Journal of Agriculture and Natural Resources (2024) 7(1): 73-80
ISSN: 2661-6270 (Print), ISSN: 2661-6289 (Online)
DOI: https://doi.org/10.3126/janr.v7i1.73195

Research Article

Factors affecting the adoption of livestock insurance among dairy farmers in Dang district, Nepal

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Received: July 10, 2024; Revised: November 20, 2024
Accepted: December 10, 2024; Published: December 30, 2024

ABSTRACT

The dairy sector plays an important role in food and nutrition security of rural households. Dairy business is exposed to high risks. The insurance scheme provides to avert the unanticipated economic loss of dairy farms. This study was conducted to analyze the various factors affecting livestock insurance adoption among dairy farmers in Dang district, Nepal. Required information was obtained through farm household surveys, focus group discussions (FGDs), and key informant interviews (KIIs). The effect of twelve predictor variables on the adoption of livestock insurance was assessed using logit regression model. This study was conducted in three local levels of Dang district in September 2020. Ninety dairy animal insurers were surveyed as a household through a stratified random sampling method. A semi-structured questionnaire was developed for the household interview, six key informant surveys, and three focus group discussions. The collected data were analyzed through logit regression model using Stata software. The regression results revealed that the probability of insurance adoption significantly increases with technical support (p=0.001), loan taken (p=0.049), breed type (p=0.0001), experience in livestock (p=0.001) and membership in the organization (p=0.011). The education status of farmers, own grazing land, access to media were found influencing factor for adoption of the livestock insurance.

Keywords: Dairy cattle, Livestock insurance, Insurance adoption

Correct citation: Timsina, T. K., & Tiwari, U. (2023). Factors affecting the adoption of livestock insurance among dairy farmers in Dang district, Nepal. *Journal of Agriculture and Natural Resources, 7*(1), 73-80. DOI: https://doi.org/10.3126/janr.v7i1.73195

INTRODUCTION

The agricultural economy highly depends on the livestock sector which contributes 19.4% to the total agriculture GDP (Subedi & Kattel, 2022). The livestock sector has a wider importance by performing four major roles and functions, viz. output function, input function, asset function, and sociocultural function (Singh & Chandel, 2019). It provides food and nutrition to human beings, manure to plants, income generation to families, and huge cultural values in society. This sector is instrumental in the rural setting of Nepal where livestock farming is considered as cash income and assets for families. Dairy sub-sector is a major

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element of the livestock sector. Cattle are the most popular and are owned by 68% of total farm households, and cattle rearing dominate the livestock production system (Rabindra, 2013). Milk is the major product of dairy industry that contributes 8% to the AGDP of Nepal (Shingh *et al.*, 2020). The dairy farming is subsistence, traditional with low productivity though moving towards commercialization in some places (Neopane *et al.*, 2022). However, the milk production is increasing in trend from 1,700,073 Mt per year in the FY 2013/14 to 2,613,843 Mt per year in the FY 2022/23 (MoALD, 2024).

Despite being a major income generation and food security for human beings, it is also exposed to various risks that cause huge economic losses. Nepal ranks 4th and 11th in terms of its relative vulnerability to climate change and earthquakes, respectively, which causes significant cattle loss (MoHA, 2021). Total 743,728 cattle were lost from 1973 to 2011, and the number is increasing each year (Paudel, 2013). Not only disasters and climate change have impacted livestock, but outbreaks of diseases have also affected them. More than 21,000 animals have died and nearly 550,000 animals have been impacted by lumpy skin disease in 2023 which cost approximately 21 million USD (Acharya, 2023). Untimely mortality, morbidity with fatalities, and infertility also cause huge financial loss to farmers. The risks related to dairy animals are leading to adverse impacts on the farms. To safeguard the unforeseen loss of animals, agriculture insurance has come to exist in Nepal with the introduction of the Crop and Livestock Insurance Directives, 2013 by the Insurance Board which focuses on crops (i.e. paddy, vegetables, potatoes, apples and banana), livestock and poultry (Ghimire & Kumar, 2015). This scheme has been formulated with two major objectives as providing a security mechanism to the dairy farmers against any unanticipated loss and motivating farmers for livestock rearing. Livestock insurance is widely accepted and adopted by Nepalese farmers (Practical, 2017). Livestock insurance provide coverage to all types of animals based on sum insured fixed by the Insurance Company (Ghimire & Kumar, 2015). The government of Nepal has subsidized 80% to the farmers on the insurance premiums (NIC, 2022). All the non-life insurance companies are mandatory to offer insurance policies for those products.

Every year a significant amount is spending by the government in the livestock insurance program. Total NPR 1848.9 million (14.22 million USD) was collected to National Insurance Committee (NIC) as premium from livestock sector, and NPR 3039.8 million (23.4 million USD) was claimed by livestock farmers from their livestock loss (NIC, 2022). However, studies on livestock insurance sector has not been conducted enough in Nepal. A few studies were conducted in Chitwan, Nawalparasi, Dhading, Nawalpur districts (Adhikari & Bidari 2018; Ghimire, 2013; Koirala & Bhandari, 2018; Timilsina & Kandel, 2018; Mishra & Singh, 2024) The trends of joining in livestock insurance is significantly increasing annually with huge economic transaction. In light of this context, this study was conducted to assess the impact of livestock insurance program on dairy sub-sector in Dang district and to determine the factors affecting adoption of livestock insurance among dairy farmers.

METHODOLOGY

Study site

Dang district of Lumbini Province was selected purposively for the study due to highest population of dairy animals (MoALD, 2024). This district is surrounded by Pyuthan, Argakhachi and Kalipbastu

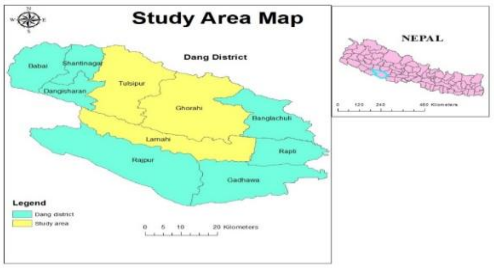

Figure1: Map of Study

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districts from east side, Salyan, Pyuthan and Rolpa districts from north side, Banke and Surkhet districts from west side.

The lowest point of this district is 213 meter above sea level (masl) and extend up to 2058 masl, expanding from plain Terai to mid hills.

Sample size and sampling procedure

The dairy animal insurer list was obtained from six non-life insurance companies located in Dang district. Based on the information collected from the insurance companies, local levels were selected by considering the highly populated dairy insurers through a purposive sampling method. Three local levels were selected as Lamahi Municipality, Ghorahi Sub-Metropolitan City, and Tulsipur Sub-Metropolitan City. Total number of dairy animal insurers in three local levels were considered as total population for the study. Total 900 dairy animal insurer list was received from the insurance companies so 900 number was considered as total population. The stratified random sampling method was employed to select the sampled household.

The sample size was determined by using the following formula provided by Yamane (Isreal, 2003). The Yamane's formula is expressed as

$$n = \frac{N}{1+N\,(e)^2} = \frac{900}{1+900\ (0.1)^2} = 90 \ldots\ldots\ldots\ldots\ldots (1)$$

Where, n is the sample size, N is the population size, e is the level of precision which considered 0.1. Thus, 90 dairy animal insurers were taken as a sample size.

Data collection

The household information was collected from 90 sampled households. Three Focus group discussions (FGDs) and six key informant interviews (KIIs) were conducted to gather additional information. FGD was conducted among inclusive team of dairy farmers. KII was conducted among National Insurance Committee, Veterinary Hospital and Livestock Service Expert Center, Dairy Lead Farmers. A semi-structured interview schedule was used for the primary data collection from the household survey.

The study was based mainly on primary data, however, secondary data were also used. The secondary data was collected from the National Insurance Committee, Insurance Companies, Veterinary Hospitals, and Livestock Service Centers. The information for the specific predictor variables like age, membership in an organization, education, experience in livestock, grazing land, total land, breed type, shed type, loan taken, access to media, technical support and experience in animal loss were collected from the household survey.

Statistical analysis

Model specification

A logit regression model was used to predict the insurance policy adoption by farmers. This model is best fit because it can resolve the heteroscedasticity and assumption of cumulative normal probability distribution satisfies. A positive coefficient indicates an increase in the probability of insurance adoption. The d determination of factors affecting the adoption of livestock insurance among dairy farmers, as:

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$$\text{Ln}\,(P_i/1-P_i) = \beta_0 + \beta_1 X_1 + \cdots + \beta_i X_i + e_i \quad \text{.....(2)}$$

Where, P_i = Probability of adoption of livestock insurance, 1-P_i = Probability of not adopting livestock insurance, β_0 = Intercept, β_i = Regression coefficients, X_i = Explanatory variables, and e_i= Error term

Table 1: The description of predictor variables used for binary logit regression mode.

Description of variables	Type/Unit	Definition and measurement
Age	Continuous	Years
Group membership	Dummy	1 if HH is member, 0 otherwise
Education status	Continuous	Years
Livestock experience	Continuous	Years
Own grazing land	Continuous	Kattha
Total land	Continuous	Kattha
Breed type	Dummy	1 if Improved, 0 otherwise
Shed type	Dummy	1 if Concrete, 0 otherwise
Loan taken	Dummy	1 if Yes, 0 No
Access to mass media	Dummy	1 if Yes, 0 No
Technical training and support	Dummy	1 if Yes, 0 No
Animal lost experience	Dummy	1 if Yes, 0 No

Statistical Analysis

Received information from household surveys, FGDs and KISs were cleaned to ensure the uniform throughout the dataset. The outlier data were removed to reduce the sampling and processing errors. The explanatory variables were selected to determine the factors affecting insurance adoption (Table 1). The result was analyzed through logit regression model using Stata software.

RESULTS AND DISCUSSION

All the predictor variables namely age, membership in organization, education status, experience in livestock farming, own grazing land, total land, breed type, shed type loan taken, access to mass media, technical support, and experience in animal loss have associations with the adoption of livestock insurance (Table 2). The result showed that the probability of adopting dairy animal insurance decreases by 1.3% when the respondent's age increases by a unit (p=0.004). The indifference relationship between age and adoption of livestock insurance showed by the study of (Mohammed & Ortmann, 2010). Increasing farmers' ages leads to risk-averseness, fear of investing, and reluctance to initiate an innovative idea. Continuation of regular work without considering risk would be the patterns of the aged work-life that caused the likelihood of refusal of livestock insurance adoption. Young farmer seeks business expansion opportunities with minimizing unforeseen risks. The exploration of various risk mitigation measures and selection of the best-fit mitigation measures are promptly adopted. Youth may have linkage with service providers, consult with experts, and put their ideas for business promotion and protection results in the adoption of livestock insurance.

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The membership of the organization has positive relationship with the adoption of livestock insurance which demonstrated that the probability of adoption of livestock insurance increased by 37.9% if the family holds membership in any organization. This finding was supported by the other study as it is more likely to reduce the adoption of livestock insurance if farmers has not hold on membership in any organization (Kandel & Timilsina, 2018). Membership in any organization as a key determinant factor on adoption of insurance (Wairimu *et al.*, 2016). Holding membership in groups or cooperatives increases the probability of livestock insurance adoption (Kumar *et al.*, 2011; Devkota *et al.*, 2021). Membership in the organization has a positive influence on information access and motivates them to be innovative. Learning from other group members also influences the adoption of new ideas. Joining of a local institution/group increases the farmers' exposure various mitigation adopted by others over the potential risks, increases decision power with greater confidence results for the purchasing of insurance products. Similarly, cooperatives have also been supporting their members to adopt insurance policies.

The probability of livestock insurance adoption decreases by 2.4% when experience in dairy farming increases by one unit (p=0.001). The relationship between dairy farming experience and livestock insurance adoption is inversely correlated (Chand *et al.*, 2016). The higher experience results in careful analysis of the risks within the firm. Farmers are familiar with the potential risks associated with the dairy firm, analyze the probable risks and adopt the risk-mitigating measures. The farming system also gets upgraded with considering the potential risks so less likelihood to adopt other risk mitigating measures. There could be the bitter experience in the past on insurance system too.

The probability of livestock insurance adoption has positive relationship with technical services availability, which was found increased by 38.15%. Periodic technical training to farmers influenced to adoption of insurance (Wairimu *et al.*, 2016). Regular attending in the dairy technical capacity building programs influenced the adoption of livestock insurance (Sadati, 2010). The intensity and frequency of the risk occurrence were analyzed before and during the firm operation. The technical assistance could increase the confidence level for better risk management.

The probability dairy animal insurance adoption increases by 21.3% if farmers have borrowed loan from financial institutions (p=0.049). The relationship of loan taken by the farmers to adoption of livestock insurance was illustrated the positive and significant influence to the livestock insurance adoption (Wairimu *et al.*, 2016). Taking a loan is considered a long-term business investment by analyzing all the financial indicators. The loan investment must be protected through all possible ways. The financial institution has mandatory actions to protect loans by forcing farmers to link with insurance packages before loan disburses that encourages farmers to join insurance. Nevertheless, farmers also want to protect agribusiness and safeguard the loan investment incurred them to join risk mitigating measures. Many financial institutions offer loans embedded with insurance policy. Farmers get loans along with the insurance products.

Adoption of livestock insurance and rearing of improved animal breed are positively related. The probability of adoption of livestock insurance increased by 51.7% when improved animal breed was reared (p=0.0001). Introduction of improved breed in the firm is positively correlated with the livestock insurance adoption (Devkota *et al*., 2021). Replacing improved breed in the herd influences the adoption of livestock insurance schemes (Singh & Chandel,

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2019). Introduction of improve animal breed impacted higher investment, higher management and higher risk. With higher risk, the likelihood of livestock insurance adoption increases. Second, the improved breed type of dairy animals has high exposure to many risks which leads to more protection required to run the enterprise smoothly.

Table 2: Factors affecting adoption of livestock insurance among dairy farmer animals (Logit regression model results)

Particular	Coefficient	Std. Err.	Z Value	P > I z I	dy/dx
Age	0.947	0.178	-2.87	0.004***	-0.013
Membership in organization	5.990	4.204	2.55	0.011**	0.379
Education	0.975	0.057	-0.42	0.677	-0.006
Experience in livestock	0.905	0.025	-3.46	0.001***	-0.024
Own grazing land	1.027	0.067	0.41	0.678	0.006
Total land	1.009	0.015	0.64	0.525	0.002
Breed type #	10.445	4.871	5.03	0.0001***	0.517
Shed type #	0.454	0.216	-1.65	0.099*	-0.193
Loan taken #	2.380	1.047	1.97	0.049**	0.213
Access to media #	0.875	0.917	-0.13	0.899	-0.033
Technical support #	5.154	2.560	3.30	0.001***	0.381
Experience in animal lost#	0.492	0.244	-1.43	0.154	-0.172
Constant	1.657	2.742	0.31	0.760	

'#' represents the discrete change of dummy variable from 0 to 1. ***, ** and * represents the significant at 1%, 5% and 10% level respectively. dy/dx is marginal effect after logistic regression

CONCLUSION

Risk is inevitable factor however it can be managed my applying mitigating measures. Natural disasters, climate-induced hazards and outbreak of epidemic, pandemic always threat for this industry. Risk is unescapable however the economic impact of risk can be minimized through insurance adoption. Many factor determines the livestock insurance. Joining in group or cooperative is one of them which enhances the collaborative efforts for enterprise initiation, expansion, and the best risk-mitigating measures adoption. Government should motivate to enroll the individual in groups or cooperatives. Simultaneously, Government should develop the regulatory body to monitor group or cooperative in local level. Regular monitoring of groups or cooperative is essential to increase the effectiveness. Age is determinant factor for livestock insurance considering as the key change agents, having high-risk-taking capacity. Young farmers have a higher likelihood of livestock insurance adoption. The insurance company should disseminate the insurance policy through young farmers. Financial component is determinant factor for insurance adoption. The financial support along with risk mitigating measures in package could minimize the risk. Further, frequent monitoring of financial institutions to farmer for risk analysis and update also effective for risk mitigation. Introduction of improved breed has also a positive influence on the adoption of livestock insurance. Promotion of higher productive dairy animals, breed improvement schemes, low-yielding breed replacement announcement by government could be effective for higher income and likelihood of insurance adoption.

ACKNOWLEDGMENT

The authors would like to acknowledge all respondents for providing the valuable information.

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Authors' Contribution

T. K. Timsina and U Tiwari designed the research plan. T. K. Timsina collected the data from the field survey. Moreover, T. K. Timsina analyzed the data and prepared the manuscript. U. Tiwari provided guidance during field survey and provided suggestions to finalize this manuscript. The final form of the manuscript was approved by all authors.

Conflict of Interest

The author declares no conflict of interest.

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