RISK MANAGEMENT STRATEGIES AMONG SMALLHOLDER BROILER FARMERS IN EBONYI STATE, NIGERIA.

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ABSTRACT
This study investigates risk management strategies among smallholder broiler farmers in Ebonyi State, Nigeria. Eighty respondents were selected through a multi-stage random sampling technique, and primary data was collected using structured questionnaires and interviews. Descriptive statistics were utilised to achieve the study objectives, including frequency distribution, percentage responses, and multiple regression analyses. Findings on socioeconomic characteristics show that most respondents were male, young, educated, married, and experienced in broiler farming, with access to credit and involvement in off-farm activities. Key risks identified include high input costs, profit reduction, employment loss, stunted bird growth, and mortality. Policy changes and labour shortages were also highlighted. Regression results reveal education level, gender, marital status, off-farm income, farming experience, and cooperative membership positively influence risk management, while age and credit access have significant negative impacts. Recommendations include improved extension services, educational programs, support for off-farm activities, and inputs to encourage resilience in broiler farming.

Keywords: Risk management, risk tolerance, smallholder farmers, broiler production, Ebonyi State.

INTRODUCTION
Livestock farming plays a crucial role in supporting rural economies by providing income, food security, and economic stability, especially in developing regions. For smallholder farmers, livestock acts as a buffer against financial uncertainties and as a source of social and economic security (Bettencourt et al., 2013; Asresie & Zemedu, 2015; Ume et al., 2018). Among livestock, poultry is particularly prominent for its rapid protein production and accessibility for both rural and urban households (Bettencourt et al., 2013). Poultry production, including chickens, ducks, and turkeys, is widespread, with over 70% of livestock-owning households in Nigeria involved in chicken farming (Udoh & Etim, 2007). It serves as a critical income source, enhances household food security, and provides manure for soil enrichment (Ume et al., 2016). The sector also significantly contributes to employment and national GDP, aligning with poverty alleviation objectives (Omotosho & Ladele, 1988).

Nigeria leads West Africa in poultry production, with over 140 million birds (Akpabio et al., 2007). Broiler farming within the poultry sector is particularly prominent due to its fast growth, high feed efficiency, and short market cycle, making it ideal for addressing protein deficiencies (Food and Agriculture Organization; Omotosho & Ladele, 1988). However, risks and uncertainties, such as market volatility and environmental factors, hinder farmers from fully realizing the sector's potential (Mishra & El-Osta, 2002). Risk, defined as future investment uncertainty due to fluctuating climatic and economic conditions, poses significant threats to broiler production (Dwivedi, 2003). The highly perishable nature of poultry products and the complexity of the production process compound these risks, especially for smallholder farmers, who often lack the resources and knowledge needed to mitigate such challenges (Olartinde et al., 2007; Edeoghon & Oria-Arebun, 2011).

Prior research highlights the consequences of risk in the poultry sector, including increased bankruptcy, reduced farmer participation, and heightened consumer costs (Adeyemo & Onikoyi, 2012). Effective risk management, defined as the selection of strategies to minimize adverse impacts, is therefore essential for sustaining the welfare of broiler farmers (Walker et al., 2011; McSweeney & Raish, 2012). In developed countries, farmers adopt risk mitigation strategies such as forward pricing, diversification, and insurance (Mishra & El-Osta, 2002). In contrast, farmers in developing countries rely on traditional coping methods, which often prove insufficient (Wenner, 2010). This study aims to analyze the risks faced by broiler farmers in Ebonyi State, Nigeria. The specific objectives are to:

i. describe the socioeconomic characteristics of smallholder broiler farmers.
ii. identify and classify risks and uncertainties in broiler production.
iii. examine the risk tolerance attitudes of respondents.
iv. assess the effect of socioeconomic characteristics on risk tolerance.

METHODOLOGY

This study was conducted in Ebonyi State, Nigeria, located between latitudes 5°41’ and 6°50’N and longitudes 5°25’ and 7°30’E. The state experiences an annual rainfall of 1,500-2,500 mm, 28-48°C temperatures, and a relative humidity average of 75%. Ebonyi State is divided into three agricultural zones: North, Central, and South, encompassing 13 local government areas. Major crops cultivated include cassava, yam, rice, maize, and tomatoes, while livestock farming involves goats, sheep, and poultry. The inhabitants also engage in off-farm activities such as petty trading and craftsmanship and participate in cooperative societies. A multi-stage sampling technique was employed. First, two agricultural zones (Central and South) were purposively selected based on their intensity of broiler production. Then, two local government areas (LGAs) were randomly selected from each zone, resulting in four LGAs. Within each LGA, two communities were randomly selected, yielding eight communities. Finally, from lists provided by extension agents and local broiler farming leaders, ten farmers were randomly selected per community, resulting in a sample of 80 respondents.

Primary data were gathered using structured questionnaires and interviews. Descriptive statistics, including frequency distribution and percentage responses, were used to analyze objectives (i) and (iii). A three-point Likert scale was used to assess risk severity for objective (ii). Multiple regression analysis was applied to evaluate the effect of socioeconomic characteristics on risk tolerance (objective v). The regression model is represented as:

Y=f(X1,X2,...,X10+e)Y=f(X1,X2,...,X10+e)

where:

Y = Output of poultry farmers (kg); X_1 = Age of respondents (years); X_2 = Sex (male =1, female = 0); X_3 = Marital status (married = 1, otherwise = 0) ; X_4 = Educational level (years); X_5 = Primary occupation (farming =1, others = 0); X_6 = Off- farm income (Naira) ; X_7 = Farming experience (years); X_8 = Credit access (Dummy); X_9 = feed cost, X_{10} = Farm size (Total number of birds housed); X_{11} = Labour cost, X_{12} = Medication cost, and e = Stochastic error term.

Four functional forms (linear, semi-log, double log, and exponential) were tested, with the model providing the best fit selected based on economic, statistical, and econometric criteria.

RESULTS AND DISCUSSION

Socio-Economic Characteristics of the Broiler Farmers

The socioeconomic characteristics of the respondents are presented in Table 1. **able 1** shows the demographic characteristics of respondents in the broiler farming study area. A majority (66.2%) were male, with males often having financial and managerial resources that may help mitigate risks associated with production. This finding contrasts with Ume et al. (2013), who observed that females are often adept at negotiating prices, thus managing price-related risks. Meanwhile, Meuwiswen et al. (2001) reported no significant gender-based differences in risk management practices.

The largest age group among respondents (33.8%) fell between 30 and 49 years, implying a predominantly youthful farmer demographic. Younger farmers are often more agile and open to adopting innovative risk management techniques, potentially increasing business resilience (Knight, 1998).

Regarding marital status, most respondents (56.2%) were married, suggesting that marital responsibilities may encourage them to adopt risk management practices that support farm profitability and family welfare (Ogoke, 2009; Ayinde, 2008). Those with household sizes of 1-5 individuals made up 48.8% of the sample, which may reflect labour accessibility, particularly in resource-poor farming households (Good, 2008). Table 1 indicates that the majority of respondents (35%) had formal education, while 17.5% had no formal education. This suggests that most respondents were educated and might be more inclined to take risks compared to those without education.

Table 1: Socioeconomic characteristics of the respondents

Variable	Frequency	Percentage	Mean
Gender			
Male	53	66.2	
Female	27	33.8	
Age			
Age(years)			
Less than 30	20	21	
30- 49	27	33.8	
50 – 69	22	27.5	34.7
Above 60	10	12.5	
Marital Status			
Single	19	23.8	
Married	45	56.2	
Divorced	4	5.0	
Widow	12	15	
Household Size			
1 – 5	39	48.8	
6 – 10	29	36.2	4.2
Above 10	12	15	
Educational status			
No formal education	14	17.5	
Primary education	16	20	
Secondary education	22	27.5	
Tertiary education	28	35.	
Primary Occupation			
Farming	27	33.8	
Trading	28	35	
Civil Service	16	20	
Artisan	9	11.2	
Membership of cooperatives			
Yes	30	37.5	
No	50	62.5	
Farm Distance Household.			
Less than 1	18	22.5	
1 -2	19	23.8	2.1
2 -3	8	10	
3 – 4	18	22.5	
Above 4	17	21.2	
Flock Size			
Less than 40	14	17.5	
41 – 0	15	18.8	25.4
Rearing Experience	51	63.7	
0 -4	22	27.5	
5 – 9	29	36.2	6.4
Above 9	29	36.2	
Extension Services			
Yes	59	73.8	
No	21	26.2	
Access to Credit			
Yes	51	63.8	
No	29	36.2	
Off – farm Income			
Yes	44	55.5	
No	36	45	

Adress et al. (2010) support this, noting that educated individuals often have easier access to information, which can aid in managing risks associated with their work. Additionally, most respondents (35%) were traders, with only 11.2% in other occupations. This implies that broiler farmers may have alternative income sources, which could support adopting risk management innovations on their farms (Dercon & Christiansen, 2007). However, Hardaker (2000) offers a different view, suggesting that farmers with multiple income streams may neglect farm-related risks due to time constraints.

Furthermore, most respondents (62.5%) were members of a cooperative society, while 37.5% were not. Cooperative societies often provide members with training on effective risk management (FAO, 2011). Conversely, Ume et al. (2018) found that some agricultural cooperatives have deviated from their primary purpose, engaging in partisan politics instead. Moreover, most respondents (23.8%) had broiler farms located 1–2 km from their homes, while the fewest (10%) were 2–3 km away. When transportation is limited, the distance can delay critical farm activities, leading to increased risks and potential livestock losses (Ayinde et al., 2008).

Additionally, 63.8% of respondents had flocks larger than 60 birds, with only 17.5% having fewer than 40 birds, indicating most were small-scale operators. Resource constraints among these farmers may limit access to improved inputs, posing production risks (Claire, 2010). Emmanuel (2003), however, argues that small-scale farmers are often more resourceful in managing risks than larger-scale operators. Table 1 shows that 72.4% had broiler rearing experience of 5–9 years, while 27.6% had 1–4 years. Experience enhances resource management prudence, reducing risk (Fakayode et al., 2011). Ogoke (2009), however, found that experienced farmers might resist adopting new risk management innovations, relying instead on traditional methods.

Furthermore, 73.8% of respondents had access to extension services, facilitating the adoption of risk management information in broiler production (FAO, 2009). However, ineffective extension services may undermine these benefits (Anozie et al., 2014). Additionally, 63.8% had access to credit, while 36.2% did not. Access to credit can help farmers manage price fluctuations in input costs (Deweerdt & Dercon, 2006). In contrast, Anozie et al. (2014) found that many farmers are unaware of credit facilities due to the distance of lending institutions. Lastly, 55% of respondents engaged in off-farm activities, which helps mitigate risks associated with fluctuating product prices and diversifies income (Ume et al., 2017).

4.2 Risks and Uncertainties in Broiler Production

The table below shows the mean score from the three-point Likert Scale on risks and uncertainties in broiler production. Table 2 illustrates the risks identified by farmers concerning income and production stability. High input costs (mean = 2.2) and fluctuating input prices (mean = 2.1) were prominent income risks. This trend of rising input costs, especially during the farming season, can be attributed to increased demand among farmers (Aina & Omonona, 2012; Andres, Picazo-Tadeo, & Allan, 2010).

Table 2: Distribution of the Respondents based on Risk and Uncertainties.

Risk and uncertainties	Mean score	Decision
Income risks		
high cost of inputs	2.2	Accepted
high cost of inputs	2.2	Accepted
reduction in profits	2.5	Accepted
loss of employment	2.0	Accepted
stunted growth	2.1	Accepted
Assets Risk		
Theft	2.1	Accepted
Death of bird	2.4	Accepted
Poor access to credit	2.4	Accepted
Break down of equipment	1.5	Accepted
Accident	1.8	Rejected
Fire outbreak	1.6	Rejected
Health risk		
Ill health/ outbreak of disease	2.3	Accepted
Pure covariate risks		
Food	1.5	Rejected
Hard economic times	1.2	Rejected
Policy changes	2.3	Accepted
Labour shortage	2.3	Accepted
Death due to thunder and lightning	1.6	Rejected
Rainfall	1.5	Rejected

Source; Field Survey, 2023.

Additionally, a reduction in profits (mean = 2.5) was frequently noted, likely due to high production costs resulting from expensive inputs and the seasonal oversupply that drives down produce prices (Ume et al., 2018).

Stunted growth in broilers (mean = 2.1) was another issue linked to low-quality breeds, which, characterized by poor performance, lead to financial inefficiency and wastage of resources such as space and labour (FAO, 2009). Farmers also reported limited access to credit, which may stem from high interest rates, strict collateral requirements, bureaucratic delays, and the urban location of most lending institutions (Anozie et al., 2014). Theft (mean = 2.1) emerged as critical asset risk, encompassing losses of birds and equipment due to both internal and external theft, with the potential to disrupt farm operations if not mitigated (Ayinde, 2008; Nto et al., 2013). High mortality rates among broilers (mean = 2.4) were reported as another concern, often resulting in reduced income and increased poverty due to decreased savings and investment opportunities (Ume et al., 2013). Additionally, health-related risks, specifically disease outbreaks (mean = 2.3), were prevalent. Labor shortages, particularly during peak seasons, due to urban migration and youth aversion to farming, further constrained production (Ume et al., 2016). Finally, government policy changes (mean = 2.3) affecting imports of chickens, vaccines, drugs, and equipment were noted as critical risks, impacting local production costs and market prices (Nto et al., 2013).

4.3 Farmers' Attitude Toward Risk

The attitude of farmers towards risk is presented in Table 3. The result shows that out of the 80 respondents, 46.3% (37 individuals) are risk-averse, making it the most prevalent risk attitude. This suggests a tendency among respondents to avoid risks in their agricultural activities, potentially due to concerns over financial security and stability in an uncertain environment. Risk aversion can limit the adoption of innovative or high-yield practices that may come with greater variability or initial cost but have potential long-term gains.

The remaining respondents are split almost evenly between risk-takers (27.5%, or 22 individuals) and risk-neutral individuals (26.2%, or 21 individuals). Risk-takers are likely more open to adopting new methods, technologies, or ma rket practices, indicating a potential for higher gains but also a higher risk of losses. Risk-neutral respondents, on the other hand, weigh potential gains against risks more evenly, suggesting that they might adopt new strategies only if the expected outcomes are reliably positive.

Table 3; Distribution of **respondents' attitude towards risks taking**

Risk Behaviour	Frequency	Percentage
Risk Taker	22	27.5
Risk Neutral	21	26.2
Risk Averse	37	46.3
Total	80	100

Source; Field Survey; 2023.

4.4 Effects of Socioeconomic Characteristics on Attitudes to Risk

Table 2 presents a regression estimate of the effect of socio-economic factors on respondents' attitudes towards risk-taking. Among the regression models fitted, the Cobb-Douglas functional form was chosen as the lead equation based on econometric and statistical criteria, including the highest number of significant variables and the highest R^2 value. The R^2 value was 0.689, indicating that 68.9% of the total variation in the dependent variable was explained by the explanatory variables in the model, while the remaining 31.1% was due to the error term. The F-value of 7.85 was statistically significant at the 1% probability level, indicating the goodness of fit of the model. The coefficient for the age of the farmer was negative and statistically significant at the 5% level. This implies that ceteris paribus, older farmers tend to be less prone to taking risks than younger ones. This could be because older investors are often averse to risk-taking, as potential future losses may harm their financial well-being upon retirement (Hawood et al., 1999). However, Hardecker (2000) offered a differing view on the relationship between age and risk tolerance, suggesting that younger individuals have more time to recover from potential financial losses resulting from risk-taking. The coefficient for gender was positive and significant at the 10% level, indicating that men have a higher risk tolerance than women. This may be due to men being more innovative, having greater incentives for risk-taking, and being more aggressive in business and proactive in entrepreneurship development (Kouame, 2001). Furthermore, Deweerdt and Decon (2006) noted that women tend to have less confidence in investment decisions and take more care when making equity investments.

Contrary to a priori expectations, the coefficient for marital status was positive and significantly affected respondents' risk tolerance at the 5% probability level. This could be explained by the possibility that married individuals engage in risky projects anticipating higher future benefits to enhance their livelihoods (Nto et al., 2013). Hardecker et al. (1997) found that married individuals tend to exhibit lower risk tolerance compared to single persons, likely due to greater household responsibilities and financial commitments.

In line with a priori expectations, the coefficient for education had a direct relationship with risk tolerance at the 1% confidence level. Studies show that highly educated individuals are generally more associated with risk-taking than those with lower levels of education, especially when they have professional training related to the subject matter, time management, personnel skills, financial management, and risk management (Dercon & Christiansen, 2007). The coefficient for farming experience was positively correlated with risk tolerance and significant at the 1% level. According to Ume et al. (2018), years of farming experience may indicate the practical knowledge a farmer has acquired on how to overcome inherent farm problems or risks. Experienced farmers have a better understanding of various investment options and their features, as well as knowledge of managing risks using various techniques (Grable & Roszkowski, 2007).

Membership in cooperatives positively influenced the risk tolerance of the sampled farmers at the 10% significance level. Cooperatives, as reported by Ume et al. (2016), provide members with access to information on improved innovations, material inputs (such as fertilizer and chemicals), credit for labour payment, capacity building, and training. These features equip member farmers to overcome risks and enhance their production frontier. Several studies (Halek & Eisenhver, 2001; Andemay, 2008; Adrex et al., 2010) have made similar findings.

The coefficient for off-farm income had a positive correlation with risk tolerance and was significant at the 5% probability level. Naim (2005) and Nto et al. (2011) observed that higher income levels serve as a buffer to counteract potential future losses. Contrary to a priori expectations, the coefficient for access to credit had an indirect relationship with respondents' risk tolerance at the 95% confidence level. This could be due to the diversion of agricultural credit into social functions such as chieftaincy titles and weddings (Ume et al., 2017). However, Ajetumobi and Binuomote (2006) disagreed, suggesting that credit access can offset farmers' production, marketing, and input procurement risks.

CONCLUSION AND RECOMMENDATIONS

The study identified several significant risks faced by farmers, including high input costs, reduced profits, loss of employment, stunted growth, bird mortality, and poor access to credit. Additional risks included government policy changes and labour shortages. The analysis revealed that the level of risk tolerance among respondents was influenced by factors such as educational level, gender, marital status, off-farm income, farming experience, and membership in cooperatives. Based on findings from this study, the following recommendations are made:

1. The government, in collaboration with private organizations, should develop and implement educational programs aimed at helping farmers identify risks and adopt effective coping strategies. These programs could be disseminated through the Ministry of Information.

2. The government should establish policies and programs that encourage farmers to participate in cooperatives. These cooperatives can play a crucial role in mitigating production and marketing risks.

3. There is a need to attract young and educated individuals to broiler production. This can help absorb available labour and reduce poverty by providing new employment opportunities.

4. Farmers should be encouraged to diversify their resources beyond agriculture. This diversification can help reduce the risks and uncertainties associated with farming and provide multiple income streams.

5. Farmers should be exposed to educational opportunities such as adult education, seminars, and workshops. These initiatives would enhance their access to information and equip them with the knowledge needed to manage risks effectively in broiler production.

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