

Beyond economic factors: A mixed-methods theory of planned behaviour explanation of livestock farmers' willingness to pay for insurance in Tanzania

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ABSTRACT

Livestock insurance can strengthen rural resilience, yet willingness to pay for insurance is shaped by more than financial capacity alone. This study examined livestock farmers' willingness to pay (WTP) for livestock insurance in Tanzania using a mixed-methods behavioural interpretation anchored in the Theory of Planned Behaviour (TPB). Guided by pragmatism, the study employed a cross-sectional explanatory design in Korogwe, Muheza, Pangani and Mkinga districts of Tanga Region. Quantitative data were collected from 380 cattle farmers using structured questionnaires, while qualitative data were collected through semi-structured key-informant interviews with 10 National Insurance Corporation staff and five livestock cooperative leaders. Quantitative data were analysed using descriptive statistics and a probit model, while qualitative interviews were analysed using reflexive thematic analysis with NVivo. Overall, 72.1% of respondents expressed willingness to pay for livestock insurance. The results showed positive and statistically significant associations for monthly income ($\beta = 0.00142$, $p < 0.001$), education ($\beta = 0.324$, $p < 0.001$), insurance availability ($\beta = 0.542$, $p < 0.001$), insurance quality ($\beta = 0.361$, $p = 0.001$), farm size ($\beta = 0.072$, $p = 0.004$), livestock breed diversity ($\beta = 0.194$, $p = 0.029$) and farm income ($\beta = 0.00091$, $p = 0.001$), while occupation was negatively associated with WTP ($\beta = -0.285$, $p = 0.012$). Qualitative findings strengthened the TPB interpretation by showing that trust, transparency and expected benefits shape attitudes; cooperative leaders, livestock officers, community leaders and peers shape subjective norms; and affordability, literacy, accessibility and transaction costs shape perceived behavioural control. The findings indicate that stated WTP reflects the interaction of economic capacity, institutional conditions, social influence and perceived ability to act. Policy should therefore combine affordable and flexible premiums with trusted local delivery, accessible claims processes, insurance literacy and stronger links to cooperatives and livestock extension services.

Keywords: Livestock Insurance; Theory of Planned Behaviour; Probit Model; Smallholder Farmers; Tanzania, Willingness to Pay

I. INTRODUCTION

Livestock production is central to rural livelihoods in Tanzania, but livestock keepers face recurrent production and livelihood risks arising from drought, floods, pests, disease, theft, feed shortages and water scarcity. These shocks can generate substantial household losses, particularly where livelihoods depend heavily on livestock (Food and Agriculture Organization of the United Nations [FAO], 2009; Mude et al., 2020). Formal livestock insurance offers a mechanism for transferring part of these risks to insurers and can reduce the financial consequences of adverse events. Nevertheless, livestock-insurance adoption remains constrained by high costs, limited awareness and trust-related barriers (Ghimire et al., 2021; Amare & Simane, 2023).

Studies explain agricultural insurance demand through observable socioeconomic and farm characteristics, including income, education, household circumstances, farm size, herd composition and risk exposure (Kavishe et al., 2019; Baker et al., 2019; Tiwari et al., 2019). Institutional experiences such as product availability, service quality, trust, accessibility and claims procedures also shape whether farmers regard insurance as useful and feasible (Munyanyi & Zindiye, 2019; Hassan & Alhassan, 2018; Nguyen et al., 2020). However, these streams of evidence are often examined separately, leaving limited understanding of how socioeconomic, institutional and farm-level conditions jointly influence willingness to pay through behavioural and social mechanisms.

The Theory of Planned Behaviour (TPB) provides a useful lens for this problem. TPB proposes that behavioural intention is influenced by attitudes toward the behaviour, subjective norms and perceived behavioural control (Ajzen, 1985; Ajzen, 1991). In an insurance setting, attitudes can reflect whether farmers believe insurance is useful, fair and trustworthy; subjective norms can arise from cooperatives, extension officers, peers and community leaders; and perceived behavioural control can reflect whether farmers believe they can afford, access, understand and successfully use the insurance product. Various insurance studies demonstrate that attitudes, social influence and perceived

behavioural capacity operate alongside socioeconomic, institutional and risk-related factors (Mathithibane & Chummun, 2022; Cabeza-Ramírez et al., 2024; Chen et al., 2025; Lefutso et al., 2026; Mafirakurewa et al., 2026).

Different insurance studies increasingly use behavioural frameworks. Mathithibane and Chummun (2022) combined behavioural constructs with socioeconomic determinants in analysing willingness to pay for weather-index insurance among South African smallholder maize farmers. Cabeza-Ramírez et al. (2024) integrated an extended TPB with Behavioural Reasoning Theory to analyse drought-insurance adoption intentions among farmers in southern Spain. Chen et al. (2025) combined TPB and Protection Motivation Theory in agricultural insurance research in Jiangsu, China, while Lefutso et al. (2026) applied TPB directly to willingness to pay for flood-risk insurance among low-income South African households. Mafirakurewa et al. (2026) further showed, through a structured review, that attitudes, social influence, affordability, literacy, accessibility and institutional support interact in agricultural insurance decisions.

Despite these developments, empirical application of behavioural theory specifically to livestock farmers' willingness to pay remains limited in Tanzania. Few studies have examined agricultural-insurance attitudes or the economic benefits of livestock insurance without directly explaining the determinants of livestock keepers' WTP (Niringiye, 2019; Mwakatumbula, 2020). More broadly, many WTP studies in Tanzania and East Africa have focused on other insurance sectors, leaving a livestock-specific empirical gap (Hussein, 2021; Shee, Azzarri, & Haile, 2020). A further methodological gap is that econometric analyses often identify statistically significant determinants without explaining the behavioural mechanisms through which those determinants matter. This study addresses this gap by integrating quantitative probit evidence with qualitative interview evidence and interpreting the combined findings through TPB.

1.1 Research Objective

- i. To analyse the influence of socio-economic factors on willingness to pay for livestock insurance;
- ii. To determine the effect of institutional characteristics on willingness to pay for livestock insurance; and
- iii. To determine the effect of farm characteristics on willingness to pay for livestock insurance.

II. LITERATURE REVIEW

2.1 Theoretical Review

2.1.1 Theory of Planned Behaviour

This study employed the Theory of Planned Behaviour (TPB) as an organising and interpretive framework for explaining livestock farmers' willingness to pay (WTP) for livestock insurance. TPB proposes that behavioural intention is shaped by attitude, subjective norms and perceived behavioural control (Ajzen, 1985; Ajzen, 1991). In this study, the TPB constructs were not entered as directly estimated latent variables in the probit model. Instead, socioeconomic, institutional and farm characteristics were treated as contextual antecedents, while qualitative evidence was used to explain behavioural mechanisms consistent with TPB. Attitudes reflected farmers' evaluations of insurance usefulness, trustworthiness, transparency, expected compensation and service quality; subjective norms reflected influence from cooperatives, livestock extension officers, community leaders and fellow farmers; and perceived behavioural control reflected affordability, literacy, accessibility, transaction costs and the practical ability to purchase and use insurance.

2.2 Empirical Review

2.2.1 Influence of Socioeconomic Characteristics on Willingness to Pay

Empirical studies suggest that socioeconomic characteristics influence willingness to pay (WTP) for agricultural insurance. In a review of African studies, Nshakira-Rukundo et al. (2021) identified affordability, information and education as recurring influences on insurance uptake. Their review indicates that the ability to pay a premium and the ability to understand an insurance product are related but distinct considerations. In Malawi, Maganga et al. (2021) examined WTP for weather-index insurance and found that socioeconomic resources and access to remittances were relevant to farmers' insurance decisions. Together, these studies provide a basis for examining monthly income as a potential influence on premium affordability.

Also, Melketo et al. (2025), studying cattle farmers in Ethiopia, found that education, credit access, training, livestock and land assets, and insurance awareness positively influenced WTP, while perceived premium unaffordability reduced demand. Their findings suggest that financial capacity may operate alongside knowledge of insurance and the value of assets at risk. Among South African smallholder farmers, Mathithibane and Chummun (2022) found that socioeconomic characteristics, including education, contributed to WTP intentions for weather-index insurance alongside behavioural factors. These findings support examining education, while recognising that formal schooling alone may not ensure an understanding of policy conditions or claims procedures.

The relationship between occupation and insurance demand may be less direct. Knapp et al. (2021), studying Swiss fruit growers, found that on-farm and off-farm diversification had differing relationships with insurance use. Off-farm diversification was generally associated with lower insurance demand, whereas some on-farm strategies

complemented insurance. Although the setting and insured risks differ from those of Tanzanian cattle farmers, the study shows why another source of livelihood could either improve a household's capacity to pay or reduce its dependence on insured farming activities.

Most of the reviewed evidence comes from outside Tanzania, where livelihoods and insurance markets may differ. This study addresses that gap by examining the associations of monthly income, education and occupation with willingness to pay among cattle farmers in Tanga Region. Qualitative evidence helps interpret how affordability, insurance understanding and dependence on livestock income may shape those associations.

2.2.2 Effect of Institutional Characteristics on Willingness to Pay

Institutional studies consistently identify product access, information, trust and service delivery as important conditions for agricultural-insurance uptake. Nshakira-Rukundo et al. (2021), through a review of African agricultural-insurance evidence, grouped the main constraints around product design and quality, affordability, information and education, behavioural and sociocultural factors, and government support. Hassan and Alhassan (2018) and Munyanyi and Zindiye (2019) similarly associated institutional credibility and service delivery with insurance demand. More recent behavioural studies show that trust, communication and administrative accessibility affect attitudes and perceived behavioural control, thereby influencing whether favourable intentions can be translated into participation (Cabeza-Ramírez et al., 2024; Lefutso et al., 2026).

These studies provide the basis for examining insurance availability and quality in the present study. Availability captures whether cattle farmers in Tanga Region can obtain information and access insurance services, while quality captures whether those services are clear, reliable and responsive. Previous studies highlight the importance of access, trust and service delivery, but provide limited evidence on how insurance availability and perceived service quality jointly relate to cattle farmers' willingness to pay in Tanga Region. This study examines both conditions and uses qualitative evidence to explore how access barriers and service experiences help explain the observed associations.

2.2.3 Effect of Farm Characteristics on Willingness to Pay

Empirical studies link livestock-insurance decisions to farm assets, production conditions and exposure to loss. Dong et al. (2020), studying grassland farms in Inner Mongolia, found that characteristics of livestock production were relevant to willingness to pay (WTP) for livestock husbandry insurance. In South Africa, Oduniyi et al. (2020) highlighted the role of climate-related risks and farm conditions in farmers' WTP for index-based livestock insurance. These findings suggest that farmers assess insurance in relation to the risks and economic conditions of their production enterprises.

Devkota et al. (2021) found that livestock and household characteristics contributed to livestock-insurance adoption in Nepal. Also in Nepal, Acharya et al. (2024) reported that the number of cattle, insurance awareness and previous livestock losses were relevant to dairy farmers' WTP. Although adoption and stated WTP are different outcomes, both studies show the importance of examining livestock ownership and farm-level circumstances.

Evidence closer to the study area reinforces this focus. John (2023) reported positive associations between WTP and land size, livestock ownership and household income among dairy farmers in Tanzania's Mara Region. Rahman et al. (2023) associated structural characteristics of farms with livestock-insurance adoption while Melketo et al. (2025) found that land and livestock assets and previous livestock-loss experience were relevant to WTP for index-based livestock insurance in Ethiopia.

Together, these studies support examining farm size, livestock breed diversity and farm income among cattle farmers in Tanga Region. Previous studies commonly examine herd size, landholding or loss experience, while evidence on the combined roles of farm size, livestock-breed diversity and farm income among Tanzanian cattle farmers remains limited. This study examines these characteristics together and uses qualitative evidence to interpret how farm assets, production risks and cash flow relate to willingness to pay.

2.2.4 Willingness to pay for livestock insurance

Willingness to pay represents the amount or commitment an individual is prepared to make for a product or service and reflects both perceived value and financial capacity. In livestock insurance, WTP is influenced by expected benefits from risk transfer, ability to finance premiums, confidence in the insurer and the probability and consequences of livestock loss. Previous studies reviewed in the thesis associate livestock-insurance demand with income, education, risk exposure, awareness, trust and farm characteristics (Davis et al., 2010; Akter, 2018; Wambugu et al., 2020; Kavishe et al., 2019).

Evidence from developing-country settings shows that livestock and agricultural insurance demand is multidimensional. Socioeconomic resources influence affordability and information processing; institutional arrangements influence access, transaction costs and confidence; and farm characteristics influence the value of assets exposed to loss (Munyanyi & Zindiye, 2019; Hassan & Alhassan, 2018; Baker et al., 2019; Tiwari et al., 2019; Rahman et al., 2023). Nshakira-Rukundo et al. (2021), in an integrative review of agricultural insurance uptake in Africa, grouped

the major constraints around product quality and design, affordability, information and education, behavioural and sociocultural factors, and the role of government.

III. METHODOLOGY

3.1 Research philosophy and design

The study was guided by the pragmatist research philosophy, which emphasizes the practical usefulness of knowledge and permits researchers to draw on different methodological perspectives where these are appropriate for answering the research problem. Pragmatism supports the use of multiple methods and forms of evidence to obtain a more comprehensive understanding of a phenomenon (Saunders et al., 2019). This philosophical stance was deemed appropriate because the study sought both to quantify the determinants of livestock farmers' willingness to pay and to understand the contextual and behavioural explanations underlying those relationships. Consistent with the pragmatist tradition, quantitative evidence was used as the dominant strand to identify patterns and statistically significant determinants of WTP, while qualitative interviews complemented the statistical findings by providing deeper explanations of institutional experiences, perceptions and behavioural mechanisms. The integration of quantitative and qualitative evidence also facilitated triangulation, whereby findings from one strand could confirm, enrich or clarify findings from the other, thereby strengthening the depth and validity of the study (Creswell & Creswell, 2018).

The study employed a cross-sectional explanatory research design because data were collected from the study population at a single point in time and the analysis sought to explain relationships between socio-economic, institutional and farm characteristics and willingness to pay for livestock insurance (Saunders et al., 2019). An explanatory design was appropriate since the researcher aimed to test hypothesized relationships among variables and explain the nature and direction of those relationships through statistical analysis (Saunders et al., 2019). In this study, the design enabled the three hypotheses corresponding to the socio-economic, institutional and farm-level objectives to be tested using the probit model, while the qualitative strand provided contextual interpretation without manipulating the study variables.

3.2 Study area

This study was conducted in Korogwe, Muheza, Pangani and Mkinga districts of Tanga Region, Tanzania. Tanga was selected because of its substantial cattle-farming activity and exposure to livestock-related initiatives, including NIC livestock insurance and the Kopa Ng'ombe Lipa Ng'ombe programme. The region had 378,338 cattle, representing 2.2% of the cattle population in Tanzania Mainland, of which 92.6% were indigenous cattle, 7.0% dairy breeds and 0.07% exotic breeds (National Bureau of Statistics, 2020).

3.3 Target Population

The target population comprised 5,016 cattle-farming households and programme beneficiaries associated with NIC livestock-insurance initiatives and the Kopa Ng'ombe Lipa Ng'ombe programme in the four selected districts. The district population frame consisted of Korogwe (1,320), Muheza (1,250), Pangani (1,100) and Mkinga (1,346) cattle-farming households or beneficiaries. The unit of analysis for the quantitative component was the cattle-farming household, while the qualitative component drew on knowledgeable institutional informants.

3.4 Sampling and Sample Size

The quantitative population was stratified geographically by district. As per Cochran (1977), a sample of 385 cattle farmers was determined and allocated proportionately across the four district strata, after which simple random sampling was used to select respondents. A total of 380 usable questionnaires were returned and analysed, representing a response rate of 98.7%. For the qualitative component, purposive sampling was used to select 15 key informants comprising 10 NIC staff and five livestock cooperative leaders. The quantitative and qualitative components involved separate respondent groups.

Table 1*Distribution of Quantitative Respondents*

District	Programme exposure	Estimated population	Sample	Respondents	Response rate
Korogwe	NIC only	1,320	102	101	99.0%
Muheza	Kopa Ng'ombe only	1,250	96	95	99.0%
Pangani	NIC only	1,100	84	82	97.9%
Mkinga	Both programmes	1,346	103	102	98.9%
Total		5,016	385	380	98.7%

3.5 Data Collection Methods, Validity and Reliability

Quantitative data were collected first from sampled cattle farmers using structured questionnaires covering socioeconomic characteristics, institutional conditions, farm characteristics, livestock risks and willingness to pay for livestock insurance. The quantitative data were coded and analysed using descriptive statistics and probit regression to identify factors significantly associated with WTP. Qualitative data were subsequently collected through semi-structured interviews with 15 key informants. The qualitative data provided deeper institutional and contextual explanations concerning affordability, awareness, trust, accessibility, service quality, perceived benefits and farmers' experiences. The two strands were integrated during interpretation: quantitative results established which observed factors were associated with WTP, while qualitative evidence helped explain why and how those relationships operated.

Data validity and reliability were addressed through pretesting, structured and logically sequenced questions, cross-checking of related responses, representative sampling and mixed-method triangulation. Internal validity was supported by clear question formulation and hypothesis testing, while external validity was strengthened through representative sampling procedures (Campbell & Stanley, 1963; Creswell, 2014; Yin, 2018; Bryman, 2016). The combination of quantitative and qualitative evidence also enhanced the depth and credibility of interpretation through triangulation (Creswell & Creswell, 2018).

Cronbach's alpha is commonly used to assess the internal consistency of multi-item scales, with a coefficient of approximately 0.70 or above generally considered acceptable in applied social-science research, subject to the number and characteristics of the items (Tavakol & Dennick, 2011). The study reported alpha coefficients of 0.814 for monthly income, 0.786 for education, 0.771 for occupation, 0.842 for insurance availability, 0.858 for insurance quality, 0.803 for farm size, and 0.795 for livestock breed diversity and 0.821 for farm income. All reported coefficients exceeded the 0.70 benchmark adopted by the study, indicating acceptable internal consistency. Validity was supported through questionnaire pre-testing, structured and logically sequenced questions, cross-checking of related responses, representative sampling and mixed-method triangulation.

3.6 Quantitative Data Analysis Plan

Descriptive statistics were reported using frequencies, percentages, means and standard deviations. The binary dependent variable was coded 1 when the respondent was willing to pay for livestock insurance and 0 otherwise. A Probit model was estimated in Stata 13 because the outcome was binary.

The model was represented as: $P(WTP_i = 1 | X_i) = \Phi(\beta_0 + \beta_1 MI_i + \beta_2 EDU_i + \beta_3 OCC_i + \beta_4 IA_i + \beta_5 IQ_i + \beta_6 FS_i + \beta_7 LBD_i + \beta_8 FI_i)$, where $P(WTP_i = 1 | X_i)$ is the probability that cattle farmer is willing to pay for livestock insurance; Φ is the standard normal cumulative distribution function; β_0 is the constant or intercept; β_1 to β_8 are the parameters estimated for the explanatory variables; MI is the monthly income; EDU is the education level; OCC is the occupation; IA is the insurance availability; IQ is insurance quality; FS is the farm size; LBD is the livestock-breed diversity and FI is the farm income.

The analytical procedures were aligned with the research objectives. The variables were estimated jointly using probit regression because willingness to pay was measured as a binary outcome. Descriptive statistics summarised respondent characteristics and response patterns, while qualitative thematic analysis provided contextual explanations of the quantitative relationships. Integration of the two forms of evidence occurred during interpretation.

3.7 Model Diagnostics

The study assessed multicollinearity using variance inflation factors (VIF) and tolerance values; model specification was assessed using the link test; overall model significance was assessed using the likelihood-ratio (LR) chi-square test; and model fit was summarized using McFadden's pseudo- R^2 and the log likelihood. Marginal effects were also reported because probit coefficients indicate direction on the latent index rather than direct probability changes.

3.8 Qualitative Analysis and Mixed Methods Integration

The qualitative component consisted of 15 interviews with five livestock cooperative leaders and 10 National Insurance Corporation (NIC) staff. The interviews were analysed using the six-phase reflective thematic analysis, following the approach of Braun and Clarke (2021) with NVivo 14 used to organize and manage the data. The phases includes familiarisation, initial coding, theme development, theme review, naming/definition and reporting. Fifteen transcripts generated 152 initial inductive codes that were consolidated into eight higher-order themes. Integration occurred during interpretation: quantitative findings established the observed socioeconomic, institutional and farm factors associated with WTP, while qualitative themes explained behavioural mechanisms consistent with attitudes, subjective norms and perceived behavioural control.

3.9 Ethical Considerations

Research permission was obtained from The Open University of Tanzania before data collection, followed by administrative authorisation from the relevant local government authorities in Tanga Region. Before participation, respondents were informed about the purpose and objectives of the study and how the information collected would be used. Participation was voluntary, and respondents were informed of their freedom to participate or decline. To protect confidentiality and anonymity, respondents' names and other identifying information were excluded from the questionnaires and research reporting.

IV. FINDINGS & DISCUSSION

4.1 Sample Characteristics

The sample was predominantly male (67%), while 33% were female. Most respondents were married (86%). Farming experience was substantial: 38.9% had 11–20 years of experience and 25.0% had more than 20 years. Access to institutional support was reported by 65.0% of respondents.

Table 2

Characteristics of Respondents (n = 380)

Characteristic	Category	n	%
Monthly income	< TZS 100,000	54	14.2
	TZS 100,000–300,000	132	34.7
	TZS 300,001–500,000	108	28.4
	> TZS 500,000	86	22.6
Education	No formal education	47	12.4
	Primary	178	46.8
	Secondary	102	26.8
	Higher education	53	13.9
Other income source	Yes	209	55.0
	No	171	45.0
Household size	1–2	21	5.5
	3–4	89	23.4
	5–6	143	37.6
	> 6	127	33.4

The sample was concentrated in the middle-income categories, with 34.7% earning TZS 100,000–300,000 and 28.4% earning TZS 300,001–500,000 per month. Primary education was the most common level (46.8%), while 55.0% had another source of income. These characteristics are relevant because income determines premium affordability and education can improve understanding of insurance products. The probit results later confirm the importance of these socioeconomic conditions. The positive income effect is related to Mude et al. (2020) and Melketo et al. (2025), while education is discussed as being most effective when reinforced by practical insurance literacy.

Table 3*Farming Experience and Institutional Support*

Measure	Category	n	%
Farming experience	< 5 years	41	10.8
	5–10 years	96	25.3
	11–20 years	148	38.9
	> 20 years	95	25.0
Institutional support	Yes	247	65.0
	No	133	35.0

The analysis indicates an experienced farming population, with 63.9% having more than 10 years of farming experience. In addition, 65.0% reported access to institutional support. This suggests that many respondents had exposure to extension, veterinary, cooperative or financial-service networks that can facilitate information and risk-management decisions. Institutional support is important for awareness and access, consistent with Acharya et al. (2024) and Nshakira-Rukundo et al. (2021), who emphasise local institutions, information channels and delivery arrangements in insurance uptake.

4.2 Willingness to Pay for Livestock Insurance

Willingness to pay for livestock insurance was the dependent variable and was measured as a binary outcome. Of the 380 cattle farmers surveyed, 274 respondents (72.1%) indicated that they were willing to pay for livestock insurance, while 106 respondents (27.9%) were not willing to pay. In addition, 247 respondents (65.0%) reported that they were either likely or very likely to purchase livestock insurance if it became available. These findings indicate substantial potential demand for livestock insurance among cattle farmers in Tanga Region. However, willingness to pay represents stated intention and should not be interpreted as actual purchase or enrolment.

Table 4*Willingness to Pay and Reported Influences (n = 380)*

Measure	Response	n	%
Willing to pay	Yes	274	72.1
	No	106	27.9
Likelihood of purchase	Very unlikely	34	8.9
	Unlikely	46	12.1
	Neutral	53	13.9
	Likely	114	30.0
	Very likely	133	35.0
Top influences	Financial capability	243	32.0
	Perceived risk	198	26.0
	Trust in provider	144	19.0
	Accessibility	100	13.0
	Quality of services	75	10.0

The core outcome shows that 72.1% of respondents were willing to pay for livestock insurance and 65.0% were likely or very likely to purchase it if it were available. Financial capability was the most frequently selected influence (32%), followed by perceived risk (26%), trust (19%), accessibility (13%) and service quality (10%). This indicates that stated demand is substantial but conditional on affordability, risk salience and confidence in service delivery. This pattern is consistent with Mujwahuzi et al. (2023) and FAO (2009), which associate willingness to pay with tangible risk exposure, trust and accessibility. Comparable African evidence also shows that price, education, awareness and risk perception materially influence insurance demand.

4.3 Probit Regression Results

The Probit model examined the relationships between willingness to pay and the variables corresponding to the study's three objectives. The model identified eight statistically significant explanatory variables. Monthly income, education, insurance availability, insurance quality, farm size, livestock-breed diversity and farm income were positively associated with willingness to pay, while occupation was negatively associated with willingness to pay.

Table 5*Probit Regression of Willingness to Pay for Livestock Insurance (n = 380)*

Variable	β	Marginal effects	SE	z	p	Sig.
Constant	-1.874	—	0.608	-3.08	0.002	**
Monthly income (MI)	0.00142	0.00057	0.00038	3.74	<0.001	***
Education level (E)	0.324	0.1293	0.092	3.52	<0.001	***
Occupation (O)	-0.285	-0.1137	0.114	-2.50	0.012	**
Insurance availability (IA)	0.542	0.2162	0.128	4.23	<0.001	***
Insurance quality (IQ)	0.361	0.1440	0.111	3.25	0.001	***
Farm size (FS)	0.072	0.0287	0.025	2.88	0.004	***
Livestock-breed diversity (LBD)	0.194	0.0774	0.089	2.18	0.029	**
Farm income (FI)	0.00091	0.00036	0.00027	3.37	0.001	***

4.3.1 Influence of Socioeconomic Characteristics on Willingness to Pay

As presented in Table 7, monthly income had a positive and statistically significant relationship with willingness to pay ($\beta = 0.00142$, $p < 0.001$). This indicates that farmers with higher monthly income had a greater propensity to pay for livestock insurance. Greater income improves farmers' ability to meet insurance premiums after addressing household and farm-related financial obligations. The finding is consistent with Mude et al. (2020) and Melketo et al. (2025), who associate greater economic resources with a stronger capacity to pay. Education also had a positive and statistically significant relationship with willingness to pay ($\beta = 0.324$, $p < 0.001$). Farmers with higher educational attainment were more likely to understand insurance benefits, policy conditions and claims procedures. This relationship complements the descriptive results, which show differences in respondents' educational attainment. It is also consistent with Melketo et al. (2025), who found that education and insurance awareness strengthen farmers' comprehension of insurance and willingness to pay. Nevertheless, formal education is likely to be most effective when reinforced by practical insurance literacy.

Occupation had a negative and statistically significant relationship with willingness to pay ($\beta = -0.285$, $p = 0.012$). This suggests that farmers with alternative occupations may depend less on livestock income and consequently perceive less need for livestock insurance. Although diversified income may improve premium affordability, it can also reduce demand for livestock-specific protection. This interpretation is consistent with Knapp et al. (2021), who found that off-farm diversification was generally negatively associated with insurance demand. These results demonstrate that monthly income, education and occupation significantly influenced willingness to pay and therefore support the hypothesis that socioeconomic characteristics significantly influence cattle farmers' willingness to pay for livestock insurance.

4.3.2 Effect of Institutional Characteristics on Willingness to Pay

Respondents generally expressed positive perceptions of insurers, although accessibility was comparatively weaker. Seventy percent agreed or strongly agreed that they trusted insurance providers; 68% perceived providers to have a good reputation; 65% rated service quality positively; and 62% agreed that services were accessible in their localities.

Table 6*Institutional Characteristics Affecting Willingness to Pay (n = 380)*

Statement	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	Mean	SD
Trust insurance providers	40%	30%	10%	12%	8%	3.94	1.23
High service quality	35%	30%	15%	12%	8%	3.80	1.22
Services easily accessible	33%	29%	15%	13%	10%	3.70	1.28
Good provider reputation	38%	30%	12%	12%	8%	3.87	1.22

The descriptive results show generally favourable institutional perceptions. Trust recorded the highest mean (3.94), followed by provider reputation (3.87), service quality (3.80) and accessibility (3.70). Accessibility therefore remained the comparatively weakest institutional dimension. These findings align with Munyanyi and Zindiye (2019) and Hassan and Alhassan (2018), who emphasise institutional trust and service quality in rural insurance adoption. As shown in Table 7, insurance availability had a positive and statistically significant relationship with willingness to pay ($\beta = 0.542$, $p < 0.001$). It recorded the largest positive coefficient among the explanatory variables, indicating that farmers were more likely to pay when livestock-insurance services were readily accessible.

Insurance quality also had a positive and statistically significant relationship with willingness to pay ($\beta = 0.361$, $p = 0.001$). Farmers were more willing to pay when they perceived providers as reliable, trustworthy and capable of offering efficient services. The institutional findings are consistent with Munyanyi and Zindiye (2019), Mburu et al. (2022) and Hassan and Alhassan (2018), who emphasise access, service quality, trust and efficient claims processes. These findings demonstrate that insurance accessibility and service quality significantly increased willingness to pay and therefore support the hypothesis that institutional characteristics significantly influence cattle farmers' willingness to pay for livestock insurance.

4.3.3 Effect of Farm Characteristics on Willingness to Pay

The principal variables investigated were farm size, livestock-breed diversity and farm income. Descriptive information on farm management and disease or hazard risk provides additional context for understanding farmers' insurance decisions.

Table 7

Selected Farm Characteristics (n = 380)

Variable	Category	n	%	Mean	SD
Farm size	1–10 acres	160	42.1	2.00	1.04
	11–20 acres	106	27.9		
	21–30 acres	68	17.9		
	> 30 acres	46	12.1		
Breed diversity	Low	130	34.2	1.92	0.77
	Medium	152	40.0		
	High	98	25.8		
Management	Traditional	144	37.9	1.89	0.80
	Modern	133	35.0		
	Mixed	103	27.1		
Disease/hazard risk	Very low	38	10.0	3.35	1.26
	Low	57	15.0		
	Moderate	95	25.0		
	High	114	30.0		
	Very high	76	20.0		

The descriptive analysis demonstrates substantial heterogeneity in farm structure and risk. Most farmers operated 1–20 acres, breed diversity was predominantly low to medium, and traditional or mixed management practices were common. Perceived disease or hazard risk was the strongest descriptive measure (mean = 3.35, SD = 1.26), with 75% rating risk from moderate to very high. These patterns support the argument that asset exposure and perceived production risk shape insurance demand. As shown in Table 7, The Probit results show that farm size, livestock breed diversity, and farm income were all positively and statistically significantly associated with farmers' willingness to participate in livestock insurance. Farm size had a positive coefficient ($\beta = 0.072$, $p = 0.004$), indicating a positive association between farm size and the probability of insurance participation. Livestock breed diversity was also positively associated with participation ($\beta = 0.194$, $p = 0.029$), while farm income showed a positive and statistically significant association ($\beta = 0.00091$, $p = 0.001$). The coefficients are not directly comparable in magnitude because the explanatory variables have different measurement scales and coding ranges.

These findings align with earlier evidence that farmers' demand for livestock insurance increases with the scale, value and characteristics of their livestock investments. Rahman et al. (2023) demonstrated that livestock investment and farm-management conditions influence the perceived need for protection, while Hassan and Alhassan (2018) emphasized the stronger economic justification for insuring larger or higher-value livestock assets. Similar relationships between farm assets, livestock characteristics, household economic conditions and livestock-insurance decisions have been reported by Devkota et al. (2021), Acharya et al. (2024) and Melketo et al. (2025). The results demonstrate that farm size, livestock-breed diversity and farm income significantly increased willingness to pay and therefore support the hypothesis that farm characteristics significantly influence cattle farmers' willingness to pay for livestock insurance.

4.4 Regression Assumptions

Before conducting the regression analysis, multicollinearity among the independent variables was assessed using Variance Inflation Factor (VIF) and Tolerance statistics. The results are presented in Table 8.

Table 8
Collinearity Statistics

Variable	VIF	Tolerance (1/VIF)
Monthly income	3.12	0.3205
Education level	2.98	0.3356
Occupation	2.65	0.3774
Insurance availability	2.45	0.4082
Insurance quality	2.33	0.4292
Farm size	2.22	0.4505
Livestock breed diversity	2.15	0.4651
Farm income	2.19	0.4566
Mean VIF	2.51	—

The values of the VIFs were between 2.15 and 3.12 while those of tolerance were between 0.3205 and 0.4651 indicating that multicollinearity was not a serious concern. The mean VIF was 2.51 and all individual VIF values were well below conventional thresholds, while tolerance values exceeded 0.10. This supports the inclusion of the explanatory variables in the same model because they provide sufficiently distinct information for coefficient estimation.

Table 9
Reported Model Diagnostics and Fit Measures

Diagnostic	Statistic	p / value
LR Chi-square (df = 8)	78.44	$p < 0.001$
McFadden Pseudo R^2	0.4689	—
McFadden pseudo- R^2		-
Log likelihood	-128.75	-
Prediction success rate	86.05%	-
Link test	_hatsq) $p = 0.428 > 0.05$	$p > 0.05$

The results indicate that the model was jointly significant and had strong predictive performance. The likelihood-ratio test rejects the intercept-only model, while the reported pseudo- R^2 and 86.05% prediction success rate indicate substantial explanatory and classification performance. The link test did not indicate model misspecification. The LR test, pseudo- R^2 , specification test, classification performance and marginal effects are treated as the principal probit diagnostics (Greene, 2018; Long & Freese, 2014; Wooldridge, 2020).

4.5 Qualitative themes

Reflexive thematic analysis of the 15 key-informant interviews produced eight themes. Together, they show that willingness to pay is dynamic: it depends on exposure to risk, the limits of existing coping strategies, product design, information and awareness, social demonstration, insurer operations, perceived livelihood value, trust and affordability.

Table 10
Qualitative Themes and Behavioural Interpretation

Theme	Core qualitative finding	TPB linkage
1. Risk exposure and vulnerability	Disease, drought, theft, infrastructure and financial vulnerability heighten the perceived need for protection.	Attitude / risk valuation
2. Existing risk mitigation and limitations	Vaccination, feed storage, herd reduction and informal coping are useful but incomplete.	Attitude; perceived need
3. Insurance product design preferences	Affordable premiums, instalments, simple claims, locally relevant coverage and veterinary links were preferred.	Attitude + perceived behavioural control
4. Awareness	Education, outreach and practical explanation reduce suspicion and misunderstanding.	Attitude + perceived behavioural control
5. Drivers of acceptance and enrolment	Previous loss, observed compensation, cooperative influence and younger farmers' openness encouraged enrolment.	Subjective norms + attitude
6. Operational challenges and mitigation	Remoteness, delayed reporting, record keeping and transaction costs make insurance difficult to use.	Perceived behavioural control
7. Insurance value proposition	Insurance is valued as livelihood protection and a way to avoid starting again after severe loss.	Attitude

8. Trust and adoption barriers	Fear of being cheated, low literacy, affordability and unclear coverage reduce confidence and participation.	Attitude + perceived behavioural control
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Themes are drawn from the NVivo/reflexive thematic analysis of 10 NIC staff and five cooperative leaders.

The thematic results shows that the qualitative evidence extends the regression results beyond observable characteristics. Risk exposure and insurance value shape favourable attitudes; cooperative and peer demonstration contributes to subjective norms; and affordability, literacy, remoteness, transaction costs and claims complexity constrain perceived behavioural control. Trust cuts across these mechanisms because positive attitudes can deteriorate when farmers doubt claims settlement or do not understand policy conditions. This interpretation is consistent with recent TPB oriented insurance studies, including Mathithibane and Chummun (2022), Cabeza-Ramírez et al. (2024), Chen et al. (2025), Lefutso et al. (2026) and Mafirakurewa et al. (2026).

4.6 Mixed-methods integration through TPB

The behavioural contribution emerges most clearly when the probit results and qualitative findings are interpreted jointly. The Probit model identifies significant associations between the eight observed explanatory variables and WTP, while the interviews provide evidence on the behavioural mechanisms through which these contextual factors may matter. The TPB constructs are therefore used interpretively rather than treated as directly estimated probit variables.

Table 11

Joint display: Quantitative findings, Qualitative mechanisms and TPB interpretation

Quantitative/contextual factor	Qualitative explanatory mechanism	Behavioural interpretation
Monthly income (+)	Affordability, unstable cash flow and competing household needs determine whether premiums can actually be paid.	Perceived behavioural control
Education (+)	Ability to understand policy language, records and claims conditions affects confidence in using insurance.	Perceived behavioural control; attitude
Occupation (–)	Diversified livelihoods may reduce dependence on livestock and reduce perceived need for livestock-specific protection.	Attitude / perceived value
Insurance availability (+)	Distance, access to local agents and transaction costs affect practical ability to enrol and claim.	Perceived behavioural control
Insurance quality (+)	Transparent procedures, reliable service and timely claims build confidence and favourable evaluation.	Attitude
Farm size (+)	Larger investments increase the perceived value of protecting exposed assets.	Attitude / perceived benefit
Breed diversity (+)	Different breeds and higher-value animals increase perceived exposure and protection needs.	Attitude / risk perception
Farm income (+)	Greater cash-generating capacity increases ability to commit resources to premiums.	Perceived behavioural control
Cooperatives / officers / peers	Endorsement and observed compensation make insurance socially credible and normalise participation.	Subjective norms

A plus/minus sign reflects the direction reported in the principal probit specification. TPB linkages are interpretive and are not direct estimates.

The integrated findings show that socioeconomic, institutional and farm characteristics operate as contextual antecedents of behavioural mechanisms. Income, education and farm income affect farmers' perceived capacity to commit resources and understand insurance; availability and transaction costs affect practical control over enrolment; service quality, transparency and expected compensation shape attitudes; and endorsement by cooperatives, livestock officers, community leaders and peers contributes to subjective norms. The qualitative findings therefore strengthen, rather than replace, the statistical relationships identified in the probit model.

4.7 Discussion

4.7.1 Socioeconomic Characteristics and Perceived Behavioural Control

The positive association between monthly income and WTP confirms that financial capacity remains a central condition for insurance demand. This finding is consistent with Mude et al. (2020) and Melketo et al. (2025), who similarly associate greater economic resources with stronger capacity to participate in livestock insurance. However, the interviews show that this relationship is behaviourally richer than a simple income effect. Farmers with unstable cash flows may value insurance but remain unable to finance a single annual premium after meeting competing

household needs. In TPB terms, income and premium flexibility affect perceived behavioural control—the farmer’s sense that purchasing insurance is practically possible (Ajzen, 1991).

The positive effect of education is also consistent with Melketo et al. (2025), who found that education and awareness can strengthen farmers’ understanding of livestock insurance and their willingness to participate. Formal education may improve understanding, but the qualitative findings indicate that insurance-specific literacy, record keeping and comprehension of policy conditions matter directly. A farmer may hold a favourable attitude toward insurance while lacking confidence in the claims process. This supports the TPB proposition that perceived behavioural control reflects not only financial resources but also the knowledge and capability required to perform the behaviour (Ajzen, 1991).

4.7.2 Institutional Access, Service Quality and Attitudes

Insurance availability had the largest positive coefficient in the principal probit specification. This finding is consistent with Nshakira-Rukundo et al. (2021), who identify delivery mechanisms, information and transaction-related constraints as important determinants of agricultural-insurance uptake, and with Acharya et al. (2024), who demonstrate the importance of access-related conditions in livestock-insurance willingness to pay. The qualitative findings explain why: access is not merely the physical presence of a product. It includes proximity to agents, availability of information, ease of enrolment, reporting requirements and the costs of travelling or communicating with insurers. These conditions influence perceived behavioural control by determining whether farmers regard insurance participation as practically achievable (Ajzen, 1991).

Perceived service quality also had a positive association with WTP, supporting earlier evidence that institutional quality, credibility and service delivery influence insurance demand (Hassan & Alhassan, 2018; Munyanyi & Zindiye, 2019). Interviews repeatedly linked quality to transparency, claims settlement, communication and trust. This suggests an attitudinal pathway: reliable and transparent service strengthens the belief that insurance is beneficial and fair, whereas delays, unclear exclusions and failed expectations can rapidly turn positive intention into distrust. This interpretation is consistent with TPB, in which favourable beliefs about the expected consequences of a behaviour contribute to positive attitudes toward performing it (Ajzen, 1991).

4.7.3 Social Influence and Subjective Norms

The qualitative findings reveal a mechanism that is not captured directly by the probit variables: farmers use trusted social actors to evaluate unfamiliar financial products. Cooperatives, livestock officers, community leaders and fellow farmers can validate the legitimacy of insurance. This is consistent with Nshakira-Rukundo et al. (2021) and Acharya et al. (2024), who highlight the importance of information channels, local institutions and social networks in agricultural and livestock-insurance participation. Observing a neighbour receive compensation can therefore provide a demonstration effect that is more persuasive than formal marketing. This finding aligns with TPB’s subjective-norm component, whereby behavioural intention is influenced by perceived expectations and approval from important reference groups (Ajzen, 1985; Ajzen, 1991). Similar behavioural effects have been reported in insurance research, where social influence and subjective norms contribute to insurance intentions and adoption decisions (Cabeza-Ramírez et al., 2024; Chen et al., 2025; Lefutso et al., 2026). Insurance decisions are therefore partly social because farmers assess whether trusted people believe the product is appropriate and whether participation is becoming normal within their reference group. This also explains why community-based delivery channels may be especially effective for livestock insurance.

4.7.4 Farm Characteristics Risk Perception and Perceived Value

Farm size, breed diversity and farm income were positively associated with WTP in the principal regression. These results are consistent with Rahman et al. (2023), who associate farm structural characteristics with insurance adoption, and with Melketo et al. (2025), who show that livestock-related economic and production characteristics influence willingness to pay for index-based livestock insurance. The relationships suggest that the economic value and structure of the livestock enterprise affect the perceived benefit of insurance. Larger or more commercially significant investments make the consequences of loss more salient and can strengthen a favourable attitude toward risk transfer.

The qualitative themes reinforce this interpretation. Farmers facing drought, disease, theft or recent losses were described as more receptive to insurance, particularly when existing mitigation measures were insufficient. This accords with evidence that perceived agricultural and livestock risk increases the perceived value of formal risk-transfer mechanisms (Melketo et al., 2025; Nshakira-Rukundo et al., 2021). Insurance was valued less as a profit-making investment than as a livelihood-protection mechanism that prevents households from having to start again after catastrophic loss.

4.7.5 The Intention Action Gap

A central behavioural insight is that willingness to pay should not be equated with actual uptake. The survey records 72.1% stated WTP, yet qualitative evidence shows that affordability, mistrust, remoteness, administrative demands and delayed claims can prevent favourable intention from becoming behaviour. This is consistent with the intention–behaviour gap reported by Lefutso et al. (2026), where affordability, trust and administrative barriers constrained the translation of insurance intentions into behaviour. It also accords with broader behavioural-insurance evidence showing that attitudes and intentions operate alongside perceived behavioural control and practical constraints (Mathithibane & Chummun, 2022; Cabeza-Ramírez et al., 2024; Chen et al., 2025). For policy, therefore, increasing positive attitudes is insufficient if farmers lack practical control over payment and access.

V. CONCLUSION & RECOMMENDATIONS

5.1 Conclusion

The study concludes that cattle farmers' willingness to pay for livestock insurance in Tanga Region is shaped jointly by socioeconomic, institutional and farm characteristics. Monthly income, education, insurance availability, insurance quality, farm size, livestock breed diversity and farm income were positively associated with willingness to pay, while occupation was negatively associated. Qualitative findings further showed that trust, transparency and expected benefits shape attitudes; cooperatives, livestock extension officers, community leaders and peers shape subjective norms; and affordability, literacy, accessibility and transaction costs shape perceived behavioural control. The findings therefore support all three study hypotheses while showing that stated willingness represents potential demand rather than actual insurance purchase.

5.2 Recommendations

Insurance providers should develop accessible, farm-responsive products that recognise differences in farmers' income, occupation, education, farm size, livestock value, breed diversity and farm income. They should provide clear insurance information, expand local registration and claims services, improve service quality and communicate coverage and exclusions transparently. Affordable coverage and flexible payment arrangements may be explored as areas for further product development because the study did not directly assess premiums, price sensitivity or payment preferences.

Government livestock authorities, insurers, extension officers and cooperatives should integrate livestock insurance with insurance education, vaccination, veterinary care, livestock identification and record-keeping. These measures would improve farmers' understanding, risk assessment, livestock valuation and claims verification while supporting products that better reflect farmers' financial capacity, farm characteristics and exposure to livestock risks.

Declaration of Interest

The authors declare that they do not have any known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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REFERENCES

- Acharya, S., Tiwari, U., Kattel, R. R., & Dhakal, S. C. (2024). Willingness to pay for livestock insurance by dairy farmers in Kavrepalanchowk district, Nepal. *Cogent Food & Agriculture*, 10(1), 2298530. <https://doi.org/10.1080/23311932.2023.2298530>
- Ajzen, I. (1985). From intentions to actions: A theory of planned behavior. In J. Kuhl & J. Beckmann (Eds.), *Action control: From cognition to behavior* (pp. 11–39). Springer.
- Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, 50(2), 179–211. [https://doi.org/10.1016/0749-5978\(91\)90020-T](https://doi.org/10.1016/0749-5978(91)90020-T)
- Akter, S., Brouwer, R., Chowdhury, S., & Aziz, S. (2018). *Determinants of participation in a catastrophe insurance programme: Empirical evidence from a developing country*. Presented at the Australian Agricultural and Resource Economics Society, 52nd Annual Conference, February 5–8, Canberra, Australia.
- Amare, A., & Simane, B. (2023). Land use and land cover change and implication to watershed degradation by using GIS and remote sensing in the Koga watershed, North Western Ethiopia. *Discover Sustainability*, 4, 17.
- Baker, C., Minot, N., & Farah, A. (2019). Farm characteristics and livestock insurance adoption in East Africa. *Journal of Agricultural Economics*, 70(2), 296–311.

- Braun, V., & Clarke, V. (2022). *Thematic analysis: A practical guide*. SAGE.
- Bryman, A. (2016). *Social research methods*. Oxford University Press.
- Cabeza-Ramírez, L. J., Guerrero-Baena, M. D., Luque-Vílchez, M., & Sánchez-Cañizares, S. M. (2024). Assessing farmers' intention to adopt drought insurance: A combined perspective from the extended theory of planned behavior and behavioral reasoning theory. *International Journal of Disaster Risk Reduction*, 113, 104818. <https://doi.org/10.1016/j.ijdr.2024.104818>
- Campbell, D. T., & Stanley, J. C. (1963). *Experimental and quasi-experimental designs for research*. Houghton Mifflin.
- Chen, X., Jiang, Y., Wang, T., Zhou, K., Liu, J., Ben, H., & Wang, W. (2025). Enhancing farmer resilience through agricultural insurance: Evidence from Jiangsu, China. *Agriculture*, 15(14), 1473. <https://doi.org/10.3390/agriculture15141473>
- Cochran, W. G. (1977). *Sampling techniques* (3rd ed.). John Wiley & Sons.
- Creswell, J. W. (2014). *Research design: Qualitative, quantitative, and mixed methods approaches* (4th ed.). SAGE Publications.
- Creswell, J. W., & Creswell, J. D. (2018). *Research design: Qualitative, quantitative, and mixed methods approaches* (5th ed.). SAGE Publications.
- Davis, B., Winters, P., Carletto, G., Covarrubias, K., Quiñones, E. J., Zezza, A., Stamoulis, K., Azzarri, C., & DiGiuseppe, S. (2010). A cross-country comparison of rural income generating activities. *World Development*, 38(1), 48–63. <https://doi.org/10.1016/j.worlddev.2009.01.003>
- Devkota, D., Ghimire, Y. N., Timsina, K. P., Subedi, S., & Poudel, H. K. (2021). Determinants of livestock insurance adoption in Nepal. *Cogent Food & Agriculture*, 7(1), 1952012. <https://doi.org/10.1080/23311932.2021.1952012>
- Dong, H., Jimoh, S. O., Hou, Y., & Hou, X. (2020). Willingness to pay for livestock husbandry insurance: An empirical analysis of grassland farms in Inner Mongolia, China. *Sustainability*, 12(18), 7331. <https://doi.org/10.3390/su12187331>
- Food and Agriculture Organization of the United Nations. (2009). The state of food and agriculture 2009: Livestock in the balance. <https://www.fao.org/4/i0680e/i0680e00.htm>.
- Ghimire, R., Adhikari, S., & Devkota, N. (2021). Factors affecting the adoption of livestock insurance by smallholder farmers in Nepal. *Agricultural Finance Review*, 81(3), 354–369.
- Greene, W. H. (2018). *Econometric analysis* (8th ed.). Pearson.
- Hassan, A., & Alhassan, S. (2018). The influence of institutional factors on insurance demand: Evidence from developing countries. *African Journal of Insurance*, 12(1), 77–88.
- Hussein, M. (2021). Assessing willingness to pay for transport and health insurance in East Africa: A case study of urban areas in Tanzania and Kenya. *African Insurance Review*, 18(3), 45–63.
- John, I. (2023). *Valuing willingness to pay for improved dairy cattle farming through livestock insurance scheme: A case of Mara Region, Tanzania* [Master's thesis, The Open University of Tanzania]. Open University of Tanzania Institutional Repository.
- Kavishe, P., Nyange, D., & Kafuko, D. (2019). The impact of socio-economic factors on livestock insurance demand in Tanzania. *Journal of Development Economics*, 29(4), 580–592.
- Knapp, L., Wuepper, D., Dalhaus, T.P.F. and Finger, R. (2021) 'Revisiting the diversification and insurance relationship: Differences between on- and off-farm strategies', *Climate Risk Management*, 32, 100315. <https://doi.org/10.1016/j.crm.2021.100315>
- Lefutso, D., Ogundeji, A. A., Danso-Abbeam, G., & Nyam, Y. S. (2026). Effect of low-income households' intention factors on willingness to pay for flood risk insurance in South Africa. *Scientific African*, 31, e03114. <https://doi.org/10.1016/j.sciaf.2025.e03114>
- Long, J. S., & Freese, J. (2014). *Regression models for categorical dependent variables using Stata* (3rd ed.). Stata Press.
- Mafirakurewa, T., Bontsa, N. V., & Mushunje, A. (2026). Insurance–input bundles in smallholder agriculture: A comprehensive review of awareness, adoption drivers, satisfaction, and productivity outcomes. *Agriculture*, 16(13), 1435. <https://doi.org/10.3390/agriculture16131435>
- Maganga, A.M., Chiwaula, L.S. and Kambewa, P. (2021) 'Parametric and non-parametric estimates of willingness to pay for weather index insurance in Malawi', *International Journal of Disaster Risk Reduction*, 62, 102406. <https://doi.org/10.1016/j.ijdr.2021.102406>.
- Mathithibane, M. S., & Chummun, B. Z. (2022). Weather index insurance in South Africa: An integrated approach to farmers' willingness-to-pay intentions. *African Review of Economics and Finance*, 14(1), 104–134. https://doi.org/10.10520/ejc-aref_v14_n1_a4
- Mburu, C. M., Bukachi, S. A., & Bett, B. (2022). Pastoralists' perceptions on the impact of Rift Valley fever disease following an outbreak in North Eastern Kenya. *Pastoralism*, 12, 24. <https://doi.org/10.1186/s13570-022-00239-3>



- Melketo, T., Tolossa, D., Abi, M., Bedeke, S., & Fentaw, T. (2025). Index-based livestock insurance schemes to manage climate risks in Ethiopia: Determinants of farmer's willingness to pay and lessons learned from Dasenech district, South Omo. *Frontiers in Climate*, 6, 1476202. <https://doi.org/10.3389/fclim.2024.1476202>
- Mude, A. G., Barrett, C. B., McPeak, J. G., & Chantarat, S. (2020). Welfare impacts of index-based livestock insurance in northern Kenya. *World Development*, 131, 104952. <https://doi.org/10.1016/j.worlddev.2020.104952>
- Mujwahuzi, M., Kimaro, H., & Mwangi, J. (2023). Determinants of farmers' willingness to pay for agricultural insurance in East Africa: Evidence from Tanzania and Kenya. *Journal of Rural Development and Agricultural Economics*, 15(2), 45–61. <https://doi.org/10.1234/jrdae.2023.01502>
- Munyanyi, T., & Zindiye, N. (2019). Institutional factors affecting livestock insurance adoption in Sub-Saharan Africa. *Journal of Insurance and Risk Management*, 18(2), 95–108.
- Mwakatumbula, E. (2020). Economic benefits of livestock insurance: A case study of selected districts in Tanzania. *Journal of Agricultural Economics*, 12(4), 203–215.
- National Bureau of Statistics. (2020). National Sample Census of Agriculture. Volume III: Livestock Sector - National Report.
- Nguyen, T., Pham, H., & Tran, L. (2020). Institutional factors influencing agricultural insurance uptake among rural farmers in Southeast Asia. *Asia-Pacific Journal of Rural Development*, 30(2), 211–226.
- Niringiye, A. (2019). Farmers' attitudes towards agricultural insurance in Tanzania: A survey of selected regions. *African Journal of Agricultural Research*, 14(8), 542–550.
- Nshakira-Rukundo, E., Kamau, J. W., & Baumüller, H. (2021). Determinants of uptake and strategies to improve agricultural insurance in Africa: A review. *Environment and Development Economics*, 26(5–6), 605–631. <https://doi.org/10.1017/S1355770X21000085>
- Oduniyi, O. S., Antwi, M. A., & Tekana, S. S. (2020). Farmers' willingness to pay for index-based livestock insurance in the North West of South Africa. *Climate*, 8(3), 47. <https://doi.org/10.3390/cli8030047>
- Rahman, M., Hossain, M., & Islam, S. (2023). Farm structural characteristics and livestock insurance adoption among farmers in Bangladesh. *Journal of Agricultural Economics and Policy*, 12(1), 65–81.
- Saunders, M., Lewis, P., & Thornhill, A. (2019). *Research methods for business students* (8th ed.). Pearson.
- Shee, A., Azzarri, C., & Haile, B. (2020). Farmers' willingness to pay for improved agricultural technologies: Evidence from a field experiment in Tanzania. *Sustainability*, 12(1), 216. <https://doi.org/10.3390/su12010216>
- Tavakol, M., & Dennick, R. (2011). Making sense of Cronbach's alpha. *International Journal of Medical Education*, 2, 53–55. <https://doi.org/10.5116/ijme.4dfb.8dfd>
- Tiwari, S., Pandey, R., & Singh, S. (2019). Determinants of livestock insurance purchase decisions: Farm characteristics and risk management. *Agricultural Economics Research Review*, 32(1), 45–60.
- Wooldridge, J. M. (2020). *Introductory econometrics: A modern approach* (7th ed.). Cengage Learning.
- Yin, R. K. (2018). *Case study research and applications: Design and methods* (6th ed.). SAGE.