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RESEARCH ARTICLES

Risk Management and Crop Insurance Adoption among Cocoa Farmers: Insights from Ekiti State, Nigeria

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ABSTRACT

Cocoa farming in Nigeria is increasingly threatened by production and market risks, including climate shocks, pest outbreaks, and price fluctuations. Farmers, as primary producers, often lack the resources and institutional support to effectively manage these risks, making crop insurance a potentially essential tool for protecting livelihoods. This paper examines the factors influencing cocoa farmers' adoption of crop insurance in Ekiti State, Nigeria, focusing especially on risk preferences and perceptions of insurance schemes. A total of 200 household heads were selected through multi-stage sampling across four cocoa-producing local government areas. Data on socio-demographic traits, insurance perceptions, and risk attitudes were analyzed using descriptive statistics and a binary logistic regression model. Results show that most cocoa farmers have not adopted crop insurance. Adoption was positively affected by education, household size, and debt usage, whereas membership in cooperative societies, farming experience, land ownership, and non-farm income were negatively related to insurance uptake. Notably, risk preferences did not differ significantly between insured and uninsured farmers, indicating that socio-economic factors are stronger predictors of insurance decisions. The paper concludes with policy recommendations to strengthen Nigeria's agricultural insurance system, including reforms to the Nigerian Agricultural Insurance Corporation (NAIC), the provision of better inputs, and the creation of farmer-friendly insurance products tailored for smallholders. By tackling both institutional and behavioral barriers, crop

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insurance can serve as an effective tool for improving resilience and sustainability in cocoa production.

Keywords: Cocoa production, crop insurance, farmer behaviour, Nigeria, risk management

INTRODUCTION

Nigeria is one of the world's major cocoa producers, ranking behind Côte d'Ivoire and Ghana, which dominate Africa's cocoa industry (ICCO, 2013). Cocoa has historically played a central role in Nigeria's agricultural economy, serving as both a household cash crop and a key export that brings in foreign exchange (Hamzat et al., 2006). Production averaged about 420,000 tons annually in the 1960s but dropped sharply to 170,000 tons by 1999 before rebounding to 389,272 tons in the early 2000s. Since then, output has declined again, making Nigeria the sixth-largest global producer in recent years (ICCO, 2013). The main cocoa-producing states include Ondo, Ekiti, Oyo, Osun, Edo, Ogun, and Cross River. Despite its significance, less than 10% of Nigeria's cocoa is processed domestically, which limits value addition and potential income for farmers (World Cocoa Foundation [WCF], 2012).

Globally, the cocoa sector is confronted with mounting risks that threaten both productivity and farmer welfare. Climatic variability, pest and disease infestation, and volatile international prices are among the major challenges. It is estimated that about 30% of cocoa output worldwide is lost to pests and diseases, reducing the supply available for both local and export markets (EUFIC, 1999). In Nigeria, farmers face additional challenges such as declining yields from ageing plantations, inadequate access to inputs, high production costs, and smallholder fragmentation (Babalola et al., 2016). The combination of these risks has contributed to declining production, growing economic insecurity, and increasing rural poverty among cocoa farmers (MCF, 2013). Risk is inherent in agriculture because outcomes are affected by uncertain events such as adverse weather, pest outbreaks, and price shocks (Hardaker et al., 2004). Farmers have traditionally relied on informal and semi-formal risk management strategies, including diversification, debt control, cooperative membership, and off-farm employment (Salimonu & Falusi, 2009; Alimi & Ayanwale, 2005). While these strategies provide some protection, they are often insufficient against systemic risks that affect entire communities or regions. Formal crop insurance has therefore been

advanced as an important tool to mitigate risks by indemnifying farmers against yield loss, poor prices, and climate-related shocks (Smith & Glauber, 2012).

Agricultural insurance products generally fall into three categories: named-peril products, multi-peril crop insurance (MPCI), and index-based insurance (Raviv, 1979; World Bank, 2011). In Nigeria, the Nigerian Agricultural Insurance Corporation (NAIC) was established in 1978 to promote the uptake of agricultural insurance. However, despite the potential benefits, farmer participation remains very low due to poor awareness, high premium costs, negative perceptions, and lack of trust in insurers (Giné & Yang, 2009; Seyed et al., 2010). Similar challenges have been documented across developing countries where insurance markets are underdeveloped (Smith & Glauber, 2012; Adinolfi et al., 2012).

Factors such as age, education, farming experience, farm size, debt use, land tenure, off-farm income, and risk perceptions have been identified as important predictors of insurance uptake (Barry et al., 2004; Shaik et al., 2008; Adinolfi et al., 2012). Yet, most of these studies are concentrated in developed economies or outside Africa (Rue, 2009; Brånstrand & Fredrik, 2014). Recent studies have affirmed that multiple socio-economic and structural factors shape farmers' decisions to adopt crop insurance (Sahoo & Behera, 2025; Barry et al., 2004). Variables such as education, land tenure, household size, debt burden, and cooperative membership significantly influence adoption rates. For instance, Sahoo and Behera (2025) highlight that better-educated farmers with access to credit are more likely to insure their crops, mirroring findings in Ekiti State cocoa farmers. Moreover, insurance adoption is often hindered by limited trust in insurance providers, perceived high premium costs, and a lack of understanding of insurance products (Attipoe, 2023; Giné & Yang, 2009). These challenges are compounded in settings where smallholder farmers rely heavily on cooperatives, which sometimes substitute formal insurance mechanisms. In addressing broader risk management, the United Nations Framework Convention on Climate Change (UNFCCC, 2024) advocates for integrating comprehensive risk management approaches in agrifood systems, emphasizing the critical role of risk-informed investments, technical assistance, and extension services to empower smallholders. Agricultural risk is increasingly shaped by climate variability, which threatens cocoa production significantly in West Africa (State of Africa's Environment, 2025; Christian Aid, 2025). Recent projections indicate that rising temperatures and erratic rainfall patterns could reduce suitable cocoa farming areas by up to 50% by 2050, stressing the urgency for adaptive risk mitigation strategies, including crop insurance and sustainable agricultural practices.

Within Nigeria, available studies on cocoa production have focused largely on coping strategies and marketing risks (Babalola et al., 2016; Salimonu & Falusi, 2009), while empirical research on cocoa farmers' crop insurance decisions remains scarce.

Despite the prominence of cocoa in Nigeria's agricultural exports and the increasing risks faced by smallholder farmers, there is limited empirical evidence on the determinants of cocoa farmers' uptake of crop insurance. Existing studies have either examined crop insurance in general terms (Seyed et al., 2010; Adinolfi et al., 2012) or explored farmers' coping strategies without a focus on insurance (Babalola et al., 2016; Hamzat et al., 2006). Moreover, while international literature emphasizes socio-economic and behavioral factors influencing insurance adoption (Barry et al., 2004; Smith & Baquet, 1996), few studies have contextualized these determinants within Nigeria's cocoa belt, where risks are compounded by smallholder production structures, climate change, and institutional weaknesses.

This study is therefore justified as it addresses a critical gap by examining the socio-demographic, economic, and risk-related factors influencing cocoa farmers' decisions to adopt crop insurance in Ekiti State, a major cocoa-producing region in Nigeria. By identifying these determinants, the study provides evidence that can inform policy interventions to strengthen NAIC's operations, design farmer-friendly insurance products, and promote resilience in Nigeria's cocoa sector. Ultimately, such insights are essential for enhancing farmer welfare, stabilizing production, and safeguarding the sustainability of Nigeria's cocoa industry in the face of global and local uncertainties.

MATERIALS AND METHODS

Study area

Cocoa production in Nigeria is concentrated within the humid rainforest zone, commonly referred to as the *Cocoa Belt*. This belt comprises the major producing States of Akwa Ibom, Cross River, Delta, Edo, Ekiti, Ogun, Ondo, and Oyo, which collectively form the backbone of Nigeria's cocoa economy. Among these States, Ekiti stands out as a significant contributor, producing over 40% of the cocoa output of the old Western Region.

Ekiti State, located in the southwestern part of Nigeria, has a total landmass of 6,353 km². The State is predominantly agrarian, with favourable climatic and

ecological conditions that make it particularly suited for cocoa cultivation. The climate is tropical monsoon, marked by two distinct seasons: a rainy season (April–October) and a dry season (November–March). Humidity is generally high during the rainy season but drops significantly during the Harmattan period of the dry season. Vegetation varies across the State, ranging from dense tropical forest in the southern axis to savannah vegetation in the northern peripheries. This ecological diversity not only supports cocoa farming but also sustains other forms of agriculture, further emphasizing Ekiti's status as an agriculturally endowed region.

Figure 1 highlights the risks posed by climate change on African cocoa production. Cocoa is sensitive to climate variables, and changes such as rising temperatures, altered precipitation patterns, and increased frequency of extreme weather events threaten its cultivation. The significant risk here involves reduced yields, which not only impacts farmers' livelihoods but also the economy of countries dependent on cocoa exports. As conditions become less favorable for cocoa farming, producers face the challenge of adapting to sustain their crops and income.

Figure 2 provides insights into the predicted changes in the area suitable for cocoa production across various countries. By illustrating how simulated water-limited potential yield is expected to shift—with and without the effects of increased CO2—this figure underscores the geographical risk involved. If much of the suitable land for cocoa production diminishes due to climate change, it poses a considerable threat to food security and the economy within those regions. In summary, both figures collectively emphasize the urgent need for mitigation and adaptation strategies to manage the risks associated with climate-induced changes in cocoa production.

Data collection

The study adopted a survey design targeting cocoa farmer at the household level. Primary data were collected through the administration of a well-structured questionnaire, designed to capture both socio-economic and farm-level production characteristics of respondents.

The questionnaire comprised several modules, including Household socio-economic characteristics such as information on age, education, household size, income sources, and access to credit; Farm characteristics, including area of cocoa farms, tenure arrangements, farming experience, and labour utilization patterns

(family labour, hired labour, or cooperative labour arrangements). Other information elicited includes Production practices involving the adoption of cultural practices such as fertilizer use, pesticide application, pruning, and access to improved cocoa seedlings. Risk exposure and Insurance perception and risk preferences: farmers' perceptions of crop insurance and their risk attitudes were assessed using Likert-scale items, ranging from 1 (strongly disagree) to 5 (strongly agree). This approach enabled the researchers to gauge levels of agreement with statements related to insurance awareness, affordability, trust in insurance providers, and willingness to adopt insurance products. Pilot testing of the questionnaire was conducted before the main survey to ensure clarity and reliability of the items. Adjustments were subsequently made to improve precision and contextual relevance.

Sampling and sampling techniques

A multistage sampling technique was utilized to select respondents from various regions in Ekiti State. The process began with the selection of four local government areas (LGAs) known for their cocoa production: Irepodun/ Ifelodun, Gbonyin, Ekiti West, and Ijero. These areas were chosen specifically due to their significance in cocoa farming and the high involvement of local farming households in this crop.

Following the selection of the LGAs, the next step involved identifying two communities within each selected LGA, resulting in a total of eight communities. Randomly selected communities included Awo and Afao from Irepodun/Ifelodun, Ijan and Ilumoba from Gbonyin, Erijinyan and Aramoko from Ekiti West, and Ipoti and Odo Owa from Ijero. The final stage focused on selecting households within these communities. A method of systematic random sampling was employed, where enumerators followed a designated route. They started from one side of the road and alternated sides, selecting every third house to maintain objectivity and reduce bias in the selection process. In each household chosen, the head who managed a cocoa plantation was identified as the respondent. Through this comprehensive sampling procedure, a total of 200 cocoa farming households were successfully sampled across the eight communities. This dataset encompassed a diverse representation of cocoa farmers in Ekiti State, providing a solid foundation for analyzing various socio-economic factors, risk exposures, and the determinants influencing the uptake of crop insurance.

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Source: https://www.wur.nl/en/research-results/research-institutes/plant-research/show-wpr/climate-change-puts-african-cocoa-production-under-pressure.htm.

Figure 1. Climate change puts African cocoa production under pressure

Data analysis

The data generated from the field survey were subjected to both descriptive and inferential statistical analyses. Descriptive statistics, including measures such as means, frequencies, and percentages, were employed to summarize the socio-economic characteristics of the sampled cocoa farmers. These descriptive tools provided a useful overview of variables such as age, education, household size, land tenure, farm size, and cooperative membership, which are important for understanding the general profile of cocoa farmers in Ekiti State.

To empirically determine the factors influencing cocoa farmers' uptake of crop insurance, a binary logistic regression model was employed. The choice of the logit model is consistent with previous studies that analyze dichotomous outcomes, where the dependent variable takes two values—insured (1) and not insured (0) (Barry et al., 2004; Adinolfi et al., 2012). The logit specification enables estimation of the probability that a cocoa farmer will purchase crop insurance as a function of explanatory variables such as education, household size, farming experience, debt use, land ownership, non-farm income, and cooperative membership. Logistic regression is widely applied in agricultural economics because of its robustness in handling categorical outcomes and its ability to isolate significant determinants while controlling for confounding effects (Greene,

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1993).

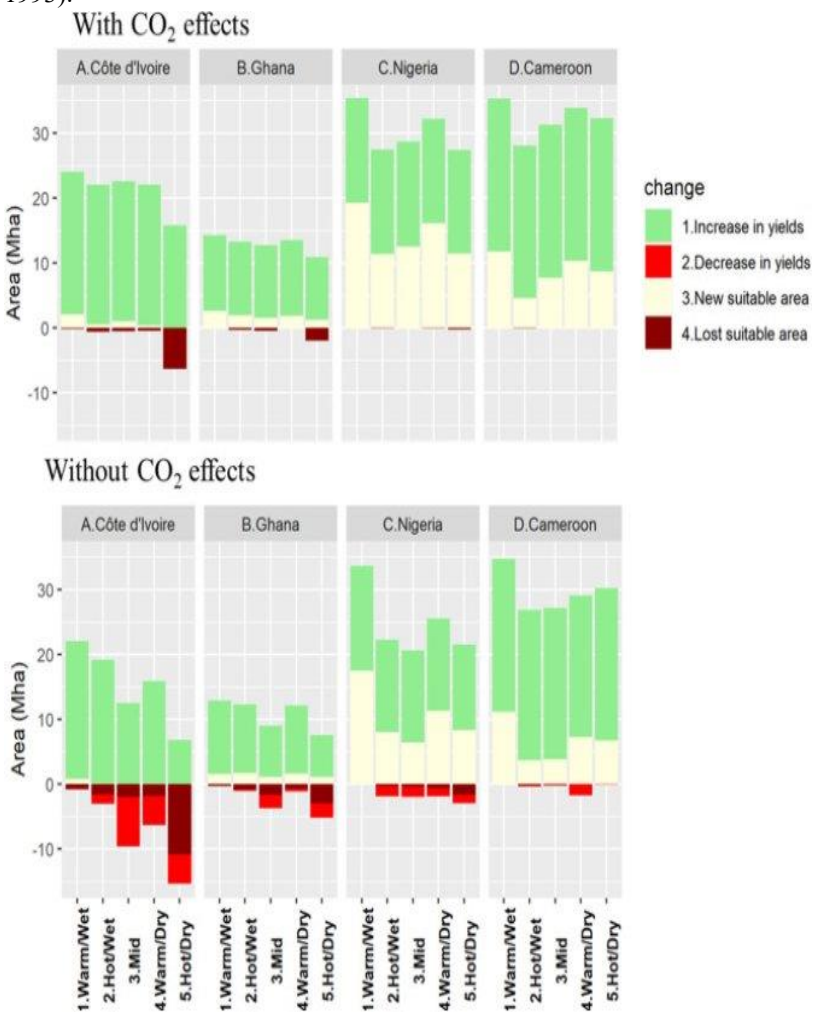

Figure 2. Predicted changes in total area suitable for cocoa production in each country where simulated water-limited potential yield is expected to change, with and without CO2 effects.

Source: https://www.wur.nl/en/research-results/research-institutes/plant-research/show-wpr/climate-change-puts-african-cocoa-production-under-pressure.htm

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T-Test

To complement the regression analysis, an independent samples t-test was conducted to examine whether statistically significant differences exist between cocoa farmers who are insured and those who are not insured, across selected socio-economic attributes. The t-test provides a comparative assessment of group means, offering insights into whether observable differences are merely due to sampling variability or reflect genuine disparities (Newbold, 1991).

The null hypothesis tested was:

$H_0: \mu_x - \mu_y = 0$

which assumes no significant difference between the mean values of insured and uninsured farmers across each attribute. The alternative hypothesis was:

$H_1: \mu_x - \mu_y \neq 0$

which posits that the mean differences are statistically significant. The test assumes that observations are independent and approximately normally distributed within each group. The population variances σ_x^2 and σ_y^2 were estimated using the sample variances S_x^2 and S_y^2. The level of significance, α, was set at 5% (0.05), following conventional statistical standards in agricultural economics research (Newbold, 1991; Greene, 1993).

The decision rule was straightforward: if the calculated t-statistic exceeded the critical value at the chosen significance level, the null hypothesis was rejected in favor of the alternative. This approach provided a rigorous basis for determining whether insured and uninsured cocoa farmers differed significantly in terms of socio-economic and farm-level characteristics, thereby complementing the regression results with additional inferential evidence. A distribution table was employed, where the probability for the outcome is set at $\frac{\alpha}{2}$, reflecting a two-tailed test of significance (Newbold, 1991). This statistical procedure compares the mean values of an observed factor between two independent groups—farmers with insurance (X) and those without insurance (Y), to determine whether significant differences exist between them.

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Logit Model

To analyze how the entire set of explanatory variables influences farmers' decisions to purchase crop insurance, a logistic regression model was employed. Logistic regression is particularly suitable for dichotomous dependent variables, as it estimates the probability of an event occurring (yes/no, success/failure) based on observed predictor variables (Greene, 1993). In this study, the dependent variable was insurance uptake, defined as:

Y = 1 if the farmer has crop insurance, 0 if the farmer does not have crop insurance

Thus, the model estimates the probability that a cocoa farmer adopts crop insurance, P(Y=1), as a function of socio-economic and farm-level characteristics. Logistic regression assumes that the probability of adoption is related to the independent variables (X) through a logistic cumulative distribution function (CDF). The general form of the model can be expressed as:

$$P(Y=1) = F(\beta'X) = \frac{1}{1+e^{-(\beta_0+\beta_1 X_1+\beta_2 x_2 \ldots..\beta_n x_n}} \quad (2)$$

Where:

P(Y=1) = probability of insurance uptake,
Y = binary dependent variable (insurance status),
β = estimated parameters (coefficients),
X = vector of independent variables (e.g., farm size, production level, age, education, debt use, cooperative membership, and risk preference).

The coefficients (β) capture the direction and strength of influence of each explanatory variable on the likelihood of insurance adoption. A positive coefficient implies that an increase in the explanatory variable raises the probability of being insured, while a negative coefficient indicates the opposite effect. Logistic regression is widely used in agricultural economics because it not only accommodates the binary nature of insurance decisions but also provides a measure of marginal effects, showing how incremental changes in explanatory variables affect the probability of insurance uptake (Barry et al., 2004; Adinolfi et al., 2012).

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RESULTS AND DISCUSSION

Descriptive analysis

Table 1 presents the descriptive statistics of the socio-economic characteristics of sampled cocoa farmers in Ekiti State, disaggregated by insurance status. The results highlight important differences between farmers who reported having crop insurance and those without. The average age of farmers with crop insurance was 51.3 years, compared with 56.4 years for those without insurance. This finding suggests that younger cocoa farmers may be more inclined to adopt agricultural innovations such as crop insurance, a trend consistent with earlier studies indicating that younger farmers are often more receptive to new technologies and risk management tools (Barry et al., 2004; Adinolfi et al., 2012). In terms of farming experience, cocoa farmers without crop insurance were generally more experienced than their insured counterparts. For example, nearly three-quarters of farmers who reported between 31 and 45 years of farming experience did not hold crop insurance. This outcome aligns with previous research suggesting that older, more experienced farmers may rely on traditional coping mechanisms or personal resilience rather than formal insurance products (Hardaker et al., 2004; Giné & Yang, 2009). It also raises questions about trust in insurance institutions, as experience with past policies—especially through the Nigerian Agricultural Insurance Corporation (NAIC)—has been associated with farmer skepticism (Hamzat et al., 2006). With respect to farm size, the majority of plantations fell within the range of 6–15 hectares, reflecting the dominance of small- to medium-scale production in the study area. Interestingly, farmers without crop insurance tended to control larger farm sizes compared with their insured counterparts. This finding appears counterintuitive, as larger farms are often associated with higher levels of risk exposure and, consequently, greater incentives to insure (Shaik et al., 2008). However, it may reflect structural constraints such as the affordability of premiums or limited access to suitable insurance products for larger commercial producers in Nigeria. Gender dynamics also reveal important patterns. Overall, 86% of cocoa farmers in the sample were male, underscoring the gender imbalance in cocoa production in Nigeria. Among insured farmers, 40% were male, while 46% of uninsured farmers were male. The relatively small difference across categories suggests that gender, while influential in access to agricultural resources, may not be a strong determinant of insurance uptake in this context. This contrasts with findings from other African settings where female farmers often face additional barriers to insurance adoption, including limited access to information and financial services (Asante et al., 2021).

Finally, the distribution of farmers across insurance categories indicates that a greater proportion of cocoa farmers (66%) did not hold insurance, compared to only 34% who reported being insured. This imbalance reflects broader national and regional trends, where adoption of agricultural insurance remains low among smallholder farmers due to high premium costs, lack of awareness, and distrust in insurance institutions (Smith & Glauber, 2012; Yusuf et al., 2024).

The analysis of household demographics shows that the mean household size for farmers without crop insurance was higher (8.2 persons) compared to 5.6 persons for insured farmers. Larger household sizes may increase consumption pressure and encourage reliance on informal coping mechanisms rather than formal risk management, a finding consistent with studies suggesting that household dependency often constrains investment in agricultural insurance (Brånstrand & Fredrik, 2014; Barry et al., 2003). Regarding land ownership status, the majority of cocoa farmers (77%) owned the land on which their cocoa was cultivated, either through purchase or inheritance, while the remaining 23% rented or leased farmland. Among landowners, 43% did not have crop insurance compared to 23% who did, whereas all farmers cultivating on rented or leased land reported having no insurance. This suggests that land tenure security may influence the likelihood of adopting crop insurance, as farmers who lack secure ownership may be less motivated to insure crops (Barry et al., 2004; Adinolfi et al., 2012).

In terms of debt use and access to credit, results show that a majority of those who borrowed capital for production were insured cocoa farmers (64%), while the remaining 36% of borrowers were uninsured. Among indebted farmers, 58% sourced loans through cooperative societies, while 30% accessed credit from the Central Bank of Nigeria's Anchor Borrower Scheme. Notably, all farmers who secured loans through the Anchor Borrower Scheme also had crop insurance, suggesting that insurance may act as a prerequisite or incentive for accessing institutional credit.

This aligns with findings from previous studies, which emphasize the complementarity between insurance adoption and credit access in agricultural risk management (Giné & Yang, 2009; Yusuf et al., 2024). Interestingly, cooperative membership showed an inverse relationship with insurance uptake. A greater proportion of uninsured cocoa farmers (60%) belonged to cooperatives compared with 40% of insured farmers.

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Table-1. Socio-economic characteristics of cocoa farmers (n=200)

Variables	Insurance	No Insurance	Mean
Gender (%)			
Male	40		46
Female	6.0		8.0
Marital status (%)			
Single	3.0		4.0
Married	40	49	
Divorced	0.0	0.0	
Widowed	3.0	1.0	
Age (Mean)	51.3	56.4	
Household size (Mean)	5.6	8.2	5.9
Non-Farm income			
Yes	38		105.0
No	42	15.0	
Education (%)			9.0
Primary	42	15.0	
Secondary	10.0	4.0	
Tertiary	5.0		
No formal	12.0	38.0	
Membership of cooperative (%)			
Member	11.0	50.0	
Non-member	29.0	10.0	
Farming experience			16.0
1-15	13.0	25.0	
16-30	6.0	16.0	
31-45	11.0	30.0	
Insurance Use (%)	34.0	66.0	47.0
Land Ownership Status (%)			
Owned Land	34.0	43.0	
Rented/Lease	0.0	23.0	
Debt Use (%)	64.0	36.0	
Sources of Debt (%)			
Cooperative	28.0	30.0	
Commercial Bank	0.0	0.0	
Anchor Scheme (CBN)	30.0	0.0	
Money Lender	6.0	6.0	
Cocoa Farm Size (Ha)			5.6
1-5	2.3	1.9	
6-10	18.0	27.8	
11-15	15.3	28.0	
16-20	2.0	4.7	

Source: Author's Computation

This may imply that cooperatives serve as an alternative or substitute to insurance, providing a form of collective risk-sharing and financial support in times of shock (Salimonu & Falusi, 2009; Babalola et al., 2016). However, the overlap between cooperative participation and borrowing suggests that cooperatives also play a dual role as both informal insurance mechanisms and credit providers.

Table 2 further presents farmers' perceptions of production risks, their risk preferences, and their evaluation of crop insurance as a risk-mitigating strategy. Using an independent samples t-test, the analysis evaluated mean differences in reported risks between insured and uninsured farmers. The results show statistically significant differences in perceived risks related to drought, flooding, pest and disease incidence, lack of subsidies, input prices, weak extension services, and high production costs. These risks were considered more critical among farmers with insurance, possibly reflecting their heightened sensitivity to production shocks or their awareness of insurance as a formal risk buffer. These findings reflect the tension between formal and informal risk management strategies: while insurance is a formal safety net, farmers often rely on cooperatives, diversification, or accumulated experience as substitutes for formal insurance schemes (Adinolfi et al., 2012; Brånstrand & Fredrik, 2014).

Conversely, risks such as soil and sand drift, natural weather effects, reliance on traditional farming methods, high maintenance costs, poor productivity, and limited technical knowledge did not yield statistically significant differences between insured and uninsured farmers. This contrasts with earlier findings that identified these factors as major constraints in cocoa production (Babalola et al., 2016; Brånstrand & Fredrik, 2014). The divergence may be explained by contextual differences, suggesting that some risks are perceived as routine challenges by farmers, while others—such as climatic shocks and financial constraints—are recognized as more pressing and insurance-relevant.

Risk preferences, as presented in Table 2, were derived from farmers' responses to structured statements designed to capture their attitudes toward risk in cocoa production. The results indicate that cocoa farmers with crop insurance exhibited higher average scores across nearly all risk-preference statements compared to their uninsured counterparts. In practical terms, this suggests that insured farmers not only acknowledged the existence of risks but also demonstrated a greater willingness to engage with risk in their farming activities, possibly reflecting a more entrepreneurial orientation. Interestingly, insured cocoa farmers showed a stronger tendency to accept risk as an inherent aspect of farming and agreed with

risk-oriented statements to a significantly higher extent. This finding aligns with the expected utility theory, which suggests that risk-averse individuals adopt insurance as a means of reducing uncertainty, while those with higher risk tolerance may still insure to safeguard against catastrophic losses (Pindyck & Rubinfeld, 2005; Barry et al., 2004). The statistical analysis further revealed that the differences in mean responses between insured and uninsured farmers were statistically significant for most of the statements. However, two exceptions emerged: one, *"I like having my farm exposed to risk"*, and two, *"I strongly prefer to acquire sustainable gains rather than avoiding losses in my cocoa farm."* For these two items, no significant differences were observed, indicating that both insured and uninsured farmers shared similar attitudes.

This nuance suggests that while insurance adoption is linked to heightened risk awareness, there are certain intrinsic attitudes toward farming risks that remain consistent across groups. The analysis of insurance perceptions in Table 2 further underscores the importance of farmers' subjective evaluations of insurance products. Perceptions were shown to significantly influence the decision to adopt insurance, consistent with earlier studies that emphasize the role of trust, affordability, and product design in shaping adoption decisions (Smith & Baquet, 1996; Adinolfi et al., 2012; Yusuf et al., 2024). Significant differences were observed in most perception statements, indicating that insured farmers generally held more positive views about insurance as a viable risk-mitigation tool. However, one notable exception was the premium per hectare, which did not yield significant differences between the two groups. This suggests that while cost is an important factor, it may not be the sole determinant of insurance adoption. Other issues, such as accessibility, claim processes, and institutional credibility, appear to carry greater weight (Hamzat et al., 2006; Oladele & Obaniyi, 2023).

Taken together, the findings highlight that risk preferences and insurance perceptions are critical behavioral dimensions influencing cocoa farmers' decisions to insure. Farmers with crop insurance are generally more risk-tolerant and hold more positive views about insurance products, while uninsured farmers often substitute membership in cooperatives or informal arrangements for formal insurance. This reflects broader literature suggesting that perception gaps and institutional weaknesses, rather than cost alone, remain the major barriers to widespread adoption of agricultural insurance in developing countries (Giné & Yang, 2009; Smith & Glauber, 2012).

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Table 2. Risks, risk preferences and insurance perception in cocoa production in Ekiti State

Sources of Risks/Preference/Perception	Mean – Insurance	Mean – No Insurance	T-Test
Sources of Risk			
Drought	2.3	2.1	2.49**
Flood	1.1	1.3	2.22**
Soil and sand drift	1.2	1.3	1.35e
Pests and diseases	3.5	3.3	3.78***
Natural weather effects	3.3	3.1	1.43e
Lack of subsidies on agrochemicals	2.4	3.1	2.11**
Price of inputs	3.7	3.5	4.22***
Traditional methods of farming	2.5	2.2	1.12e
Weak research and extension linkages	3.5	2.8	2.31**
High maintenance of the farm	2.6	2.3	1.54e
High cost of production	3.2	3.5	245**
Poor productivity	2.5	2.7	1.14e
Technical Capacity/knowledge in the production process	2.5	2.5	1.32e
Risk Preferences			
I like having my farm exposed to risk	2.6	2.5	1.23e
I am willing to expose myself to greater risk in order to increase the yield of my crop	3.0	2.7	2.11**
I prefer to be safe than sorry in my business	3.3	3.1	2.43**
I strongly prefer to acquire sustainable gains than avoiding losses in my cocoa farm	2.6	2.5	1.25e
I am willing to take higher risks in order to achieve a higher payoff	3.1	3.0	4.52***
Insurance Perception			
Crop insurance is important because of debt and rent payment obligations	2.4	1.8	2.31**
I am well aware of the crop insurance Provisions	3.4	2.2	2.42**
Crop insurance is an important risk-management tool in my production	3.1	1.6	2.44**
Per-hectare premium costs are very important to my crop insurance decision	3.2	3.2	2.21**
Availability of high coverage levels is important to me	3.3	2.1	2.37**
The ability to insure different acreages separately is Important	3.4	3.0	2.29**
Crop insurance is not important for me because my yield per hectare is already low	1.8	3.8	2.18**
Crop insurance provides good protection to my yield	3.5	2.2	2.49**

P value < 0.05 and * < 0.01. e=not significant

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Logit regression results

Table 3 presents the results of the binary logit regression, which estimates the likelihood of cocoa farmers adopting crop insurance based on their socio-economic and farm-level characteristics. The coefficients reflect the direction and magnitude of influence of each explanatory variable on the probability of insurance uptake. The results reveal that Age, Gender, and Farm Size (hectares) did not significantly affect the decision to adopt crop insurance. This finding suggests that insurance adoption in the study area is not necessarily dependent on demographic characteristics such as age or gender, nor on the scale of landholding. This contrasts with some earlier studies that found larger farm sizes and younger farmers to be more inclined toward insurance (Barry et al., 2004; Adinolfi et al., 2012), but aligns with more recent evidence from Nigeria and other developing countries, which emphasizes institutional and economic barriers over demographic factors (Attipoe, 2023; Yusuf et al., 2024). Out of the ten independent variables included in the model, seven emerged as significant determinants of insurance uptake:

The results, presented in Table 3, show that while Education ($\beta = 0.59$), Household Size ($\beta = 0.0029$), and Debt Use ($\beta = 0.02$) were positively significant, four other variables—Membership of Cooperative ($\beta = -4.53$), Farming Experience ($\beta = -2.51$), Land Ownership ($\beta = -2.19$), and Non-Farm Income ($\beta = -0.65$) were negative and statistically significant. The interpretation of the signs and significance levels provides important insights into the determinants of cocoa farmers' insurance adoption in Ekiti State. A positive coefficient implies that higher values of the variable are associated with an increased probability of adopting crop insurance, while a negative coefficient implies the reverse. The positive and significant effect of Education suggests that as farmers attain higher levels of formal education, their likelihood of purchasing crop insurance increases. Education enhances farmers' ability to process information, evaluate risks, and understand the benefits of formal insurance schemes. This finding is consistent with Sahoo and Behera (2025), Barry et al. (2004), and Adinolfi et al. (2012), who observed that more educated farmers are more open to sophisticated risk management strategies, including insurance. Household size also positively influenced crop insurance adoption. Larger households may face greater consumption and livelihood pressures, which increase the incentive to safeguard against production risks that could jeopardize food security and household welfare. This finding aligns with studies such as Brånstrand and Fredrik (2014),

who noted that insurance serves as a buffer against shocks that could destabilize household well-being. The result highlights how the survival instinct of farmers with larger families motivates proactive risk management through insurance. The positive significance of Debt Use indicates that indebted farmers are more likely to adopt crop insurance. This outcome is consistent with Barry et al. (2004) and Giné & Yang (2009), who argued that farmers with higher debt ratios rely more on insurance to secure loan repayment capacity and protect themselves from financial distress. In this case, crop insurance provides a safeguard for both the farmer and the lender, particularly under schemes such as the Central Bank of Nigeria's Anchor Borrower Programme, where insurance is often encouraged as a condition for accessing credit.

Conversely, Membership of Cooperative Societies was negatively associated with insurance uptake. This suggests that cooperative membership reduces the likelihood of adopting crop insurance, as farmers may substitute formal insurance with the financial and social safety nets provided by cooperatives. Similar findings have been reported in Nigeria and elsewhere, where cooperatives play a critical role in mutual aid, credit provision, and collective risk-sharing (Babalola et al., 2016; Yusuf et al., 2024). Farming Experience also exhibited a negative and significant relationship with insurance uptake, indicating that more experienced farmers are less likely to insure. This finding deviates from Barry et al. (2004), who argued that experienced farmers tend to be more positive toward insurance. In the Nigerian context, however, long-term exposure to failed or inadequate insurance schemes, such as inefficiencies within the Nigerian Agricultural Insurance Corporation (NAIC), may have bred skepticism among older, more experienced farmers (Hamzat et al., 2006; Oladele & Obaniyi, 2023).

Thus, institutional weaknesses may override theoretical expectations. Similarly, Land Ownership negatively influenced the adoption of crop insurance. Farmers who own their land outright are generally more financially secure and less vulnerable to production shocks than tenants or renters. Consequently, they perceive less need for insurance (Barry et al., 2004; Smith & Baquet, 1996). In contrast, tenant farmers with insecure land tenure face higher risks and thus stand to benefit more from insurance. Finally, Non-Farm Income was also negatively significant. Farmers who earn income from off-farm activities are less likely to adopt crop insurance, as diversification through alternative income sources stabilizes household earnings and serves as a substitute for formal insurance. This observation corroborates findings from Salimonu and Falusi (2009) and Barry et

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al. (2003), who emphasized that non-farm income functions as an informal risk management strategy, reducing reliance on insurance products.

Table 3. Factors affecting cocoa farmers' uptake of crop insurance

Factors	Coefficient	P-Value
CONSTANT	-0.684**	0.010
Age	(0.266) 0.3456	0.507
Education	0.595** (0.274)	0.03
Household size	0.0029293*** (0.00285)	0.001
Non-Farm Income	-0.658** (0.360)	0.068
Gender	0.0763423 (0.00067)	1.19326
Membership Cooperative	-4.530*** (0.481)	0.000
Farming Experience	-2.51599***	0.0034
Owned Land	-2.19365*** (0.0012)	0.000
Debt Use	0.0206272** (0.0005)	0.048
Farm Hectare	-0.000401 (0.000002)	0.719
McFadden Pseudo- R2 = 0.0878.		

Notes: Standard errors shown in parentheses. Statistical significance levels: ***1%, **5% and *10%.

Taken together, the results suggest that financial exposure (through debt), household welfare needs, and human capital (education) drive insurance adoption, while traditional coping mechanisms (cooperatives), accumulated experience, and income diversification discourage it. These dynamics highlight the dual role of formal and informal institutions in shaping insurance adoption and underscore the need for targeted policies that integrate insurance with existing social structures, credit systems, and farmer education programs (Smith & Glauber, 2012; Attipoe, 2023).

CONCLUSION

The study revealed that cocoa farmers are exposed to multiple risks, including drought, floods, pests, diseases, and rising input costs, although some risks—such as soil erosion, sand drift, and limited technical capacity—were found not to be statistically significant in influencing production outcomes. Surprisingly, farmers' risk preferences did not differ significantly between insured and uninsured farmers. This contrasts with the expected utility theory, which suggests that risk-averse farmers should be more likely to purchase insurance to secure protection against uncertainty. However, perceptions of insurance products emerged as an important determinant of uptake. Premium affordability, in particular, was critical: risk-averse farmers expressed willingness to adopt

insurance if premiums were reasonably priced, consistent with findings in other developing economies.

The logit regression analysis identified seven critical variables influencing insurance adoption. Education, household size, and debt use had positive effects, indicating that better-educated farmers, those with larger households, and those relying on credit are more likely to adopt crop insurance. Conversely, membership in cooperatives, farming experience, land ownership, and non-farm income negatively influenced uptake.

POLICY RECOMMENDATIONS

To enhance uptake, Nigerian policymakers must adopt a holistic approach that integrates affordable insurance schemes with complementary interventions in farmer education, cooperative engagement, and institutional reform. Explicitly, the following policy recommendations are made.

1. Design of Affordable and Flexible Insurance Products,
2. Integration of Insurance with Credit Schemes,
3. Strengthening Farmer Education and Extension Services,
4. Enhancing Risk Management Beyond Insurance,
5. Leveraging Cooperatives as Insurance Gateways,
6. Promoting Cocoa as a Strategic Export Commodity:

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