

An Assessment of the Factors Influencing the Uptake of Agricultural Insurance among Farmers in Chipata District

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ABSTRACT

With the low demand for agricultural insurance in Zambia, particularly within the Chipata District farming community, where only 2.5 percent of farmers have insurance coverage. Given the vulnerability of farmers to financial losses due to unpredictable weather patterns and market volatilities, understanding the factors hindering widespread adoption is crucial. The research aimed to explore how demographic factors, pricing, and awareness of insurance concepts influence insurance uptake in agriculture. Using quantitative methods, the study employed binary logistic regression to analyse the relationship between various factors and the adoption of agricultural insurance. It considered demographic characteristics such as age, farm size, type of farming business, farm income, and education level. The research also examined the impact of pricing and awareness on insurance uptake within the farming community. The findings revealed several key insights. Farm income emerged as a significant predictor of insurance uptake, indicating a 138 percent increase for every one-unit increase in income. Education level also demonstrated a significant impact, with higher education correlating with increased insurance uptake. However, factors like farm size and age showed less significant associations with insurance adoption. Interestingly, pricing and affordability did not significantly influence insurance uptake, while awareness of insurance services exhibited a positive relationship with uptake. Moreover, the type of farming business had a significant negative impact on insurance uptake. Based on these findings, the study recommended a multifaceted approach to address the low demand for agricultural insurance. Suggestions included income-enhancement programs, tailored education initiatives for different farm sizes, inclusive promotion strategies across age groups, targeted awareness campaigns, continuous evaluation of pricing strategies, and interventions to correct misconceptions about insurance within various farming businesses. By addressing these dynamics, it was likely that the uptake of agricultural insurance could be improved, providing vital financial protection for farmers in Zambia.

Keywords: agricultural insurance, awareness, chipata district, insurance uptake

I. INTRODUCTION

Insurance is a contractual agreement between an insurer and an insured entity, it offers financial compensation against specific risks or contingencies in return for a premium (Kagan et al., 2023). In agriculture, where unpredictability is rife due to factors like weather and pests (Nyabochwa, 2015), insurance plays a critical role. Agriculture is not only economically vital but also pivotal for food security and rural livelihoods (United Nations, 1994). However, disruptions in this sector, such as natural calamities, can have far-reaching impacts (Food and Agriculture Organization, 2021).

Agricultural insurance aims to mitigate economic losses from crop or livestock damage due to natural events (Hatch, 2008). Yet, challenges like information asymmetry and adverse selection complicate its implementation (Baskaran, 2021). Smallholder farmers, particularly vulnerable, stand to benefit but often remain excluded (Ankrah et al., 2021). This exclusion perpetuates reliance on inadequate risk mitigation methods (Sina, 2012).

Index-based weather insurance (IBWI) has emerged as an alternative, addressing some drawbacks of traditional schemes (Njue et al., 2018). However, its uptake remains limited, especially among smallholders (Kerer, 2013). Agriculture is pivotal in Zambia, engaging two-thirds of the population and contributing significantly to the labour force and income (Mulenga et al., 2016; Lubinga et al., 2019). However, low uptake of insurance products, notably agricultural insurance, poses challenges, leaving farmers susceptible to weather and market uncertainties (Kaunda & Chowa, 2023; International Finance Corporation, 2018; Saluseki, 2022). Existing literature underscores the need to explore factors influencing insurance demand, including awareness and understanding, which have been overlooked (Nshakira-Rukundo et al., 2021; Nyabochwa, 2015; Carrer et al., 2020). Addressing this gap, this study in Chipata District aimed to analyse demographic factors, pricing, and

awareness's impact on insurance uptake. Understanding these dynamics is vital for sustaining agricultural growth, resilience, and economic stability, offering insights for tailored policies and products (Frascarelli et al., 2021; Nshakira-Rukundo et al., 2021; Kaunda & Chowa, 2023).

II. LITERATURE REVIEW

2.1 Insurance Uptake in Agriculture Sector

Agricultural insurance is crucial for mitigating risks in farming, especially in developing countries, yet its adoption faces challenges. Recent research emphasizes understanding farmers' specific challenges (Sandeepani & Silva, 2022). Factors influencing uptake, such as product design and awareness, have been studied extensively, revealing low adoption rates (Nshakira-Rukundo et al., 2021). Studies also highlight the complexity of decision-making for farmers and barriers faced by smallholders (Ankrah et al., 2021). Understanding demand and uptake aids in tailoring insurance products effectively (Ali et al., 2020).

Agricultural insurance not only mitigates financial losses but also contributes to poverty reduction by offering long-term stability (Nshakira-Rukundo et al., 2021). It enhances access to credit, enabling investment in modern farming technologies and sustainable practices, thereby boosting productivity (IFAD, 2021). Moreover, it stabilizes the agricultural sector by preventing systemic shocks and promoting food security (IFAD, 2021). With climate change increasing uncertainty, agricultural insurance becomes even more critical. Aligning insurance products with farmers' preferences enhances effectiveness and encourages broader adoption (King & Singh, 2020).

Therefore, agricultural insurance is pivotal for farmers' economic well-being, agricultural industry stability, and global food security. Through risk mitigation, poverty alleviation, and facilitating credit access, it serves as a linchpin for sustainable agricultural development in both developed and developing economies.

2.2 Insurance Uptake in the Agricultural Sector of Developed Economies

Insurance uptake in developed economies' agricultural sectors exhibits a nuanced landscape. Comprehensive coverage characterizes the sector, yet adoption levels vary among farmer types. Influential factors include climate change, natural risks, and market fluctuations, impacting production and income (Sandeepani & Silva, 2022). While coverage extends to various farming operations, smallholder farmer uptake remains low due to barriers such as awareness and knowledge gaps (Ankrah et al., 2021). Farmers' preferences also shape demand, with policy features often failing to align with their needs (Mensah et al., 2023).

Access discrepancies exist, favouring larger, commercially oriented farms with greater financial capacity and access to information. Conversely, smaller, family-owned farms encounter obstacles related to awareness and affordability (Ankrah et al., 2021). Addressing these gaps is vital for equitable risk protection distribution. Overall, enhancing agricultural insurance effectiveness in developed economies requires tackling access barriers, raising awareness, and tailoring products to diverse farming needs.

2.3 Insurance Uptake in the Agricultural Sector of Developing Economies

Insurance uptake in developing economies' agricultural sector is hindered by various factors, leading to disappointingly low adoption rates (Mensah et al., 2023). This scarcity in risk management strategies highlights vulnerabilities to climate change, natural risks, and market fluctuations. Coverage, particularly among smallholder farmers, remains limited, with only 14 percent having access and finding it acceptable (Ankrah et al., 2021). Larger farms generally have better access than smaller ones, exacerbating disparities.

Despite recognizing the value of insurance in safeguarding livelihoods, low awareness and understanding impede overall demand, necessitating targeted education campaigns (Ankrah et al., 2021). Access challenges, including awareness, information asymmetry, and affordability constraints, disproportionately affect smallholders, accentuating their risk exposure. Bridging this gap is vital for creating a more inclusive and effective landscape, ensuring equitable distribution of risk mitigation benefits across diverse farming operations in developing economies.

2.4 Insurance Uptake by Farmers in Zambia

The uptake of insurance within Zambia's agricultural sector is notably limited, with only 2.5 percent of total written premiums in the broader Zambian insurance sector attributed to agricultural insurance (Kaunda & Chowa, 2023). Despite efforts to enhance accessibility through collaborations like the government's partnership with Mayfair to provide weather-based index insurance, demand for agricultural insurance remains subdued (InsuResilience, 2023; International Finance Corporation, 2018). This deficiency leaves farmers vulnerable to financial losses from unpredictable weather patterns and market fluctuations (Saluseki, 2022).

Smallholder farmers face challenges in accessing and accepting agricultural insurance, with only 14 percent adoption rate, influenced by demographic variables and awareness levels (Ankrah et al., 2021; Kaunda & Chowa, 2023). The extent of coverage and demand in Zambia underscores the critical need for targeted education and awareness campaigns to bridge knowledge gaps (GIZ, 2005).

Access discrepancies persist, favouring larger farms over smaller ones due to financial capacity and resources, exacerbating adoption disparities (World Bank, 2019). Addressing these barriers is imperative for equitable distribution of risk protection benefits across Zambia's agricultural sector. In conclusion, Zambia's agricultural insurance sector faces challenges in uptake, emphasizing the necessity for tailored interventions to improve effectiveness and inclusivity.

2.5 Effect of Demographic Factors on Agricultural Insurance Uptake

Studies investigating the relationship between demographic characteristics and agricultural insurance uptake reveal multifaceted dynamics across different regions. In Kenya's Kiambu County, socioeconomic factors significantly influenced adoption decisions, with insurance costs, farming type, risks, and income pivotal (Nyabochwa, 2015). Similarly, in Zambia's Kasama District, age influenced Weather Index Insurance uptake among smallholder farmers, indicating younger individuals or those with diverse income streams might be less inclined to adopt insurance (Kaunda & Chowa, 2023).

Product quality, affordability, and information accessibility emerge as critical determinants globally. In Africa, low uptake is attributed to products misaligned with local practices and affordability concerns (Nshakira-Rukundo et al., 2021). Education positively influences adoption, while behavioural and cultural factors also play significant roles (Carrer et al., 2020; Ankrah et al., 2021). Gender disparities exist, with female farmers less likely to adopt due to socio-cultural barriers (Dercon & Christiaensen, 2011). Higher socioeconomic status increases adoption likelihood, while cultural and religious beliefs may hinder uptake (Clarke, 2016; Cole et al., 2013).

Marital and family status also influence adoption, with larger households showing higher propensities due to increased stakes (Alter et al., 2016). Policymakers and insurers must tailor approaches considering these demographic nuances to enhance adoption rates and ensure effective risk management in the agricultural sector globally.

2.6 Effect of Price on Agricultural Insurance Uptake

Price remains a central concern in agricultural insurance adoption, influencing stakeholders through factors like high premiums, policy acquisition delays, and compensation wait times (Nyabochwa, 2015). In Zambia's Kasama District, farmers perceive Weather Index Insurance pricing as a potential barrier, although not among the most significant factors (Kaunda & Chowa, 2023). Affordability and perceived fairness in pricing affect uptake, with smallholder farmers often finding premiums prohibitive (Nshakira-Rukundo et al., 2021; Ankrah et al., 2021).

The decision to invest in insurance competes with other financial priorities, especially for smallholders, impacting uptake even when perceived risk is high (Ankrah et al., 2021). Product design tailored to farmers' needs and perceived fairness in pricing are critical. Behavioural economics concepts like relative perception of benefits versus costs also influence adoption (Nshakira-Rukundo et al., 2021).

Government interventions and subsidies can mitigate pricing concerns, promoting higher adoption rates (Nshakira-Rukundo et al., 2021). Understanding the nuanced implications of pricing is crucial for insurance providers and policymakers aiming to enhance agricultural insurance adoption (Nyabochwa, 2015).

2.7 Effect of Awareness and Understanding on Agricultural Insurance Uptake

Awareness and understanding of insurance benefits significantly influence uptake in the agricultural sector, as highlighted in various studies. In Kiambu County, Kenya, farmers' lack of awareness led to low utilization, with only 10 percent having active agricultural insurance covers (Nyabochwa, 2015). Insufficient awareness campaigns exacerbate this challenge, indicating a need for comprehensive education efforts (Nyabochwa, 2015; Kaunda & Chowa, 2023).

The gap between availability and comprehension of insurance products persists globally. While farmers recognize the utility of agricultural insurance, acceptance remains low due to inadequate understanding of its nuances and benefits (Nshakira-Rukundo et al., 2021; Ankrah et al., 2021). Socio-cultural factors further complicate awareness efforts, necessitating tailored campaigns that contextualize insurance within local traditions and practices (Nshakira-Rukundo et al., 2021).

Understanding of insurance varies among farmers, influencing their perceptions of its benefits. Collaborations between governments, NGOs, and insurance companies are suggested strategies to bridge the awareness gap through educational campaigns and technological innovations (Nyabochwa, 2015). Ultimately, deeper understanding and trust are essential for increasing insurance adoption in the agricultural sector.

2.8 Lessons Learnt from Empirical Literature

Lessons from empirical studies highlight demographic characteristics, pricing, and awareness as key factors in agricultural insurance uptake. Socioeconomic factors significantly influence adoption, with age impacting risk aversion and resource utilization. Pricing's perception relative to benefits affects uptake, while awareness gaps hinder adoption, emphasizing the need for comprehensive education. Stakeholder collaboration is crucial for bridging knowledge gaps and fostering trust. Further research aims to explore awareness and comprehension's roles alongside traditional determinants in shaping insurance assimilation within agriculture (Kaunda & Chowa, 2023). Understanding these factors can inform tailored strategies for higher adoption rates and improved risk management.

III. RESEARCH METHODOLOGY

The study focused on farmers in Chipata district, Zambia, which was strategically chosen due to its significance in the agricultural sector and representative nature of broader agricultural trends in the region. With over 16,000 farmers in Chipata District under FISP (Breezefm, 2021), the study aimed to target approximately 16,000 farmers using the Yamane formula to determine a sample size of 155 farmers. The study employed random sampling to ensure unbiased selection.

The research aimed to understand the nuanced dynamics influencing insurance uptake among farmers in Chipata District, considering demographic factors, pricing considerations, and levels of awareness and understanding. Structured questionnaires were utilised to gathering quantitative data, which is particularly useful for gauging farmers' attitudes, perceptions, and behaviours towards agricultural insurance (Ponnusamy, 2007). Questionnaires were chosen for their scalability and effectiveness in gathering quantitative data, consistent with previous research in Zambia such as the study by Kaunda & Chowa (2023).

The model selection was guided by the binary nature of the dependent variable, reflecting the uptake of insurance in agriculture. Since the outcome involved two possibilities, the Logit model was chosen over the linear probability model to ensure outcomes between 0 and 1, aligning with the nature of the data. Hence, the postulated model for the study took the following form:

$$\text{Logit}(y_i) = y_0 + y_1x_1 + y_2x_2 + y_3x_3 + y_4x_4 + \dots \dots y_nx_n + \varepsilon_i \quad (1)$$

$$\text{Logit}(y_i) = y_0 + y_1\text{farm}_{\text{size}} + y_2\text{Age} + y_3\text{farm}_{\text{income}} + y_4\text{Educ} + y_5\text{price} + y_6\text{aware} + y_7\text{business}_{\text{type}} + \varepsilon_i \quad (2)$$

where y_i is the probability of a farmer taking up insurance in the agricultural sector; 0 or 1 is an indicator of whether the farmer has not taken up insurance or the farmer has taken up insurance in the agricultural sector respectively. Moreover, $\text{farm}_{\text{size}}$ is farm size, Age denotes the age of farmers, $\text{farm}_{\text{income}}$ is farm income, x_4 is education status of farmers, x_5 is the price of insurance, x_6 is the state of farmers being aware of benefits which can be derived from insurance and x_7 is the type of farming business the farmer runs.

IV. ETHICAL CONSIDERATION

The study on the effects of demographic factors, price, and awareness on insurance uptake in agriculture among farmers in the Chipata District farming community adhered to rigorous research ethics. Given the sensitive nature of data collection and analysis, the researchers prioritized ethical considerations throughout the study. In line with positivism, the research aimed for objectivity, employing structured questionnaires to gather data objectively. This approach ensured neutrality, minimizing biases in data collection and analysis. Additionally, the study's cross-sectional design allowed for a snapshot of variables without intervention, respecting participants' autonomy and minimizing harm.

Ethical principles guided the selection of the target population, ensuring relevance and representativeness. Farmers in Chipata District were chosen due to their centrality to the agricultural sector, respecting their expertise and experiences. Moreover, the study's sample size calculation ensured adequacy while minimizing participant burden and risks. Random sampling further promoted fairness and minimized selection bias, enhancing the study's credibility.

V. ANALYSIS OF THE RESULTS

5.1 Descriptive statistics

The results of the study, based on the response rate of 150 out of 155 distributed questionnaires, provide insights into the gender distribution of the respondents. The data shows that a total of 67 individuals identified as female, constituting 44.7 percent of the sample, while 83 individuals identified as male, representing 55.3 percent of the respondents. These figures indicate a relatively balanced gender representation in the study, with a slight majority of male participants. As such the response rate is approximately 97 percent ($150/155 \times 100$ percent).

Participants' perceptions of agricultural insurance premiums were assessed, with 24.0% strongly disagreeing and 28.0% disagreeing with their affordability. This suggests a significant portion holds negative views. Meanwhile, 8.7% remained neutral, and 39.3% agreed or strongly agreed, indicating a mix of opinions on pricing fairness (**Figure 1**).

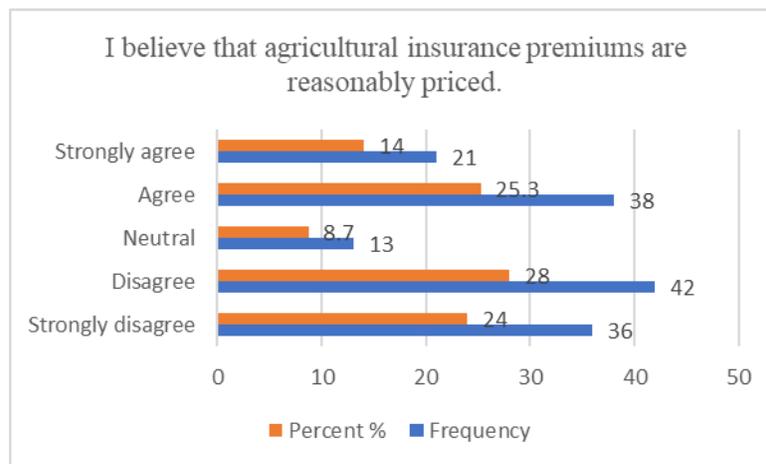


Figure 1: Perceptions on the price of insurance

The study's descriptive statistics highlight diverse opinions on various factors influencing the adoption of agricultural insurance. Regarding age, a significant portion of participants acknowledge its relevance in shaping attitudes towards insurance, suggesting the need for targeted communication strategies. Similarly, perceptions on farm size, farm income, and the type of farming business indicate significant recognition of their influence, emphasizing tailored outreach strategies. Education level also emerges as a crucial factor, with participants recognizing its role in shaping attitudes towards insurance. However, there's a notable knowledge gap regarding the benefits of agricultural insurance services, indicating the necessity for educational initiatives.

5.2 Correlations

In this study, correlations were examined among various demographic factors related to farmers and their engagement with agricultural insurance. The Pearson correlation coefficients were calculated to assess the strength and direction of relationships between different variables. Firstly, the correlation between the decision to take up insurance for farming businesses and the level of education was found to be significant ($r = 0.501, p < 0.01$). This suggests a moderate positive correlation, indicating that individuals with higher levels of education are more likely to have taken up insurance for their farming businesses (see **Table 1**).

Additionally, a strong positive correlation was observed between the estimated income generated by the farm and the decision to take up insurance ($r = 0.725, p < 0.01$). This implies that as the income generated by the farm increases, there is a higher likelihood of farmers opting for agricultural insurance. Furthermore, the size of the farm, as estimated by the respondents, also showed a positive correlation with the decision to take up insurance ($r = 0.414, p < 0.01$). This suggests that farmers with larger-sized farms are more inclined to engage in agricultural insurance. The length of time a farmer has been working in the field exhibited a positive correlation with the decision to take up insurance ($r = 0.531, p < 0.01$). This indicates that more experienced farmers are more likely to opt for agricultural insurance. In terms of gender, there was a weak but statistically significant correlation with the length of time a farmer has been working ($r = 0.170, p < 0.05$). This suggests a slight association between gender and the duration of farming experience. However, other correlations, such as those between age and the decision to take up insurance, gender and age, and age and the size of the farm, were not found to be statistically significant (see **Table 1**).

Table 1: Pearson correlation test

Correlations								
		Have you taken up any insurance for your farming business?	What is your gender?	How old are you?	What is your level of education?	Indicate an estimated range of how much income your farm helps you generate on average every month.	Estimate the size of the farm based on the following categories	How long have you been working as a farmer?
Have you taken up any insurance for your farming business?	Pearson Correlation	1	.016	.053	.501**	.725**	.414**	.531**
	Sig. (2-tailed)		.843	.517	.000	.000	.000	.000
	N	150	150	150	150	150	150	150
What is your gender?	Pearson Correlation	.016	1	-.005	-.024	-.054	-.007	.170*
	Sig. (2-tailed)	.843		.948	.768	.511	.934	.038
	N	150	150	150	150	150	150	150
How old are you?	Pearson Correlation	.053	-.005	1	-.102	.058	.095	.141
	Sig. (2-tailed)	.517	.948		.214	.479	.245	.086
	N	150	150	150	150	150	150	150
What is your level of education?	Pearson Correlation	.501**	-.024	-.102	1	.671**	.310**	.395**
	Sig. (2-tailed)	.000	.768	.214		.000	.000	.000
	N	150	150	150	150	150	150	150
Indicate an estimated range of how much income your farm helps you generate on average every month.	Pearson Correlation	.725**	-.054	.058	.671**	1	.419**	.601**
	Sig. (2-tailed)	.000	.511	.479	.000		.000	.000
	N	150	150	150	150	150	150	150
Estimate the size of your farm based on the following categories	Pearson Correlation	.414**	-.007	.095	.310**	.419**	1	.318**
	Sig. (2-tailed)	.000	.934	.245	.000	.000		.000
	N	150	150	150	150	150	150	150
How long have you been working as a farmer?	Pearson Correlation	.531**	.170*	.141	.395**	.601**	.318**	1
	Sig. (2-tailed)	.000	.038	.086	.000	.000	.000	
	N	150	150	150	150	150	150	150
** . Correlation is significant at the 0.01 level (2-tailed).								
* . Correlation is significant at the 0.05 level (2-tailed).								

Therefore, the results obtained in this study reveal meaningful correlations between various factors and farmers' decisions to engage with agricultural insurance. The findings highlight the importance of education, farm income, farm size, and years of farming experience in influencing farmers' choices regarding insurance. These insights can inform targeted interventions and policy measures aimed at promoting agricultural insurance adoption among farmers. Understanding the

nuanced relationships among these variables is essential for developing tailored strategies that address the specific needs and considerations of different segments within the farming community.

5.3 Logistic Regression

This study aimed at investigating factors affecting the uptake of agricultural insurance, logistic regression analysis was employed to identify significant predictors influencing the decision to take up insurance for farming businesses. The case processing summary indicates that all 150 cases were included in the analysis, with no missing cases, ensuring a complete dataset for examination (see **Table 2**). The classification table, representing the model's predictive performance, shows that the overall percentage of correct predictions is 51.3 percent. However, upon closer inspection of the model's effectiveness, it becomes evident that the predictive accuracy for those who have not taken up insurance (No) is 100 percent, while for those who have taken up insurance (Yes), the accuracy is 0 percent (see **Table 2**).

Table 2: Logistic regression

Dependent Variable Encoding	
Original Value	Internal Value
No	0
Yes	1

Variables in the Equation							
		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1 ^a	Indicate an estimated range of how much income your farm helps you generate on average every month.	.869	.334	6.784	1	.009	2.384
	Estimate the size the of your farm based on the following categories	.647	.387	2.792	1	.095	1.911
	How old are you?	-.052	.305	.029	1	.866	.950
	What is your level of education?	.662	.344	3.689	1	.055	1.938
	"I would purchase agricultural insurance if it were more affordable."	.020	.220	.008	1	.928	1.020
	"I am aware of the various agricultural insurance services available to farmers like me."	.749	.333	5.055	1	.025	2.115
	Share your opinion on: "The type of farming business I engage in (e.g., crop farming, livestock, mixed farming) significantly influences my interest in agricultural insurance."	-.828	.333	6.206	1	.013	.437
	Constant	-5.105	1.588	10.332	1	.001	.006

a. Variable(s) entered on step 1: Indicate an estimated range of how much income your farm helps you generate on average every month., Estimate the size the of your farm based on the following categories, How old are you?, What is your level of education?, "I would purchase agricultural insurance if it were more affordable.", "I am aware of the various agricultural insurance services available to farmers like me.", Share your opinion on: "The type of farming business I engage in (e.g., crop farming, livestock, mixed farming) significantly influences my interest in agricultural insurance."

The omnibus tests of model coefficients reveal that the model, collectively, is statistically significant ($\chi^2 = 111.315$, $df = 7$, $p < 0.001$), suggesting that the included variables collectively contribute to explaining the variation in the dependent variable, i.e., the decision to take up agricultural insurance. The model summary provides insights into the goodness-of-fit statistics. The -2-log likelihood is 96.522, and the Nagelkerke R Square, a measure of the model's explanatory power, is 0.699.

These values suggest a reasonably good fit of the model to the data. Moving to the classification table in Step 1, the overall percentage of correct predictions improves to 88.0 percent. Notably, the accuracy for predicting those who have not taken up insurance (No) is 93.5 percent, while for those who have taken up insurance (Yes), the accuracy is 82.2 percent. This represents a significant improvement from the initial classification table. Examining the variables in the equation, several predictors emerge as statistically significant contributors to the likelihood of taking up agricultural insurance. Notably, the estimated range of monthly farm income ($p = 0.009$), awareness of available insurance services ($p = 0.025$), and the perceived influence of farming business type on insurance interest ($p = 0.013$) are significant predictors. These variables demonstrate the importance of economic factors, awareness, and individual perceptions in influencing the decision to adopt agricultural insurance (see **Table 2**).

The coefficient (B) for Farm income range is 0.869, with a standard error (S.E.) of 0.334. The Wald statistic is 6.784 with 1 degree of freedom, and the p-value is 0.009, which is less than the chosen significance level of 10 percent. Therefore, Farm income range is considered a significant predictor. The odds ratio ($\text{Exp}(B)$) is 2.384, indicating that for a one-unit increase in the Farm income range, the odds of taking up agricultural insurance increase by approximately 138 percent. In this regard, given that a farmer makes a higher income from his or her farming business per month, he or she is more likely to take up insurance in the agricultural sector, *Ceteris Paribus* (see **Table 2**).

For farm size, the coefficient is 0.647 with a standard error of 0.387. The Wald statistic is 2.792 with 1 degree of freedom, and the p-value is 0.095, slightly close to the 10 percent significance level. Thus, farm size has a low statistically significant impact on uptake of agricultural insurance at the 10 percent level. The odds ratio is 1.911, suggesting that a one-unit increase in farm size category corresponds to a 91.1 percent increase in the odds of taking up agricultural insurance (Table 18).

The coefficient for age is -0.052, with a standard error of 0.305. The Wald statistic is 0.029 with 1 degree of freedom, and the p-value is 0.866, well above the 10 percent significance level. Age does not reach statistical significance, indicating that it has no significant impact on the odds of taking up agricultural insurance (see **Table 2**).

The coefficient for education level is 0.662, with a standard error of 0.344. The Wald statistic is 3.689 with 1 degree of freedom, and the p-value is 0.055, slightly below the 10 percent significance level. As such, education level has a statistically significant impact on uptake of agricultural insurance at the 10 percent level. The odds ratio is 1.938, suggesting that a one-unit increase in education level increases the odds of taking up agricultural insurance by approximately 93.8 percent. This implies that a farmer with a higher level of education is more likely to take up agricultural insurance, assuming that other factors remained constant (see **Table 2**).

The coefficient for the affordability statement is 0.020, with a standard error of 0.220. The Wald statistic is 0.008 with 1 degree of freedom, and the p-value is 0.928, far above the 10 percent significance level. Affordability or price does not reach statistical significance, indicating that it does not significantly influence the odds of taking up agricultural insurance (see **Table 5**). The awareness variable has a coefficient of 0.749, a standard error of 0.333, and a Wald statistic of 5.055 with 1 degree of freedom. The p-value is 0.025, meeting the significance criterion. The odds ratio is 2.115, suggesting that being aware of available insurance services increases the odds of taking up agricultural insurance by approximately 111.5 percent. This implies that if a farmer is more aware about agricultural insurances services available for his or her type of farming business, he or she is more likely to take up insurance in the agricultural sector, *Ceteris Paribus* (see **Table 2**).

The coefficient for the opinion about farming business type is -0.828, with a standard error of 0.333. The Wald statistic is 6.206 with 1 degree of freedom, and the p-value is 0.013, meeting the significance criterion. The odds ratio is 0.437, indicating that those who believe farming business type significantly influences their interest in agricultural insurance have lower odds of uptake by approximately 56.3 percent (see **Table 2**).

VI. DISCUSSION OF RESULTS

The study's findings on the factors affecting agricultural insurance uptake contribute to the existing empirical literature. Regarding farm size's relationship with insurance uptake, results show low statistical significance at the 10 percent level, consistent with previous studies in Kiambu County, Kenya (Nyabochwa, 2015), and Kasama District in Zambia (Kaunda & Chowa, 2023), emphasizing socio-economic influences on adoption. The odds ratio of 1.911 implies a 91.1 percent increase in insurance uptake odds with larger farm sizes, though not statistically significant.

Conversely, belief in farming business type significantly affects insurance uptake, with a coefficient of -0.828 and a p-value of 0.013, indicating approximately 56.3 percent lower odds of uptake for farmers perceiving farming business type's significance (Nshakira-Rukundo et al., 2021). Education level emerges as a significant predictor (Hill et al., 2013), with a coefficient of 0.662 and a p-value of 0.055, suggesting a 93.8 percent increase in uptake odds with higher education levels.

Age does not significantly influence insurance uptake, contrary to findings in Zambia (Kaunda & Chowa, 2023), highlighting the complexity of age's role. Farm income range significantly predicts uptake (Nshakira-Rukundo et al., 2021), with a coefficient of 0.869 and a p-value of 0.009, indicating a 138 percent increase in odds with higher income.

Awareness of insurance benefits significantly influences uptake (Nyabochwa, 2015), emphasizing the importance of educational initiatives (Nshakira-Rukundo et al., 2021). Although affordability's statistical significance is lacking, its complex interplay with other factors is evident (Nyabochwa, 2015; Kaunda & Chowa, 2023).

Demographic factors, including age, social economic status, gender, and education, shape insurance decisions (Azevedo, 2015; Dercon & Christiaensen, 2011), suggesting tailored strategies for different groups. The non-significance of affordability underscores the multifaceted nature of insurance decision-making (Nyabochwa, 2015; Kaunda & Chowa, 2023), aligning with the literature's emphasis on various influences beyond direct financial considerations.

VII. CONCLUSION AND RECOMMENDATIONS

7.1 Influence of Demographic Factors on Insurance Uptake

The first objective of this study was aimed at examining the influence of demographic factors, including age, farm size, type of farming business, farm income, and education, on the uptake of insurance in agriculture within the Chipata District farming community. The study examined demographic factors' influence on agricultural insurance uptake in Chipata District. Significant positive relationships were found between insurance uptake and farm income and education level. Farm size also influenced uptake positively, but age did not. Negative perceptions of farming business type hindered uptake.

7.2 Effect of Price on Insurance Uptake

The second objective of this study was aimed at investigating the effect of price on the uptake of insurance in the agricultural sector. However, the study did not find statistical significance in this regard. Price did not significantly influence the odds of taking up agricultural insurance, as indicated by a coefficient for the affordability statement of 0.020 and a p-value of 0.928.

7.3 Impact of Awareness and Understanding on Insurance Uptake

The third objective of this study was aimed at assessing the extent to which awareness and understanding of insurance concepts affect the likelihood of insurance uptake among farmers in the Chipata District farming community. The study revealed a positive relationship between awareness and insurance uptake. Farmers with higher awareness of available insurance services were more likely to adopt agricultural insurance, as indicated by a significant coefficient of 0.749 and an odds ratio of 2.115.

7.4 Theoretical and Practical Contributions

The theoretical foundation of the Health Belief Model (HBM) was employed to explore the psychological factors influencing farmers' decisions to adopt agricultural insurance. The study incorporated elements of perceived susceptibility, severity, benefits, and barriers from HBM to provide a nuanced understanding of how individual perceptions shape the uptake of insurance in the agricultural sector. Meanwhile, the Social Cognitive Theory (SCT) was instrumental in examining the role of social influences and observational learning in the context of agricultural insurance adoption. The study explored how farmers' behaviours were influenced by social factors, emphasizing the importance of social networks, community norms, and role models in shaping perceptions and decisions related to insurance uptake. Finally, the Transtheoretical Model (TTM) and its stages of change concept provided a framework for understanding the readiness of farmers to adopt agricultural insurance. The study considered different stages of behaviour change, acknowledging that farmers might be at various levels of readiness, and tailored interventions and strategies accordingly.

The empirical findings contribute to the identification of key determinants influencing the uptake of agricultural insurance. Specifically, farm income, farm size, education level, awareness of insurance services, and perceptions about the type of farming business were identified as significant factors. This practical insight is valuable for policymakers, insurers, and stakeholders in designing targeted interventions to address specific barriers and enhance adoption. Additionally, the lack of significance regarding the impact of price or affordability on insurance uptake suggests that pricing may not be a major barrier. However, it highlights the need for continuous monitoring and periodic reassessment of pricing strategies to ensure ongoing affordability. Insurers can use this information to develop sustainable pricing models that align with the financial capacities of the farming community. Furthermore, the positive relationship between awareness and insurance uptake emphasizes the practical importance of targeted awareness campaigns.

7.5 Recommendations

Based on the results obtained from the study investigating factors affecting the uptake of insurance in the agricultural sector, several recommendations can be derived:

- I. **Farm Income:** The significant impact of farm income on the uptake of agricultural insurance suggests that policies and interventions aimed at increasing farmers' income can potentially boost insurance adoption. Implementing income-enhancement programs or facilitating access to financial resources may contribute to a broader acceptance of agricultural insurance.
- II. **Farm Size:** Although farm size had a low statistically significant impact, the positive coefficient and odds ratio indicate a potential relationship between larger farm sizes and insurance uptake. Tailored educational programs or awareness campaigns targeting farmers with larger operations could be beneficial, emphasizing the advantages of insurance in mitigating risks associated with larger-scale farming.
- III. **Age:** The non-significant impact of age implies that efforts to promote agricultural insurance should be inclusive across different age groups. However, considering that younger farmers may have different preferences or face unique challenges, targeted communication strategies may be developed to address the specific concerns of this demographic.
- IV. **Education Level:** The statistically significant impact of education level on insurance uptake suggests that enhancing farmers' education can be an effective strategy. This could involve workshops, training sessions, or information campaigns designed to improve financial literacy and understanding of insurance benefits, especially targeting farmers with lower education levels.
- V. **Price or Affordability:** The lack of statistical significance related to price or affordability indicates that the cost of insurance may not be a major barrier. However, continuous monitoring and periodic reassessment of pricing strategies should be conducted to ensure affordability remains within the means of the farming community.
- VI. **Awareness of Insurance Services:** The positive relationship between awareness and insurance uptake emphasizes the importance of targeted awareness campaigns. Efforts should focus on providing clear and accessible information about available insurance services, emphasizing their relevance and benefits. Collaborations with agricultural extension services and local communities could enhance the dissemination of this information.
- VII. **Type of Farming Business:** The negative impact of the opinion about farming business type suggests that perceptions play a crucial role. Interventions should aim to correct misconceptions and highlight the applicability of insurance across various farming activities. Tailored communication strategies addressing specific concerns related to different types of farming businesses may help change perceptions and increase adoption.

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