigeria, is vulnerable to production risks such as climate variations, predators, theft, pests, and diseases (Dil *et al.*, 2022). These risks threaten the growth and development of the poultry industry, which provides significant employment opportunities and animal protein for the population.

Local communities possess valuable knowledge and experience in managing climate variability, which is essential for developing effective adaptation strategies (Calviosa *et al.*, 2009). Climate risks vary across geographic locations, and their impacts on agriculture are regionally distinct (Rowlinson, 2008). As a result, adaptation responses differ across locations and are influenced by individual risk perceptions, socio-economic status, environmental conditions, and available resources. As a matter of fact, poultry farmers adopt various risk management strategies, including disease prevention, financial management, and production planning (Obike *et al.*, 2017). However, these strategies are influenced by factors such as age, household size, stock size, capital input, farming experience, location, cost of medication, and cost of labor (Obayelu *et al.*, 2017). Moreover, research has shown that risk aversion, risk neutrality, and risk preference are significant factors in poultry farmers' decision-making processes (Mbah, 2018).

The poultry industry is vulnerable to extreme weather events, which compromise farm infrastructure and lead to reduced productivity and increased mortality. Climate risks pose significant challenges to the industry's contributions to addressing poverty and achieving national development goals, such as the Agricultural Transformation Agenda (ATA). The poultry industry faces numerous challenges, including technical, labor, and input-related constraints (Malkeke & Okwen, 2017). To mitigate these risks, farmers employ diversification, marketing, and production strategies (Obike *et al.*, 2017). Furthermore, research has highlighted the importance of risk management in poultry production, with factors such as age, household size, and farming experience influencing disease prevention and financial management strategies (Adeyonu *et al.*, 2021).

Thornton *et al.* (2008) highlight the knowledge gaps regarding climate change impacts on livestock systems and livelihoods. They emphasize the need for detailed assessments of localized impacts and identification of adaptation options. However, limited access to reliable information on climate risks and management hinders small-scale poultry farmers' ability to adapt. To address these challenges, small-scale poultry farmers must consider management options to mitigate climate-related risks. It is essential to examine the nature and extent of their adaptation to climate-related risks, considering factors such as risk perceptions, socio-economic status, and environmental conditions.

This study aims to contribute to the literature on risk management in poultry production by assessing the level of risk management and analyzing its determinants among poultry farmers in Ekiti State, Nigeria. By understanding the factors that influence risk management practices, policymakers and stakeholders can develop effective strategies to support the sustainability and profitability of the poultry industry (Victor & Derlin, 2021).

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MATERIALS AND METHODS

The Study Area

This research was carried out in Ekiti State, which is situated in the Southwestern region of Nigeria. Ekiti State, positioned in the tropical zone, was established on the 1st of October, 1996, and comprises 16 Local Government Areas (LGAs). It covers an approximate land area of 6,602.8 square kilometers and had a population of 2,432,321 according to the National Population Census of 2006. Ekiti State is primarily an agricultural region, with key cash crops including cocoa, timber, oil-palm, and kolanuts. Food crops like cassava, yam, cocoyam, as well as grain crops such as maize and rice are also cultivated. Likewise, animal production enterprises, such as poultry, are predominant in Ekiti State. In this area, men are predominantly engaged in farming, while women are primarily involved in trading activities. Even among the educated local residents employed in the formal sector, farming serves as a secondary occupation (Owoeye *et al*., 2023). The State experiences two distinct seasons: the rainy season and the dry season. As of the 2006 National Population Census, Ekiti State had a population of 3,423,535.

Sampling Technique and Sampling Size

A multi-stage sampling technique was used. In first stage, six (6) Local Government Areas (LGAs) were selected purposively based on the intensity of poultry production (i.e., Ado, Ikere, Ikole, Ijero, Irepodun/Ifelodun and Ido-Osi). In the second stage, three (3) communities were chosen from each LGA. Lastly, five (5) poultry farmers were chosen, making the sample size to be ninety (90) respondents.

Data Collection

Primary data was collected with the aid of a well-structured questionnaire which was used to collect quantitative data from the selected respondents to generate information on the set objectives of the study.

Data Analysis

Both descriptive and inferential statistics were employed to analyze the collected data for the study.

Descriptive Statistics

This was used to analyze the data collected on the perceived climate change and climate adaptation strategies in the study area

Inferential Statistics

Probit Regression analysis was used to examine the factors influencing the adoption of risk management strategies among poultry farmers. The model is specified below

$Y = X\beta+\varepsilon$

Where:

y = Adoption of risk management strategies (yes = 1, otherwise = 0)

- X represents the vector of independent variables.
- β represents the vector of coefficients.
- E represents the error term, which is normally distributed with mean 0 and variance σ^2

(X_1) = Age of the Farmer (in years)
(X_2) = Gender (1 = Male, 0 = Female)
(X_3) = Education Level (0 = No formal education, 1 = Primary, 2 = Secondary, 3 = Tertiary)
(X_4) = Flock Size (number of birds or hectares)
(X_5) = Income from Poultry Farming (Naira)
(X_6) = Farming Experience (Years)
(X_7) = Access to Finance/Credit (1 = Yes, 0 = No)
(X_8) = Membership in Cooperative Society (1 = Yes, 0 = No)
(X_9) = Access to Extension Services (1=Yes, 0=No)
(X_{10}) = Access to Climate Information (1=Yes, 0=No)
(X_{11}) = Perception of Climate Change as a Risk (1=Yes, 0=No)
(X_{12}) = Type of Poultry Farming (Broilers, layers, or mixed)

RESULTS AND DISCUSSION

Perception of Climate Change

The results of a study on the perception of climate change in poultry farming show that various factors contribute to the perceived change. The majority of respondents (57.8%) perceive high humidity as a significant factor in climate change, as it can lead to heat stress in poultry, resulting in reduced productivity and increased mortality. Drought is also perceived as a significant factor in climate change, with 54.4% of respondents citing it as a major concern. Drought can lead to water scarcity, reduced feed availability, and increased feed costs, all of which can have a significant impact on poultry farming.

Other factors, such as high temperature and heat (40.0%), irregular rainfall (43.3%), extreme weather events (45.6%), diseases and pests (40.0%), poor air quality (44.4%), and solar radiation (46.7%), are also perceived as significant contributors to climate change. These factors can all have a range of impacts on poultry farming, including reduced productivity, increased mortality, and reduced feed availability. The results of this study highlight the need for farmers to adapt to climate change in order to maintain productivity and profitability. Adapting to climate change can involve a range of strategies, including the use of climate-resilient breeds, improved farm management practices, and the adoption of new technologies.

Table 1: Distribution of the respondent by the Perception of Climate Change

Perception of climate change	Frequency	Percentage
High temperature and heat	36	40.0
Long period of drought	49	54.4
High humidity	52	57.8
Irregular rainfall	39	43.3
Extreme weather events	41	45.6
Diseases and pests	36	40.0
Poor air quality	40	44.4
Solar radiation	42	46.7

Source: Computed Data Survey, 2024

Factors Responsible for the Adoption of Risk Management Strategies

The likelihood ratio (LR) chi-square test with a value of 60.56 indicates a moderately good fit of the model. The pseudo R^2 value of 0.586 suggests that the independent variables explain 58.6% of the variation in the adoption of risk management strategies. The overall p-value indicates that the model is statistically significant at conventional levels, validating its ability to identify key factors influencing adoption. Educational level, farming experience, and access to credit are the three most significant variables influencing the adoption of risk management strategies in Ekiti State, Nigeria.

The educational level of farmers significantly impacts their ability to adopt risk management strategies, with higher-educated farmers being better informed and more likely to adopt innovative practices. Farming experience also plays a crucial role, as experienced farmers are more aware of potential risks and the importance of mitigation strategies. This is in agreement with Didunyemi and Owoeye, 2022 on comparative profitability analysis of broiler production systems in Ekiti State, Nigeria who concluded that poultry farmers in the Ekiti State were well experienced, thereby making them to be efficient.

Access to credit is also a significant factor, with farmers having greater access to credit being more likely to implement risk management measures. Financial resources enable farmers to invest in preventive strategies such as high-quality feed, improved housing, vaccination programs, and disease control measures.

Demographic factors such as sex, age, and flock size also influence the adoption of risk management strategies. Young farmers, larger flock sizes, and higher-income farmers are more likely to adopt risk mitigation measures. Additionally, farmers who perceive the impact of climate change are more likely to adopt risk management measures. However, surprisingly, increased access to extension services reduces the likelihood of farmers adopting risk management strategies. This may be due to inadequate or outdated information provided by extension officers, leading farmers to seek alternative sources of knowledge.

Table 2: Probit Regression Analysis of Factors responsible for the Adoption of Risk Management Strategies

Independent Variables	Coefficient	Standard Error	P-Value
Sex	.5690701	.4466915	0.203
Age	.0270027	.0311551	0.386
Educational Level	.2179103**	0.0087	0.04
Farming Experience	.0387157**	0.0019	0.05
Flock Size	.0004495	.001948	0.817
Types of poultry Farming	.1763163	.2251536	0.434
Income	2.72e-06	2.64e-06	0.304
Access to Credit	.7078422*	.4231387	0.094
Members in cooperatives	.1717256	.427664	0.688
Extension services	-.0568243	.435656	0.896
Climate Change	.2416548	.4305206	0.575
Constant	-2.033838	1.360993	0.135
LR chi^2 (11) = 60.56			
Prob > chi^2 = 0.2106			
Log likelihood = -33.340254			
Pseudo R^2 = 0.586			

Source: Computed Data Survey, 2024

Adopted Risk Management Strategies

Poultry farmers in Ekiti State, Nigeria are adopting various strategies to improve their productivity and profitability. A significant 66% of farmers are utilizing improved bird breeds, which offer higher productivity, better feed efficiency, and resistance to diseases. This approach reduces production costs, minimizes mortality, and ensures better financial returns in the long term. Another crucial strategy is the use of weather forecasts, adopted by 54.4% of farmers. Weather forecasts enable farmers to plan ahead, reducing losses caused by extreme weather events. Vaccination is also widely adopted, with 76.7% of farmers recognizing its importance in preventing disease outbreaks and ensuring flock health. Enhanced housing is another key strategy, with 67.8% of farmers utilizing this approach to protect birds from adverse weather, predators, and disease exposure.

Disease control measures are also critical, with 75.6% of farmers prioritizing this approach. Controlling diseases minimizes flock losses, reduces treatment costs, and ensures consistent production levels. Efficient water conservation strategies are also important, with 74.4% of farmers adopting this approach to ensure a steady supply of clean water for bird health and optimal growth. Training on risk management is essential, with 73.3% of farmers adopting this approach to improve their

farm management and reduce risks. By adopting these strategies, poultry farmers can improve their productivity, profitability, and overall sustainability.

Table 3: Distribution of the Respondents by the Adopted Risk Management Strategies

Adopted Risk Management Strategies	Frequency	Percentage
Improved Birds Breed	60	66.7
Weather Forecast	49	54.4
Vaccination	69	76.7
Enhanced Housing	61	67.8
Diseases Control Measures	68	75.6
Water Conservation	67	74.4
Training on Risk Management	66	73.3

Source: Computed Data Survey, 2024

CONCLUSION

• Long period of drought, solar radiation and high temperature and heat were the noticeable perceived climate changes in the study area.

• Educational level, farming experience and access to credit were the factors responsible for the adoption of risk management strategies.

• Vaccination, disease control measures, water conservation and enhanced housing were the noticeable risk management strategies adopted by the respondents in the study area.

Recommendations

1. Targeted incentives, such as subsidized credit and skill-based training, should be introduced to encourage male participation in poultry farming.

2. Married farmers should be incentivized to participate in poultry farming through family-friendly agribusiness programs, cooperative financing, and flexible loan structures.

3. Mentorship programs and financial support should be extended to older farmers to enhance their participation and adoption of risk management strategies in poultry farming.

4. Policies should be developed to increase access to affordable credit facilities for poultry farmers to invest in improved housing, disease control, and climate adaptation techniques.

5. Structured training and extension services should be provided to improve poultry farmers' knowledge of climate adaptation strategies, disease prevention, and financial planning.

6. Agricultural extension services should be restructured to deliver timely, actionable, and localized information that addresses poultry farmers' real challenges.

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