Determinants of Livestock Insurance Adoption by Dairy Cattle Farmers of Nawalpur District, Nepal

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Abstract

Livestock farming faces inherent vulnerabilities, such as disease outbreaks and natural disasters. The utilization of livestock insurance can play a crucial role in alleviating risks and uncertainties associated with farming practices, ultimately fostering security for farmers. The research was carried out purposively in Nawalpur district during 2022 to identify the factors affecting adoption of livestock insurance among dairy cattle farmers. One hundred and twenty dairy cattle farmers were selected randomly from the study area. Primary data were collected using pretested semi-structured interview schedule, Focus Group Discussion and Key Informant Interview. Descriptive statistics and probit model were used to interpret the findings. Findings from the research revealed that age, membership in farmer's organization, contact with extension worker and rearing of improved breed were statistically significant in the adoption of livestock insurance. Extension agencies of government, non-governmental institution and insurance companies should primarily focus on farmers who are old aged, rear improved breed, participate in farmer's organization and have regular contact with extension worker for better adoption.

Keywords: age, breed, extension, organization

Introduction

Livestock sub-sector is a major component in Nepalese economy, as it alone contributed 6.40% to national Gross Domestic Product (GDP) in year 2020/21, with preliminary stat of 6.23% during 2021/22 (MoALD, 2022). Livestock rearing is prevalent across all agro-ecological regions of the country. Nepal predominantly features a smallholder livestock system. Many of these smallholder farmers are marginalized, operating near the survival threshold, and are primarily motivated by subsistence needs rather than responding to market demand (Pradhanang et al., 2015). Rearing of livestock is directly related to livelihood of resource poor farmer and is a valuable productive asset. Livestock represents substantial percentage of farm household wealth. Livestock serves vital

functions in ensuring human food and nutritional security, supporting livelihoods, maintaining regional balance, incorporating gender considerations, and contributing to the alleviation of rural poverty (ILO, 2004).

However, it has major risks and uncertainty associated, and can cause economic breakdown to farmers (Rahimi, 2000). With the increasing value of dairy animals and rising cost of production, the magnitude of risk has further increased (Pallavi et al., 2019). Most challenging issue in livestock rearing includes loss of animals from disease (Hosseini & Zadeh, 2011) and other disasters like fire, earthquake and flood (Devkota et al., 2021). Research has been conducted in the developing world to elucidate the complex relationships among climate change, emerging diseases, heat strokes, and the consequent impacts on livestock losses (Thornton et al., 2009; Rivera-Ferre et al., 2016; Thierfelder et al., 2017). Premature mortality of dairy cattle is about 2-3% per annum in Nepal (Pradhanang et al., 2015). The outbreak of lumpy skin disease among cattle and buffaloes in Nepal in 2020 resulted in significant illness with moderate fatalities, leading to substantial economic losses for dairy farmers (Koirala et al., 2022). In Nepal, as of June 16, 2023, around 21000 animals have perished, and approximately 550000 have been impacted by lumpy skin disease, leading to an economic loss of approximately US$ 21 million for the nation (Acharya, 2023). Adoption of insurance scheme is one of the effective farm protection mechanisms as it provides risk coverage and can help farmers from major economic loss. Insurance serves as a transformative financial instrument empowering farmers to navigate and mitigate agricultural risks, fostering increased productivity and bolstering the overall stability of the agribusiness sector. This innovative tool acts as a safeguard, enabling farmers to manage uncertainties inherent in agriculture, ultimately contributing to the resilience and growth of the agricultural industry (WB, 2009). By enhancing the financial resilience of farmers, this insurance instrument plays a pivotal role in fortifying food security and, consequently, positively influencing the overall welfare of farm households (Timalsina, 2019).

Agriculture Development Strategy (ADS) (2015-2035) of Nepal emphasized on insurance as means to increase productivity and commercialization. Given the escalating frequency of climate-induced risks and natural disasters, there is an urgent call to action for the widespread adoption of appropriate risk adaptation and mitigation strategies. This proactive stance is crucial to fortify the agricultural sector against the growing challenges posed by environmental uncertainties. By bolstering insurance coverage and implementing effective risk management measures, the ADS

envisions a resilient agricultural landscape capable of navigating and thriving in the face of evolving climatic and natural hazards (MoAD, 2016; Timalsina, 2019).

Insurance operates as a formalized agreement between two parties, characterized by the exchange of a premium from one party to another. In this contractual arrangement, the party receiving the premium assumes the responsibility of disbursing a predetermined amount to the other party in the event of an unforeseen occurrence (Kwadzo et al., 2013). Agricultural insurance serves as a financial mechanism that enables farmers to secure funding in the face of unforeseen shocks, offering an efficient means for farmers and other involved parties to navigate and mitigate the impacts of such disruptions. This compensation, in turn, empowers farmers to enhance their investment levels and income (Nnadi et al., 2013; Nahvi et al., 2014). Nepal is characterized by significant risk levels concerning disasters and vulnerability to climate change. These factors collectively amplify the challenges and uncertainties associated with agricultural production in the country (Timalsina, 2019). These livestock farmers face socio-economic vulnerability, lacking the capacity to withstand adverse impacts from various stressors and risks (Pradhanang et al., 2015).

Agricultural insurance encourages farmers to assign greater importance to their farm production, leading to an increased inclination to invest in higher-yielding yet riskier technologies (Radermacher & Roth, 2014). This heightened willingness stems from the assurance of compensation in the event of losses (Mani et al., 2012). Moreover, by functioning as collateral, agricultural insurance improves a farmer's credit accessibility (Ajieh, 2010). Insurance is associated with a rise in the utilization of lucrative agricultural inputs, ensuring a stable farm income, reducing reliance on expensive coping strategies, promoting engagement with market-oriented outlets, lowering levels of indebtedness, and facilitating the uptake of loans. Consequently, there is substantial evidence supporting the potential influence of insurance on risk management, investment decisions, agricultural productivity, and the augmentation of income (Olubiyo et al., 2009; De Bock & Ontiveros, 2013; Carriquiry & Osgood, 2006).

Along with the promulgation of crop and livestock insurance directive in 2013, insurance companies compulsorily involved in crop and livestock insurance in Nepal (MoALD, 2020). The 'Agriculture, Livestock, and Medicinal Herb Insurance Directives 2022' has recently been put into effect (NIA, 2022). Altogether 20 non-life insurance companies are providing crop and livestock insurance (Dangi, 2022). Livestock and poultry insurance offer coverage for a variety of animals, including cows, oxen, buffalos, yaks, sheep, goats, swine, chickens, and ducks. The premium

amount, sum insured, and other details are determined by the Insurance Board, specifying both maximum and minimum sum insured, age limits, and the applicable premium and commission rates. In the event of a covered loss, insurers will compensate 90% of the actual loss, with the remaining 10% borne by the customer. Additionally, there is a provision for a 15% premium discount when insurance is procured through group or cooperative arrangements (Timalsina, 2019). When there is animal death or permanent disability as per the stated insurance policy, farmers receive monetary compensation. Assessing the market value is a crucial component in the livestock insurance process. There is a collaborative understanding among insurance firms, dairy farmers, and technicians. Additionally, when it comes to the purchase or sale of animals, the insurance product can be transferred within the local area. Typically, insured farmers are required to contribute 5% of the sum insured as a premium, and since September 23, 2021, the government has been providing an 80% subsidy on this premium. In the unfortunate events of the death or permanent disability of the insured animal, the insurance coverage entails reimbursement of 90% and 50% of the sum insured, respectively (Dangi, 2022).

However, the adoption of agriculture insurance is quite low, below 1.10% (Thapa & Adhikari, 2018). Livestock subsector alone represents 75% of the agricultural insurance markets (Insurance Board, 2019). MoALD (2022) reported 1923 number of policies in crop insurance and 19752 numbers of policies in livestock insurance during 2020/21, while 3812 number of policies in crop insurance and 122741 numbers of policies in livestock insurance was reported during 2019/20. Coverage under livestock insurance is inadequate relative to the total national herd size (Kandel & Timalsina, 2018; Devkota et al., 2021). Cattle and buffalo are the primary dairy animals used for milk production in Nepal. Farming of domestic animals and dairy farming contributed 5.76% to national GDP during 2020/21, with preliminary stat of 5.57% during 2021/22 (MoALD, 2022). Sustainability of the dairy sub-sector is vital for the livestock industry as a whole in the Nepalese context. Despite the significant records of disability and mortality among dairy cattle, there is a lack of sufficient studies focusing on approaches to efficiently adopt insurance among dairy cattle farmers. This study exclusively focuses on dairy cattle and aims to identify the factors affecting the adoption of livestock insurance among these farmers. The findings will assist policymakers and relevant stakeholders to develop strategies to scale up the adoption process and safeguard farmers.

Methodology

Study area, sampling technique and data collection

We employed multistage, purposive and random sampling technique to select district, municipality and farmers. The study was done during 2022 in Nawalpur district (also called as Nawalparasi East district) of western Nepal. The district was selected purposively to represent one of the major commercial dairy cattle rearing district. The region possesses specific assets conducive to the promotion of livestock rearing, such as ample space for cultivating forage, abundant forest resources, convenient market access, and comprehensive healthcare for livestock. Despite these advantages, the occurrence of fatalities and physical disabilities among dairy cattle remains frequent, often attributed to factors such as floods, fires, diseases, and other variables. The surveyed municipalities in Nawalpur district include Gaidakot, Devachuli, Madhyabindu and Kawasoti. These municipalities were purposively selected considering; a. Government institutions, I/NGOs and insurance companies involvement in the promotion of livestock insurance through group approach in these areas, b. Access to proper insurance source to farmers in these areas, c. Higher adoption of livestock insurance compared to other parts of the country, and d. Availability of both adopters and non-adopters in these areas. Participation of returnee migrants, women and youth is observed in the rearing of dairy animals in the area, thus have ample space for expansion and sustainability of the subsector. Hence, the study will help to maximize the adoption of insurance and benefit the farming communities in the study area and similar settings.

The entire dairy cattle farm household in the surveyed area was considered population for this study. Key Informant Interview (KII) with officials and secondary data estimated the population to be 900. To calculate sample size, we used the formula (Daniel, 1999);

$$n = N*X / (X + N - 1),$$

Where,

$$X = Z_{\alpha/2}^2 *p*(1-p) / MOE^2, \text{ and}$$

$Z_{\alpha/2}$ is the critical value of the Normal distribution at $\alpha/2$, MOE is the margin of error, p is the sample proportion, and N is the population size.

Using simple random sampling, 120 farm households were selected. Later sample size was incorporated proportionally to each of the municipality, and then divided into two categories of adopters and non-adopters. The household survey was carried out with household head using a pretested semi-structured interview schedule. Further, 1 Focus Group Discussion (FGD) and 1 KII

among progressive farmers, executive members of farmer's organization, government and non-government officials, and insurance companies was carried out in each municipality to complement the information gathered through household survey. Secondary data was obtained from reports of government bodies and institutions, I/NGOs and others.
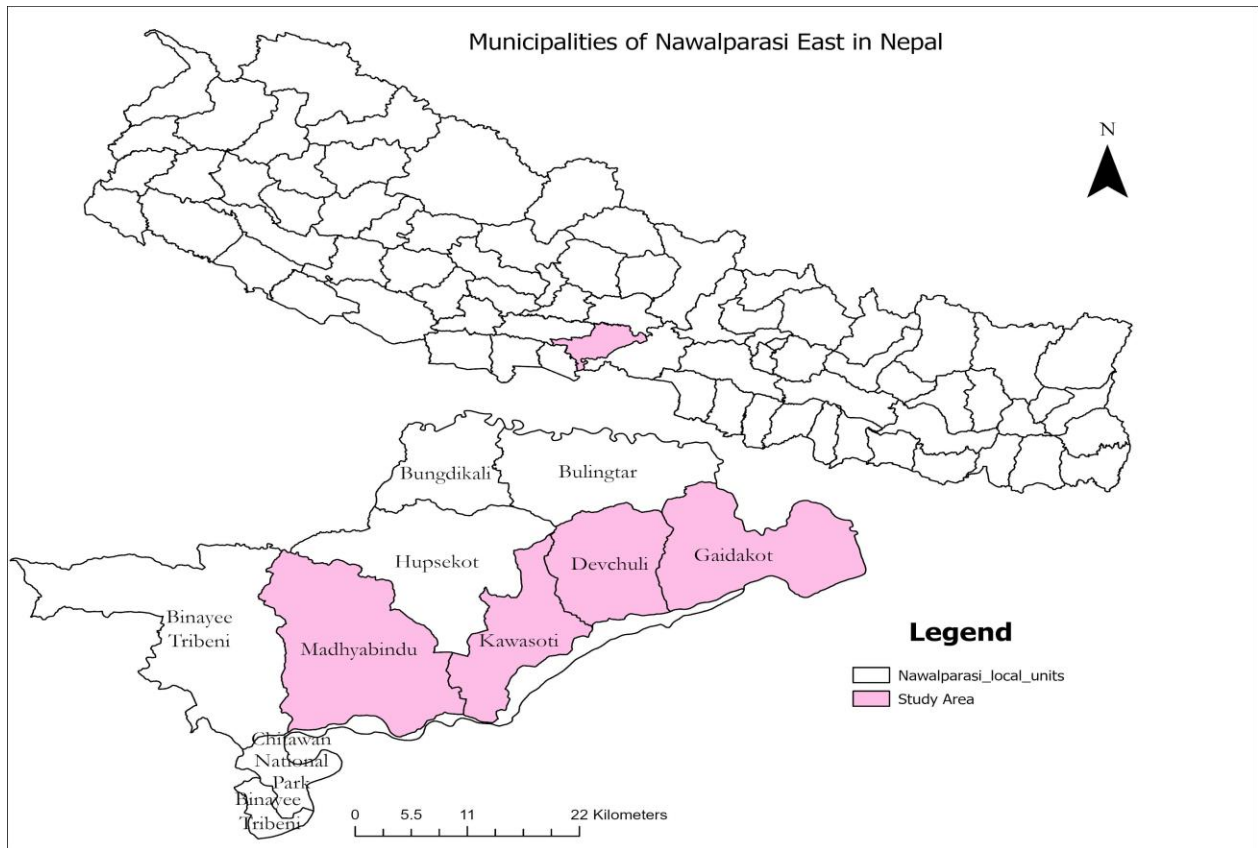

Figure 1. Map of Nepal showing study area

Empirical model

Descriptive analysis and t-test was done using IBM SPSS Statistics 25. Probit model was employed using Stata/SE 12.1 in order to determine the factors affecting the adoption of livestock insurance among dairy farmers. Further, to assess the effect of each independent variable on the adoption of insurance, marginal effect on those variables was estimated in the probit model. Previous studies (Subedi & Kattel, 2021; Devkota et al., 2021) also used this model to identify the determinants of livestock insurance in Nepal.

<u>Model specification</u>

The probit model specified in this study to analyze factors affecting adoption of livestock insurance among dairy cattle farmers was expressed as follows;

$Pr\ (Y = 1) = f\ (b_0 + b_1\ X_1 + b_2\ X_2 + b_3\ X_3 + b_4\ X_4 + b_5\ X_5 + b_6\ X_6 + b_7\ X_7 + b_8\ X_8 + b_9\ X_9 + b_{10}\ X_{10} + b_{11}\ X_{11})$

Where,

$Pr\ (Y = 1)$ = Probability of adoption of livestock insurance

X_1 = Age (continuous)

X_2 = Gender (dummy)

X_3 = Education (continuous)

X_4 = Farm size (continuous)

X_5 = Membership in organization (dummy)

X_6 = Contact with extension worker (dummy)

X_7 = Income (continuous)

X_8 = Breed (dummy)

X_9 = Income shock (dummy)

X_{10} = Farming experience (continuous)

X_{11} = Credit (dummy)

b_0 = Regression coefficient

$b_1, b_2 \ldots \ldots \ldots \ldots b_{11}$ = Probit coefficient

The description of the variables used is presented in Table 1.

Results and discussion

Descriptive statistics

Table 1. Descriptive statistics of variables for adoption of livestock insurance

Variable	Description	Mean	Standard Deviation
Dependent variable			
Adoption of livestock insurance	=1 if respondent has livestock insurance, 0 otherwise	0.66	0.476
Independent variable			
Age	Age of respondent (year)	43.45	8.674
Gender	Gender of the respondent (1-male, 0-female)	0.60	0.492
Education	Formal education of respondent (year)	10.00	4.118
Off-farm income	=1 if respondent's household receive off-farm income, 0 otherwise	0.60	0.492
Membership in organization	= 1 if respondent is member in related farmer's groups or cooperatives, 0 otherwise	0.74	0.440
Contact with extension worker	=1 if respondent has regular contact with extension worker, 0 otherwise	0.31	0.464

Income	Annual income of household (NPR)	434166.67	106704.519
Breed	=1 if respondent has improved breed, 0 local breed	0.77	0.423
Income shock	=1 if respondent has faced income shock from dairy cattle loss in last 5 years, 0 otherwise	0.72	0.448
Farming experience	Respondent involvement in dairy cattle rearing (year)	20.68	6.646
Credit	=1 is respondent have access to credit, 0 otherwise	0.26	0.440

Source: Field survey, 2022

The descriptive statistics of variables is presented in Table 1. As observed, 66% of the sampled households adopted livestock insurance, and 60% of the households were headed by male. The average age of the household head was 43.45 years. Respondents, on average, had 10.00 years of formal schooling. Respondents on average had household income of NPR 434166.67 and farming experience of 20.68 years. On average, 60% of the respondent's household received off farm income, 74% of the respondents had participation in organizations and 31% of the respondents had regular contact with extension workers. Similarly, 77% of the respondents had reared improved breed, 72% of the respondents had faced income shock and 26% of the respondents have access to credit.

Characteristics of adopters and non-adopters of livestock insurance

Table 2. Characteristics of adopters and non-adopters of livestock insurance

Variable	Adopter (n=79)	Non-adopter (n=41)	Mean difference	t-value
Age	45.52	39.17	6.348	4.040***
Gender	0.62	0.56	0.059	0.624
Education	9.70	10.59	-0.889	-1.123
Off- farm income	0.56	0.68	-0.126	-1.335
Membership in organization	0.89	0.46	0.423	5.596***
Contact with extension worker	0.37	0.20	0.172	1.949*
Income	440506.33	421951.22	18555.110	0.903
Breed	0.86	0.59	0.275	3.228***
Income shock	0.71	0.76	-0.047	-0.546
Farming experience	21.43	19.24	2.186	1.723
Credit	0.30	0.17	0.133	1.583

Source: Field survey, 2022

Note: * and *** indicate significant at 10% and 1% level of significance, respectively.

Table 2 presents the results of differences between means of characteristics describing adopters and non-adopters of livestock insurance. There appeared significant difference in age, membership in organization, contact with extension worker and breed between adopters and non-adopters. All these significant variables were significantly higher for adopters compared with non-adopter counterparts.

Factors affecting the adoption of livestock insurance in the study area

Table 3. Probit regression analysis and marginal effect for factors affecting the adoption of livestock insurance

Variable	Coefficient	p-value	SE	dy/dx	SE(dy/dx)
Age	0.0465**	0.024	0.0206	0.0139	0.0062
Gender	0.4161	0.244	0.3572	0.1280	0.1115
Education	0.0434	0.347	0.0462	0.0130	0.0138
Off- farm income	-0.2265	0.488	0.3264	-0.0666	0.0949
Membership in organization	0.9231**	0.012	0.3264	0.3113	0.1314
Contact with extension worker	1.0884***	0.008	0.4074	0.2711	0.08
Log(Income)	0.9071	0.559	1.5524	0.2716	0.4648
Breed	1.6251***	0.000	0.3906	0.4560	0.0882
Income shock	0.3999	0.336	0.4158	0.1272	0.1379
Farming experience	0.0288	0.242	0.0246	0.0086	0.0073
Credit	0.3892	0.317	0.3889	0.1078	0.0987
Constant	-9.7020	0.264	8.6775		
Summary statistics Number of observation= 120 LR chi^2(11)= 66.96 Prob>Chi^2= 0.0000 Pseudo R^2=0.4345 Log likelihood=-43.5781					

Source: Field survey, 2022

Note: *** and *** indicate significant at 5% and 1% level of significance, respectively.*

Factors affecting adoption of livestock insurance is presented in Table 3. The likelihood ratio chi-square (LR chi^2) for the model was statistically significant at 1 percent level of significance. The Pseudo R^2 was 0.4345. Result showed that age, membership in organization, contact with extension workers and rearing of improved breed was statistically significant in the adoption of livestock insurance. Keeping other variables constant, probability of adoption of livestock insurance increases by 1.39 percent if age of respondent increases by one unit. As farmers' age increases, they may become more risk-averse, hence opting for strategies to safeguard farm from risk and uncertainties. Result is in line with Chand et al. (2016). Keeping other variables constant, probability of adoption of livestock insurance increases by 31.13 percent if respondent has membership in farmer's organizations. Farmers' groups and cooperatives regularly organize assemblies and programs where members gather to share ideas, views, and information on various subjects. Progressive members, who are proactive in nature, may provide adequate and reliable information about insurance schemes to other members in the group. Knowing that fellow group members are also participating in the insurance program can increase an individual farmer's willingness to join, potentially expediting the adoption process through group confidence. Similarly, government institutions, I/NGOs, and insurance companies are promoting livestock insurance through a group approach. Farmers' organizations offer comprehensive support, from the documentation process to the resolution of claims, providing cost-effective services to their members and thereby promoting the adoption of insurance. Result is in line with previous studies (Ghimire et al., 2016; Devkota et al., 2021). Keeping other variables constant, probability of adoption of livestock insurance increases by 27.11 percent if respondent has regular contact with extension worker. The role of extension workers in increasing the adoption of livestock insurance is pivotal as they contribute to farmer level of understanding, address concerns, provide practical assistance, and facilitate a supportive environment for farmers to embrace insurance as a risk management tool. Result is in line with Kandel and Timilsina (2018). Keeping other variables constant, probability of adoption of livestock insurance increases by 45.60 percent, if respondent has reared improved breed. Improved breeds cost more for farmers compared to local breeds, and they are more vulnerable to stress, leading to higher mortality rates. Consequently, farmers seek to safeguard against economic losses through insurance schemes. Result is in line with previous studies (Singh & Chandel, 2019; Subedi & Kattel, 2021; Devkota et al., 2021; Dangi, 2022).

Conclusion

Livestock insurance programs offer farmers a financial safety net by providing compensation for losses resulting from covered risks, encompassing incidents like livestock mortality, health issues, or other events affecting the animals' well-being. Engaging in these insurance initiatives enables farmers to alleviate the economic repercussions of unforeseen events, ultimately bolstering their resilience and long-term viability. However, the adoption of insurance is still low among farming communities. Findings from the research revealed that age of the farmer positively affected the adoption of insurance. This implies that the programs and policies should primarily focus on old aged farmers for better adoption. Similarly, membership in farmer's organization positively affected the adoption of insurance scheme. Farmer's organization should further be strengthened to develop into local partner for insurance initiatives. Efforts to increase farmer participation in farmers' organizations should be promoted through various measures. These include conducting outreach programs to highlight the benefits of such organizations, emphasizing collective strength, resource sharing, and access to support. Showcasing successful cases where farmers' organizations have positively impacted members can encourage others to join for mutual benefits. Providing tangible benefit, such as training opportunities, access to better markets, and financial support, serves as incentives for farmers to participate. Customizing farmers' organization services to meet the specific needs of livestock farmers addresses their unique challenges and concerns. Facilitating networking, collaborating with extension services, promoting inclusivity, and collaborating with local leaders and influencers to endorse and promote the advantages of farmers' organizations within the livestock farming community further strengthens these initiatives. Similarly, we found positive influence of extension worker and improved breed on adoption of livestock insurance. This implies that the extension worker should efficiently deliver insurance scheme to the farming communities. Efforts to enhance the contact between farming communities and extension workers should concentrate on diverse approaches. These include providing them with the essential knowledge and skills for effective engagement with diverse farming communities, incorporating ICTs to improve communication efficiency, involving community leaders and influencers to facilitate outreach, organizing regular events and training sessions in various farming communities to establish a continuous and direct line of communication between extension workers and farmers,

and partnering with local NGOs, community-based organizations, and other stakeholders. Extension agencies of insurance company, government and I/NGOs should facilitate farmers rearing improved breed for efficient utilization of insurance.

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