Determinants of livestock insurance adoption in Nepal

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Abstract: Livestock insurance, an important risk management tool, is becoming popular in Nepal after Crop and Livestock Insurance Directives, 2013, came into action. To widen the adaptability of the insurance throughout the country, key determinants of insurance adoption need proper investigation. We designed this study to identify the factors that influence farmer's decisions in adopting livestock insurance. Primary data were collected from 415 respondents including 245 livestock insured and 170 non-insured farmers. Probit regression model using STATA15 was employed to analyze factors influencing livestock insurance adoption. The regression result revealed that the probability of insurance adoption significantly increases with farmers having membership in groups or cooperatives, raising awareness, and rearing improved animal. Intensifying public awareness campaigns through a combined effort of all the stakeholders including local government authorities, broadcasting media, insurance companies, and farmer’s groups or cooperatives is necessary for insurance uptake in the farming community. Provision of insurance through farmers’ group or cooperatives making them a formal insurer agent is required for wider adoption of livestock insurance in Nepal.

Subjects: Agriculture & Environmental Sciences; Agriculture; Agriculture and Food

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Deepa Devkota is a scientist based at the Nepal Agricultural Research Council (NARC) where she works as an agricultural economist for the last six years. Her research interest lies in the adoption and impact assessment of agricultural technologies. She worked for Pilot Program for Climate Resilience (PPCR) project funded by the World Bank with the research focus on the adoption of agriculture insurance in Nepal. Livestock insurance is an effective risk management tool. However, several aspects of the adoption of livestock insurance by the farmers have been poorly understood. This paper will contribute to an increased understanding of the factors influencing adoption decisions of livestock insurance which have become quite relevant to extend its adoption through better policy actions in Nepal. Deepa completed Bachelors of Agriculture (2011) and Masters in Agricultural Economics (2014) at the Institute of Agriculture and Animal Sciences, Tribhuvan University, Nepal.

PUBLIC INTEREST STATEMENT
The livestock sub-sector has a significant contribution to the Nepalese economy. Every animal farmer own is an investment, and insurance can protect them from financial losses due to death or permanent disability. This study focuses on the factors that influence adoption decisions of livestock insurance in Nepal. Awareness is a crucial factor that nudges farmers to insure the livestock. A vigorous publicity campaign with the combined effort of all the stakeholders including local government authorities, insurance board/companies, and farmer’s groups or cooperatives is necessary to aware farmers about the importance of livestock insurance. Due to easy access and more trust towards the groups or cooperatives on which the farmer is a member, provision of insurance through farmers’ groups or cooperatives making them a formal insurer agent can help the insurance scheme penetrate even the non-progressive farming communities which will contribute to the increased adoption of livestock insurance in Nepal.
Keywords: adoption; awareness; insurance; livestock; membership

1. Introduction
Agriculture is the principal contributing sector to the Nepalese economy that shares 27% Gross Domestic Product (GDP) and livestock sub-sector alone contribute 24% to agricultural GDP (MoALD, 2019). Although the growth rate of the livestock population has accelerated from 0.73% to 1.23% per annum during last two decades from 1995 to 2015 in Nepal (Upadhyay et al., 2017), limited access to livestock health, technical advisories, and veterinary services are making livestock business quite unpredictable and vulnerable enterprises (Adhikari & Bidari, 2018). Mortality rates for cattle and buffalo range between 2% and 3% and somewhat higher for small animals in Nepal (World Bank, 2009). Disease accounts for 78% of livestock risks (Hosseini & Zadeh, 2011). Other livestock production risks include natural disasters such as earthquake, floods, fire, etc. Risks if occur cause huge loss to the farmers being unable to cover their farming and living expenses (Rahimi, 2000). The risks need to be covered or supported to stabilize farm income. Being a risky enterprise, the livestock sector seeks an effective risk-bearing mechanism.

Livestock insurance started in Nepal after the Insurance Board released Crop and Livestock Insurance Directives in January 2013. At present, twenty non-life insurance companies are doing agricultural insurance which is mandatorily assigned to different districts for coverage all across the nation. Until 2018, insurance for more than seventy products including vegetables, rice, fruits, potato, livestock, etc. has been provisioned in the directives (Timsina et al., 2018). The livestock sector covers more than 75% of the agricultural insurance markets (Insurance Board, 2019). Valuation is a critical step in insuring livestock which is done based on the market price. Insured farmers have to pay 5% of the total insured amount as a premium for which they receive a 75% subsidy from the government. Risk coverage includes death and permanent disability, in which 90% and 50% of the total insured will be reimbursed, respectively (Insurance Board, 2017).

The agricultural insurance penetration for Nepal is only 1.10% which is the lowest in Asian countries (Thapa & Adhikari, 2018). This indicates the adoption of agricultural insurance including livestock insurance is low. There are several aspects of adoption that have been poorly understood despite livestock insurance being an effective risk management tool. Very few studies have been previously done on factors affecting livestock insurance adoption in Nepal. Kandel and Timilsina (2018) found total adult dairy animals, membership holding by the farmers, extension contact of farmers, and knowledge on premium subsidy schemes as the significant factors affecting livestock insurance adoption. Similarly, Subedi et al. (2021) noted that cattle breed, access to loan, income from livestock, and the number of cattle reared were key factors affecting livestock insurance adoption in Nepal. Understanding the factors that influence farmers’ decision to adopt livestock insurance is paramount to upscale its adoption (Chizari et al., 2003; Mohammed & Ortmann, 2005; Otieno et al., 2006). This study contributes to an increased understanding of the factors influencing adoption decisions of livestock insurance which have become quite relevant to extend its adoption through better policy actions in Nepal. Therefore, this study focuses to identify the determinants of livestock insurance adoption to draw some policy implications from the results and help develop a better extension strategy to increase the adoption of livestock insurance.

2. Methodology

2.1. Study sites, sampling, and data collection
The study was conducted in eight districts, namely, Jhapa, Rupandehi, Nuwakot, Tanahun, Kaski, Syangja, Palpa, and Surkhet. Out of these, the first two districts represented terai, whereas the remaining districts represented hill ecology. These districts with higher insurance adoption compared to other districts were selected purposively through key informant interviews (KII). In consultation with the government agriculture extension officers of respective districts, pocket areas of the farmers who had insured their livestock in insurance companies under Crop and
Livestock Insurance Directives were identified. From those identified insured farmers, 245 livestock insured farmers were selected using a simple random sampling technique. Similarly, 170 non-insured farmers were selected randomly from the same pocket areas. Primary data were collected between September 2017 and May 2018 through a cross-sectional household survey employing a semi-structured interview schedule. Pretesting was done with 10% of the total respondents to validate the interview schedule. Secondary information was obtained from government publications, relevant journal articles, reports, and working papers.

2.2. Analytical tools

Data obtained from the household survey were analyzed using descriptive statistics i.e., frequency and percentages, index of scoring, and probit regression analysis. Data were analyzed in MS Excel and STATA 15.

2.2.1. Scaling and indexing

The scaling techniques are very useful to quantify qualitative information and helps to identify the strength of agreement and disagreement on a particular statement (Kerlinger, 1983). The index of severity was prepared for livestock production risks based on response frequencies. Respondent’s perception to livestock production risks was ranked by using five-point scale compromising very high, high, intermediate, less, and least severe by using 1, 0.8, 0.6, 0.4, and 0.2, respectively. The following formula was used to find the index for ranking the risks associated with livestock. The priority index for each variable was calculated by weighted average mean to derive appropriate ranking.

\[ I_{sev} = \Sigma s_j f_j / N \]

where, \( I_{sev} \) = index of severity of the problem

\[ \Sigma = \text{summation} \]

\[ s_j = \text{scale value at jth severity} \]

\[ f_j = \text{frequency of jth severity given by the respondents} \]

\[ N = \text{total number of respondents.} \]

2.2.2. Model specification for factors influencing the decision to adopt livestock insurance

Probit and logit regression models are often used to predict the probability of adoption in which the dependent variable is dichotomous (Gujarati, 1998). Both models provide equally efficient parameters (Demaris, 1992). The statistical similarities between the probit and logit model make it difficult to choose between them (Amemiya, 1981). In the logit model, coefficients can be interpreted in terms of odd ratios. However, the probit model has been used for this study so that the interpretation can be made based on the marginal effect on the probability of adoption. Furthermore, the probit model has been used in several studies on the adoption of agriculture insurance. Velandia et al. (2009) used the probit model to study factors affecting farmers’ utilization of crop insurance as an agricultural risk management tool. Likewise, Kumar et al. (2011) and Pandaraiah and Sashidar (2015) used the probit model in their study on farmer’s perception and awareness towards crop insurance. Similarly, Falola et al. (2013) also used the probit model to study willingness to take agricultural insurance by cocoa farmers in Nigeria.

In this study, the probit model includes dependent variable as the condition of livestock insurance adoption where 1 represents insured and 0 for not insured. The model is mathematically expressed as:

\[ Y_i = \alpha + \beta_1 X_{i1} + \ldots + \beta_6 X_{i6}, \text{ where } P(Y_i = 1|X_i, 1, X_i, 2, \ldots, X_i, 6) = \Phi(\alpha + \beta_1 X_{i1} + \ldots + \beta_6 X_{i6}) \]
where $Y_i =$ Adoption of livestock insurance

$\alpha =$ Regression coefficient

$\beta_i =$ Probit coefficient

$X_i =$ Set of explanatory variables

$\Phi =$ cumulative distribution function of the standard normal distribution.

The marginal effect on the probability of adoption was also calculated using the following formula:

$$\frac{\partial P_i(Y_i = 1|X_i, X_{i2}, \ldots, X_{i6})}{\partial X_i} k = \phi(Z) \beta_k$$

Where $\phi(Z)$ is the standard normal density function.

Table 1 presents six independent variables that were used in the model for factors influencing livestock insurance adoption. The variables used were membership, loss experience, awareness, training, access to an insurance agent and animal type. Membership of farmers in groups or cooperatives may be a trustworthy means to get information on insurance and nudge farmers to adopt due to group confidence. So, membership is expected to be positively associated with the decision to adopt livestock insurance. A farmer who experienced loss in the past is hypothesized to

| Variables                  | Type    | Description                                         | Value                                      | Expected sign |
|----------------------------|---------|-----------------------------------------------------|--------------------------------------------|---------------|
| Dependent variable ($Y_i$)| Dummy   | Adoption of livestock insurance                      | Adopter = 1, Otherwise = 0                |               |
| Independent Variables ($X_i$) |         |                                                     |                                            |               |
| Membership ($X_{i1}$)      | Dummy   | Membership of the respondents in the groups/cooperatives | Yes = 1, No = 0                          | +             |
| Loss experience ($X_{i2}$) | Dummy   | Whether the respondents had experienced livestock loss in last five years | Loss occurred = 1, Otherwise = 0         | +             |
| Awareness ($X_{i3}$)       | Dummy   | Whether the respondents are aware of livestock insurance | Yes = 1, No = 0                          | +             |
| Training ($X_{i4}$)        | Dummy   | Whether the respondents have received training on livestock insurance | Yes = 1, No = 0                          | +             |
| Access to insurance agent ($X_{i5}$) | Dummy | Whether the respondents have access to insurance agent | Yes = 1, No = 0                          | +             |
| Animal type ($X_{i6}$)     | Dummy   | Type of animal reared                                | Improved = 1, Local = 0                  | +             |
be more likely to adopt livestock insurance in order to minimize future risk. Awareness of insurance will increase farmers’ ability to obtain information relevant to livestock insurance and hence will increase the probability that a farmer will adopt livestock insurance. These variables had also been used as factors influencing insurance adoption by Abdulmalik et al. (2013) and Babalola (2014) in their studies on determinants of agricultural insurance adoption. Training can influence farmers’ decision to adopt livestock insurance positively.

Access to insurance agent would be expected to increase the probability to adopt livestock insurance due to the easy availability of insurance services. This variable has also been used by Nahvi et al. (2014) in his study on factors affecting farmers to participate in agricultural insurance. An improved animal, which is a cross-bred of local with exotic breeds, require higher investment and have a higher risk to mortality than local. S. P. Singh and Chandel (2019) have included the percentage of cross-bred in a herd (%) as one of the independent variables to analyze determinants of livestock insurance adoption. Hence, it is hypothesized that farmers rearing improved breed will increase the likelihood to adopt livestock insurance. The inclusion of the mentioned six independent variables in the probit regression model is based on the literature review, field of interest, and practical knowledge. The model has been built with the approach to reduce explanatory variables until the most appropriate model was predicted. Inclusion of some relevant explanatory variables in the model for e.g., enterprise diversification, kinds of livestock raised, and some basic demographic information of the respondents, such as gender, age, education, and income have been avoided as it led to instability in numerical estimates and maximized standard errors. This limitation points to the need for further research. This study can be used as a groundwork for more complete research in the future on factors influencing the decision to adopt livestock insurance.

3. Results and discussion

3.1. Sociodemographic characteristics of the respondents

Results in Table 2 show that insured and non-insured farmers both had an average age of 45 years. The respondents were predominantly male, i.e., 84% insured and 65% non-insured farmers. The predominance of males indicates that livestock enterprise is labor-intensive mainly involving male who is also the head of the family (Babalola, 2014). The average years of schooling for both insured and non-insured farmers were equivalent to a secondary level. The literacy level positively influences the adoption of innovations and insurance policy (Fawole & Fasina, 2005; Mohammed & Ortmann, 2005). Most of the insured farmers (95%) and less than half of the non-insured farmers had membership in the group/cooperatives. Dairy cooperatives in the village level played an active role in disseminating information about livestock insurance to the farmers. Very few respondents (less

| Characteristics               | Insured farmers (n = 245) | Non-insured farmers (n = 170) |
|-------------------------------|---------------------------|--------------------------------|
| Age (average years)           | 45                        | 45                             |
| Gender                        |                           |                                |
| Male                          | 206 (84)                  | 110 (64.7)                     |
| Female                        | 39 (16)                   | 60 (35.3)                      |
| Education (years of schooling)| 8.5                       | 7                              |
| Group/cooperative Membership  | 233 (95)                  | 80 (47)                        |
| Training received             | 23 (9.4)                  | 9 (5.3)                        |

Figure in parentheses represent percentage.
Source: Field study, 2018 & 2019.
than 10%) had received training on livestock insurance. Limited training has led to a knowledge gap among farmers on the critical importance of agricultural insurance.

3.2. Description of insured farmers characteristics
In Table 3, the characteristics of insured farmers are described. Nearly two-thirds of the insured farmers had experienced livestock loss. Makaudze and Miranda (2009) stated that the insured farmers are likely to have experienced significant losses in the past. Farmers with risk experiences will have more reasons to seek insurance and raise awareness of other farmers with no experience (Babalola, 2014).

Only one-third of the insured farmers had enterprise diversification, i.e., livestock and mixed enterprise as the alternative risk management strategies, other than insurance. Farmers tried to diversify their farming activities due to poor resource ownership, to minimize risk, and gain advantage from multiple income sources. Farmers with enterprise diversification are less likely to purchase livestock insurance as the income loss in one enterprise is compensated by income from another enterprise (Mohammed & Ortmann, 2005). Barnett et al. (1990) found a negative correlation between diversification and insurance uptake.

| Characteristics                      | Insured farmers (n = 245) |
|--------------------------------------|---------------------------|
| Experience of livestock loss         | 167 (68)                  |
| Enterprise diversification           | 83 (33.8)                 |
| Insured animal                       |                           |
| Cattle                               | 175 (71.4)                |
| Buffalo                              | 51 (20.8)                 |
| Goat                                 | 19 (7.8)                  |
| Source of information                |                           |
| Insurance companies/agents           | 30 (12.3)                 |
| Government offices                   | 129 (52.7)                |
| Media (newspapers, tv, radio)        | 15 (6)                    |
| Neighbor/friend                      | 32 (13)                   |
| Farmer's groups/Cooperatives         | 39 (16)                   |
| Mandatory insurance                  | 50 (20.4)                 |
| Awareness on premium subsidy         | 186 (76)                  |
| Extent of the desired premium        |                           |
| 1%                                   | 33 (13.5)                 |
| 3%                                   | 115 (47)                  |
| 5%                                   | 43 (17.5)                 |
| 7%                                   | 6 (2.5)                   |
| 9%                                   | 3 (1.2)                   |
| More than 9%                         | 7 (2.8)                   |
| Don't know                           | 38 (15.5)                 |
| Continue insurance without subsidy   | 208 (85)                  |
| Access to insurance agent            | 52 (21)                   |
| Satisfied with the insurance procedure| 217 (88.6)             |

Figure in parentheses represent percentage.
Source: Field study, 2018 & 2019.
Table 4. Ranking of livestock production risks

| Risks                  | Index value | Rank |
|------------------------|-------------|------|
| Diseases               | 0.93        | 1    |
| Internal parasites     | 0.76        | 2    |
| Infertility            | 0.70        | 3    |
| Wild animals attack    | 0.60        | 4    |
| Fire                   | 0.22        | 5    |

Figure in parentheses represent percentage.
Source: Field study, 2018 & 2019.

About two-thirds of the insured farmers had purchased insurance for cattle followed by buffalo and goat. Cattle are the most popular animal class owned by 68% of households in Nepal (World Bank, 2009).

About half of the insured farmers (53%) received information on livestock insurance through government offices. Government offices were the major source of information on livestock insurance (Kumar et al., 2011). About 20% of the insured farmers had adopted insurance due to mandatory provision. The government-supported agricultural programs like Youth Focused Program are compulsorily linked with agricultural insurance and farmers joined insurance to receive grants or support (Timsina et al., 2018).

Knowledge about the premium subsidy schemes is a significant factor affecting livestock insurance adoption (Kandel & Timilsena, 2017). About 76% of the insured farmers had the idea of the premium amount they need to pay and the subsidy they receive from the government. The insured farmers perceived premium at present (5%) is less affordable and for nearly half of them (47%) the extent of the desired premium was 3%. Farmers were willing to pay less premium because of the mindset that they don’t get any payback in cases they don’t bear any loss. The high cost of the premium is the most important limiting factor to adopt insurance (Jokhio et al., 2016). The purchase of insurance becomes more attractive when the government subsidizes the premium (Eidman, 1990). However, about 85% of the insured farmers were willing to continue insurance without subsidy as they felt high risk for their enterprise, which is the major source of income for the household.

Only about 21% of the insured farmers have accessibility to the insurance agents in their locality and the rest of them went direct to the insurance companies. Access to insurance agents helped farmers in better understanding the insurance procedure and its benefits ultimately motivating them to insure their livestock. However, the lack of insurance service is the major hindering factor for the adoption of agricultural insurance in Nepal (Ghimire et al., 2016a). One of the factors related to low insurance adoption is an insurance agent’s failure to approach farmers to explain the policies (Jokhio et al., 2016). About 89% of the insured farmers were satisfied with the valuation and loss assessment procedure for livestock insurance. Valuation and loss assessment procedures for livestock insurance are convincing and easy to understand by the farmers compared to crops (Insurance Board, 2017).

3.3. Livestock production risks

The ranking of livestock production risks indicated that diseases are the most severe problem in livestock production which is shown in Table 4. Livestock is predominantly exposed to the risks of death caused due to several diseases with mortality rates ranging from 80% to as high as 100% (World Bank, 2009). The risk of death due to diseases is the most important factor for the farmers to insure livestock (Chizari et al., 2003; Jokhio et al., 2016).
Table 5. Factors affecting adoption of livestock insurance in Nepal

| Variable            | Coefficient | Std. error | P>|z|  | dy/dx b   | S.E b     |
|---------------------|-------------|------------|-----|-----------|-----------|
| Membership          | 1.675***    | 0.233      | 0.000 | 0.538     | 0.053     |
| Loss experience     | -0.074      | 0.193      | 0.703 | -0.029    | 0.077     |
| Awareness           | 3.095***    | 0.462      | 0.000 | 0.738     | 0.031     |
| Training            | -0.249      | 0.294      | 0.397 | -0.097    | 0.112     |
| Access to insurance agent | 0.216 | 0.244      | 0.377 | 0.086     | 0.097     |
| Animal type         | 0.992***    | 0.193      | 0.000 | 0.369     | 0.064     |
| Constant            | -4.329      | 0.534      | 0.000 | -         | -         |

Summary statistics

- Number of observations (N) 415
- Log likelihood -122.52
- LR chi² (6) 316.65*** (Prob> chi² = 0.000)
- McFadden’s Rho-Squared or Pseudo R² 0.74
- Predicted probability 0.61

*** Significant at 1% level of probability.
Source: Field study, 2018 & 2019.
*Marginal change in probability (marginal effects after probit) evaluated at the sample means.

3.4. Factors influencing the decision to adopt livestock insurance

The results of probit regression analysis for the factors influencing the adoption of livestock insurance are presented in Table 5. The Wald test (LR chi²) for the model indicated that the model has good explanatory power at 1% level. This means that all the explanatory variables included in the model jointly influenced probability of adoption of livestock insurance. The Pseudo R² is 0.74, which means the variables included in the model were able to explain about 74 percent of the probability of respondents’ decision to adopt or not to adopt livestock insurance. The regression result showed that membership of groups or cooperatives, awareness on insurance and animal type reared were highly significant variables that influenced livestock insurance adoption at 1% level of significance.

3.4.1. Membership of groups/cooperatives

The regression result revealed that if the respondent is a member of groups or cooperatives, the probability of adopting livestock insurance increases by 54%. This finding is compatible with Kumar et al. (2011) that farmers’ participation in groups or cooperatives increased the probability of adopting insurance. Similarly, Ghimire et al. (2016b) reported that the group-based approach of insurance intervention was significantly contributing to the adoption of the insurance scheme in Nepal. Farmers groups and cooperatives act as a service provider of agricultural insurance in developing countries where the insurance market is underdeveloped (Mahul & Stutley, 2010).

Nepal has successful past experiences in livestock insurance through several communities’ participatory approaches. Different models of livestock insurance like credit guarantee protection, cooperative insurance, micro-insurance, and project-based insurance under the non-regulated insurance market existed over the past 20 years till the regulated insurance was executed through Crop and Livestock Directives, 2013 (World Bank, 2009). In 1987, the Central Bank of Nepal (Nepal Rastra Bank) in conjunction with the Deposit Insurance and Credit Guarantee Corporation (DICGC) developed livestock-credit insurance, where livestock insurance and credit were bonded to protect commercial bank’s lending to small farmers to purchase cattle, buffalo, and small ruminants,
which covered mortality and loss of working use of animals (Ghimire & Kumar, 2014; World Bank, 2009). Small Farmer Cooperative Limited (SFCL), also, has been using a similar model. Most of the SFCLs have formed their own livestock insurance committees and cover animal mortality and loss of use of the animal. The insured animals are provided with free tagging and free livestock veterinary inspections and vaccinations (Ghimire & Kumar, 2014; Thapa & Adhikari, 2018). The Third Livestock Development Project (TLDP) (1996–2005) and Community Livestock Development Project (CLDP), (2003–2010), linked livestock credit and insurance. Later, many farmer groups operated informal group insurance schemes by borrowing from group funds and offering up to 80% compensation in case of death and loss of animal use (ADB, 2006, 2011).

These livestock insurance models contributed significantly to increase the adoption of livestock insurance in Nepal. They provided credit-guarantee to the small-holding farmers and are linked to livestock loans through the cooperative and microfinance executing through community-based participation so that farmers felt ownership to it and became trustworthy. Therefore, farmers’ membership to groups or cooperatives is a significant factor determining the adoption of livestock insurance.

3.4.2. Awareness
The study revealed that awareness of livestock insurance would increase the probability of adoption by 74%. The probability of insurance adoption increases with the increase in awareness about the insurance (Aina & Omonona, 2012; Augustine et al., 2010; Babalola, 2014; Mohammed & Ortmann, 2005). In the study, the respondents were considered aware if they had received information on agricultural insurance through different sources like insurance companies/agents, visit with extension officials, media, groups/cooperatives, and neighbors/relatives. These sources particularly government offices and insurance companies/agents have played an important role in livestock insurance adoption by creating awareness among the farmers. Insurance companies/agents have participated actively in the program because the insurance procedure for livestock insurance is scientific and possesses less chance of moral hazards, for instance, tagging of insured animals ensures insurance companies identify the right insured animals (Insurance Board, 2017). Moral hazards arise from asymmetric information that changes insured farmer behavior after taking insurance policy in such a way that the probability of receiving indemnity payment increases (Miranda & Glauber, 1997). Awareness helped farmers to realize the need for insurance and understand the procedures of livestock insurance. Thus, awareness greatly influences adopting livestock insurance as a risk management strategy.

3.4.3. Animal type
Rearing improved breeds of the animals was another determining factor that increased the probability of adopting livestock insurance by 37% than those with local breeds. Firstly, improved breeds require high investment compared to local breeds and also have higher mortality than local breeds, which if occurred would cause heavy loss to farmers collapsing the enterprise. Secondly, farmers rearing improved breeds have higher income due to higher productivity so that paying premium also becomes quite affordable to them. An increase in the percentage of cross-bred in a herd increases the probability of adopting livestock insurance (S. P. Singh & Chandel, 2019). People’s need for insurance depends on their income level (Brown & McCord, 2000). The higher the income from livestock, the higher is the chance of insurance adoption (Chizari et al., 2003; Otieno et al., 2006). Thus, the farmers rearing improved breeds sought insurance to secure the risk.

4. Conclusion and policy recommendations
Livestock sub-sector has been a risky enterprise subjected to several production risks. Descriptive analysis revealed that nearly two-thirds of the insured farmers had experienced livestock loss. The major source of information to the insured farmers about livestock insurance was through government offices. Very few insured farmers (21%) had access to insurance services through agents in their locality. Most of the insured farmers (89%) were satisfied with the valuation and loss assessment procedure for the livestock insurance. Probit regression analysis revealed that
membership of groups or cooperatives, awareness, and animal type were the significant variables positively influencing farmers’ decision to adopt livestock insurance. Membership of groups or cooperatives influenced farmers’ decision to adopt insurance through awareness and group confidence towards the scheme. Several livestock insurance models through community participatory approaches, i.e., groups or cooperatives played important role in increased livestock insurance adoption through awareness and farmers’ participation. Awareness helped farmers to realize the importance of livestock insurance and provided complete procedural information. Farmers rearing improved breed adopted insurance due to higher investment and production risks associated with the livestock compared to local breeds. Greater income from improved breeds due to higher productivity also influenced farmers to adopt insurance due to the higher affordability of the premium.

Raising awareness among the farmers about the importance of insurance and related procedures is very crucial to increase insurance adoption. Public awareness campaigns should be intensified through the combined efforts of all the stakeholders including local government authorities, broadcasting media, insurance companies, and farmers or farmer’s groups/cooperatives. Groups or cooperatives can act as the service provider by making them a formal insurance agent that can promote livestock insurance. Accessibility of the insurance services even in the remote areas should be enhanced increasing the number of insurance or extension agents. These agents together with innovative farmers should be provided with appropriate training and insurance product manuals in the local language so that they can approach farmers and convince them to insure livestock.

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The author(s) declare that there is no conflict of interest with regard to this manuscript publication.

Data availability statement
The data that support the findings of this study are available from the corresponding author [DD], upon reasonable request.

Author’s contribution
DD was the principal investigator and conceived the presented idea. YNG and KPT verified the analytical methods and provided critical feedback on the manuscript. SS and HKP were responsible for the field study and drafting the manuscript. All authors discussed the results and contributed to the final manuscript.

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