



Research Article

LIVESTOCK FARMERS RISK PERCEPTION AND WILLINGNESS TO PAY FOR LIVESTOCK INSURANCE IN FLOOD-PRONE AREAS OF PUNJAB

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Abstract

Pakistan is the world's most susceptible country to extreme climatic events, such as floods. As such, for many years, the country has faced the risk of losses from natural calamities without crop insurance. However, in recent years, the national government has undertaken crop insurance initiatives in Pakistan. Consequently, there is limited knowledge available on the adoption of crop insurance in Pakistan. To fill this gap, this study aims to examine the factors influencing the willingness to pay for livestock insurance in flood prone areas of Punjab. Primary data were collected from 204 farm households through a structured interview in flood-prone areas of Punjab. Data was analyzed with descriptive statistics and logistics models. The explanatory analysis was used to further look at the socio-economic characteristics of livestock farmers through MS Excel and binary logistics models to test the willingness to pay livestock farmers for insurance. The results show a positive relationship between the perceived risk of Farmers and the willingness to pay for insurance programs. The findings of this study show that the probability of farmers' WTP is increased due to a better understanding of financial institutions and having more technical knowledge. The study results show that farmers with adult males are more likely to pay livestock insurance.

Keywords: Livestock theft, Insurance, Willingness to pay, Agriculture.

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1. INTRODUCTION

Floods are natural disasters that cause significant direct financial losses to society, particularly for the rural populations of poor nations where most flood prevention measures fall insufficient. According to Delay (2005), over 65% of the world's land mass is estimated to be over 196 million people, and they are exposed to devastating floods worldwide. Wescoat (1993) and other relevant sources provide plenty of evidence to support the idea that flood events are becoming more frequent and destructive. The current research investigation concentrates on floods and related damage perceptions and techniques in Pakistan, a nation that is extremely susceptible to floods. The study analyzes farmers' risk perception and WTP for

livestock insurance. The Indus River basin, which runs across about 75 % of the country's area, is a "poster child" for this extreme climatic event (Cook et al., 2013). Although there have been thirteen significant floods in the river basin since 1947 (Azam & Khan, 2010). The 2010 flood was the worst in terms of the number of people who drowned (about 2,000) and the resulting destruction of property (Webster et al., 2011). During this unforeseen catastrophe, almost 400,000 livestock were affected, and 2.1 million hectares of standing crops were flooded in rural regions (Webster et al., 2011). The catastrophe also had a significant financial impact on the public coffers, necessitating the reallocation of funds to rehabilitate those affected and restore the damaged



infrastructure in the lack of an insurance plan.

Worldwide warming can be ascribed to the rising frequency and degree of flooding. The relationship between increasing moisture levels and escalating air and sea surface temperatures has been the subject of multiple studies (Trenberth et al., 2005). Increasing moisture levels can trigger heavy precipitation events, raising the danger of flooding. Forecasts indicate that as a result of anticipated climate changes, Pakistan may have an even greater danger of flooding in the future (Rodriguez et al., 2012). The ongoing disintegration of the Himalayan and Siachen glaciers brought on by higher temperatures is another factor contributing to flooding in the Indus River Basin (Bolch et al., 2012). In a situation like this, more adaptation measures must be implemented to mitigate the intensity of the effects of flooding events. Both structural and non-structural flood mitigation strategies constitute components of these methods. Insurance against flood-related damages is one of the nonstructural strategies (Dawson et al., 2011).

According to Akter (2011), flood insurance is a useful mechanism for dissipating disaster risks due to climate change spatially and temporally in exchange for a predetermined benefit. However, it is still unclear if flood insurance is a sustainable mitigation strategy in many developing nations such as Pakistan. Despite Pakistan's long history of floods, no scientific study has been conducted to date that examines the acceptance and potential of flood insurance among rural flood survivors, according to the authors' knowledge. Nonetheless, a few studies on flood insurance in Bangladesh have been carried out and provide insightful information (Brouwer & Akter, 2010). To close this research gap, the current study examines the willingness to pay (WTP) for flood insurance coverage to mitigate financial risk in the wake of a catastrophic flooding event in Pakistan's flood-prone regions. It also seeks to investigate the variables that

affect the nation's acceptance of flood insurance and find out the answers to these questions. Do livestock farmers perceive floods, diseases, and climatic and animal as a risk to their business? Does risk perception have any impact on farmers' willingness to insure livestock? What are the factors that affect farmers' willingness to pay for insurance? Lastly, this study presents a conceptual framework that illustrates the relationships between WTP for flood insurance and several demographic, economic, and physical characteristics, as well as the degree of damages sustained in a previous flooding incident.

The remaining section of this paper has been organized as follows: The justification for implementing flood insurance to protect against flood risk is covered in the second part. The conceptual framework of the variables impacting willingness to pay more for flood risk mitigation is presented in the third section, and the research methodology, including the details of data collecting and the analytical strategy employed, is explained in the fourth section. In Section 5, the field survey results are then provided. The study's conclusions are covered throughout chapter six.

2. Mitigation of flood risk through flood insurance

Current literature indicates a higher likelihood of severe weather conditions, such as floods, in Pakistan and around the world (Hartmann & Andresky, 2013). Little work has been done by the government or private businesses currently to introduce any insurance against flood damage. Typically, the primary emphasis has been on ex-post relief and rehabilitation initiatives, which offer victims short-term respite but place a significant financial strain on the government. Governments nevertheless make an effort to lower the risk of flooding by constructing levees, dikes, and dams (Zhai et al., 2006). No empirical study has been conducted to examine the potential of non-structural measures like insurance as an

environmentally friendly flood risk management tool in Pakistan, despite their increasing popularity in the scientific community (Dawson et al., 2011). Flood insurance is an advantageous source of quick and prompt recuperation from financial losses resulting from direct impacts on crops, animals, and other assets. Still, it does not lessen the direct effects of flooding like building remedies do. From a broader ex-ante risk management viewpoint, it is seen as a crucial tool for emergency preparedness and mitigation (Linnerooth-Bayer et al., 2005). Furthermore, it eliminates the ambiguity around the possibility of receiving insufficient rewards from state-managed compensation programs (Seifert et al., 2013).

The insurance against flooding and climate change has been widely adopted in developed nations such as the US, England, France, and Germany (Akter et al., 2011). Households in many developing nations mainly rely on the government's special remuneration in the event of flood damage because these nations lack an insurance system for floods (Van Schoubroeck, 1997). In these situations, governments reluctant to take on these elevated risks may view a bigger role for private insurance firms as appropriate. However, because such hazards are communal, the government must take preventative measures to guarantee sufficient insurance coverage (Botzen & Van Den Bergh, 2008). To initiate and carry out insurance programs, the government must be involved in terms of constitutional regulations as well as financial and logistical support. Incentives to commercial insurance companies to start such programs and a partial payment subsidy for those with lower incomes could also be part of this (Thieken et al., 2006). However, Pakistan has not yet been able to develop any insurance scheme in its areas that are highly susceptible to flooding. The primary cause of the lack of success is the insufficiency of research in this field and the lack of

willingness of private businesses to launch comparable initiatives without government support. Even though the nation has a limited crop insurance program, which may encourage the government or private insurers to think about putting similar insurance in flood-prone areas, the program doesn't yet have an impressive result.

Carefully planned protection plans can reduce the financial damage linked to previous decades. The Pakistani government dealt with catastrophic events such as flooding individually in every situation. In general, it has depended more on national budgets and, to a lesser extent, on foreign funding for flood victims' restoration and compensation (FFC, 2012). However, as noted by Azam & Khan (2010) the Government has encountered financial roadblocks when attempting to revitalize private businesses and households and has frequently been compelled to implement additional taxes and budget reconfiguration. In the early aftermath of a catastrophic catastrophe like floods, this ex-post rehabilitation technique frequently experiences financial constraints (NDMA, 2012).

Pakistan possesses robust insurance programs that are primarily focused on life, automobiles, and property coverage and are operated in close association with the banking network (CDKN, 2012). Furthermore, a limited amount of catastrophe protection is already available in some areas of the nation. For instance, in areas designated as "natural calamity-hit" by the government, insurance companies provide payouts under crop insurance policies. The responsibility for identifying a certain region as having been harmed by a disaster is governed by the National Disasters Prevention and Relief Act of 1958.

3. A conceptual framework of the variables influencing WTP for flood insurance

Every intervention's acceptance is contingent upon multiple factors. The conceptual framework illustrates the

elements impacting WTP for flood insurance, drawing on ideas from (Clark et al., 2002; Botzen & Van Den Bergh, 2008; Botzen & Van Den Bergh, 2008; Akter et al., 2011). This solely covers the elements pertinent to Pakistan's socioeconomic setting. Age, education, money, prior experience with floods, and risk perception in the form of anticipated damages have all been found to be, in one way or another, determining variables in the research described.

3.1. Livestock theft in flood-prone areas

Livestock theft is a serious concern for farmers and rural communities, and Economic losses are proportional to the scale of farming (Abid et al., 2015). The respondents were willing to invest in radio frequency identification devices and advocated revising existing laws (Abbas et al., 2015). Some people believe livestock theft is as old as agriculture (Cook et al., 2013). Stock theft affects all provinces in South Asia, and in the majority of those provinces, it has been categorized as an essential concern (Bolch et al., 2012). Livestock theft promotes tensions and, in certain cases, can turn dangerous (Saqib et al., 2016). Most of those involved in cattle theft are organized integrates that collaborate with regular farmers and traders (Webster et al., 2011). Livestock theft in Lesotho is mainly due to the growing poverty among unemployed laborers and farmers of famine-stricken crops, and its impact on stock farmers could be devastating (Bhutto & Bazmi, 2007). Livestock theft limits household ability to leverage their assets to sell the rest of their livestock in the market and use the proceeds to obtain essential food and non-food products (Abbas et al., 2015). Farmers may need to evacuate their livestock to safer grounds during floods, making monitoring and securing them challenging. Additionally, flooded areas might become inaccessible, hindering the efforts of law enforcement and farm owners to reach the affected areas promptly (Spence et al., 2011). Livestock theft in flood-prone

regions can have severe economic consequences, as farmers may already be dealing with the aftermath of natural disasters, including property damage and crop losses (Michel-Kerjan & Kousky, 2010).

H1. Farmers in flood-prone areas of Punjab face high risk to their livestock business and willing to pay for insurance.

3.2. Risk perceptions and willingness to pay

The perceptions of real risks are different because they are affected by a wide range of related, cognitive, contextual, and individual factors (Slovic et al., 2010). Farmers' perceptions of long-term or short-term climate change are the first important indicator of the adaptation process (Demeritt et al., 2009). Risk perceptions and attitudes of farm households are important factors influencing farm production; rising temperatures and declining rainfall significantly influence the choice of adaptation strategy (Khan et al., 2020). A personal encounter with flooding, or any other disaster, is strongly correlated with age and academic achievement and has a major impact in risk perception and mitigation (Spence et al., 2011). Subjective intuition, the ability to subjectively predict the various likelihoods and consequences of unpredictable and dangerous events like flooding, affects people's risk assessments. Their impressions might be influenced by their prior flood experiences and the degree of damage sustained in those floods (Brouwer & Akter, 2010). Crop insurance has been one of the most successful risk management and long-term sustainability programs for farmers in many parts of the world (Saeed et al., 2023). Farmers who have experienced significant economic losses due to livestock theft may be more willing to pay for insurance coverage to protect their investment (Michel-Kerjan & Kousky, 2010). More specifically, the experience of flooding influences one's perception of risk, which shows up as concern, vigilance, and heightened readiness to deal with the disasters and

willingness to pay (Abbas et al., 2015). Cattle herders with higher education levels, number of cattle, level of risk perception, awareness, and agreement are more likely to purchase livestock insurance in grassland areas (Botzen & Van Den Bergh, 2008). Policymakers and insurers should design programs that will educate herders on livestock insurance while recognizing other critical factors that influence households to purchase insurance.

H2. Framers having high-risk perceptions are more inclined to ensure livestock farms and are willing to pay.

3.3. Willingness to Pay

The model we propose takes into account perception in the proposed intervention (insurance) as an important component of the decision-making process on paying for or not paying for flood insurance. As noted by Glenk & Fischer (2010) the perception of the effect of the proposed intervention also plays a vital role in deciding for an alternative. Insurance is potentially an important means of transferring a portion of the risk; they seek to assess the willingness of the smallholder farmer to pay for rain risk insurance and observe factors that

affect the farmer's willingness to pay the amount (Hiwot & Ayalneh, 2015). The regularity and severity of the previous weather-related extremes, socio-economic settings, farm typology, and the farming communities' ability to pay need to be taken into consideration when introducing crop insurance programs against floods or drought in Pakistan (Arshad et al., 2016). In this case, the WTP is further clarified by the interviewer's age, basic insurance knowledge, and the village's fixed effects. Basic knowledge of insurance, in particular, can increase WTP by about 60% (Castellani, 2017). Moreover, disseminating awareness in farming communities regarding the future changes in climate and the related risks of the existence of extreme weather incidents is important (Hiwot & Ayalneh, 2015). The willingness of rural households to pay insurance premiums is not significantly affected by the risk of floods but by their financial position (Abbas et al. 2015). Farmers with more experience in raising dairy animals are more likely to be willing to pay livestock and buffalo insurance (Khan et al., 2020). The farmer's

Table. 1. Relevant Literature

Author name	Year	Title
Abbas, Azhar.	2015	Non-structural flood risk mitigation under developing country conditions: an analysis on the determinants of willingness to pay for flood insurance in rural Pakistan
Saeed, Rashed Ali, Waqas	2023	Weather-Induced Risks, Mitigation Strategies and Farmers' Willingness to Participate in Flood Insurance Scheme in Punjab, Pakistan
Spence, A. Poortinga.,	2011	perceptions of climate change and willingness to save energy related to flood experience
Clark, D. E. Novotny	2002	Willingness to pay for flood and ecological risk reduction in an urban watershed
Zhai, Guofang Sato, Teruko Fukuzono	2006	Willingness to pay for flood risk reduction and its determinants in Japan

willingness to pay for this scheme (WTP) will depend on their gender, income, cultural standards, breed of cattle, and economic value of the animal (Thieken et al., 2006). Most of the LFs are experienced in the age and have a low degree of training and are fulfilled with respect to pay level. They show that age, training, and landholding are huge determinants of readiness to pay (Saeed et al., 2023).

H3. Attributes of the farmer have a significant impact on WTP for livestock insurance.

4. Methodology

4.1. Study Area and Data Collection

Four districts of the Punjab region, Dera Ghazi Khan, Layyah, Muzaffargarh, and Rajanpur, that have experienced flooding were the subject of this investigation. The importance of agriculture in the area, the frequency of previous flooding, and the scope of the damage caused by floods were taken into consideration while determining these districts. Official conversations were held with local disaster management officials to ensure that the farm households impacted by the 2010 disaster were fairly represented. Province has 48% of Pakistan's cattle, 66% of the buffaloes, 25% of the sheep, and 38% of goats. South Punjab covers a major part of livestock, having 452,000 sheep, 254,000 goats, 50,000 camels, 576,000 cows, and 19,700 buffaloes (SPLF 2018). Primarily, a multiphase random sampling strategy was used to gather field data. Four flood-affected villages from each of the districts that were chosen randomly were chosen from a list of all the flood-affected villages that each district's deputy district officer (disaster management) presented. Seventeen respondents were chosen randomly from the list of agricultural homes impacted by the flooding that the Numberdar (village head) provided for each village. These participants functioned as the study's actual sample units. Due to the socioeconomic circumstances of Pakistani rural families and the impossibility of initiating and executing a web-based or

postal survey, a face-to-face methodology for survey administration was used.

Table. 2. List of interviewed farmers

Districts	Tehsils	No of interviewed farmers
Dera Ghazi Khan	Kotchutta	17
	Tounsa	17
	D G Khan	17
Layyah	Chaubara	17
	Karorlal	17
	Layyah	17
Muzafargarh	Jatoi	17
	Ali pur	17
	Kotaddu	17
Rajanpur	Jampur	17
	Rojhan	17
	Rajanpur	17

4.2. Analytical approach

The questionnaire was divided into two sections. Socio-economic households, flood damage, disease damage, theft, and risk perceptions towards insurance procedures. Following an inclusive description of the mock livestock insurance program, participants were asked questions about willingness to pay. First, participants are asked if they want to participate in the proposed livestock insurance program. Participants who answered "no" to the initial WTP question were asked the reasons for not buying livestock insurance. Participants who cited a lack of income as a reason for not participating in the insurance program were also asked about their type of payment preferences and asked to show the livestock-based WTP as much as possible. A portion of the participants who said 'yes' to the initial WTP question was followed by a diagnostic question that asked participants for a monthly premium of 3 to 8 bids. Bid levels are randomly assigned to participants to avoid bias (Carson & Mitchell, 1993). Yes / No: the question is followed by two closed WTP questions, asking the respondents if they are willing to pay more or less. Participants who said limited financial resources or limited cash income were the main reasons for not paying the

monthly premium were asked if they were willing to pay. Participants who agreed to the payment type were asked to show their final WTP in open format.

venture. The WTP is utilized as a double factor dependent on whether ranchers were pay domesticated animals' protection. A logistic model methodology is utilized to

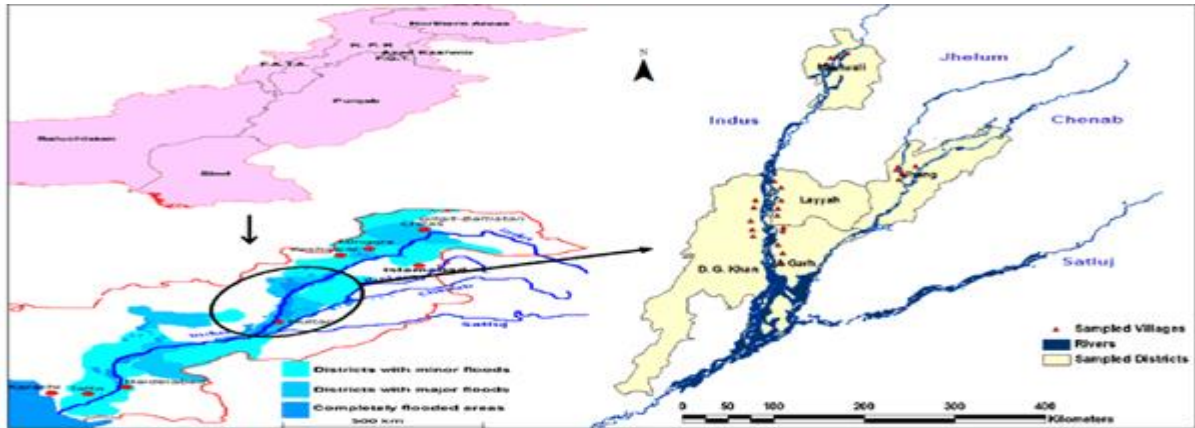


Figure.4.1.flood-pron Areas in Punjab

4.3. Contingent Valuation Method:

Agricultural insurance features selected assets. Considerable research has been done on the consent of agricultural farmers to pay for insurance (WTP). However, the WTP of livestock farmers can be measured by the Invasive Assessment Method (CVM). CVM is perhaps the most widely recognized non-market estimation technique. CVM is an economical technique for assessing non-market resources based on surveys. Maximum WTP premium can be obtained through the WTP open-end, and there are two other types of questions (yes/no) (xing et al., 2003). The view of threat will be used in the examination as 1 if the rancher considers the danger as high and 0 in any case.

4.4. Logistic model

The logistic model explains the association of random variables with binomial variables. More specifically, the logit model or logistic regression model describes the probability of action of one variable with respect to another. In the desired case, the lack of dispensary infrastructure for livestock compels the farmers to pay more for the insurance program. Moreover, if the infrastructure is well developed, then farmers are not willing to pay high for insurance programs. We examined the major factors that affect farmer WTP in the livestock insurance

survey the effect of different financial elements on ranchers' choices. Information is dissected with descriptive statics and logistic model methodology. The explanatory investigation is utilized to further look at the socio-economic characteristics of livestock farmers via MS Excel and binary logistics models to test the WTP of livestock farmers for insurance. The equation is below (i).

$$Y_i = b_0 + b_1 + b_i X_i + \mu_i \quad (i)$$

Y is a dependent variable. Y represents a farmer's willingness to pay a premium in the livestock insurance, where $Y_i=1$ if the respondent is willing to pay, and $Y_i=0$ otherwise. X_i is the vector of independent variables like age, education, income, land holding, household size, household member, farming experience, availability of animal dispensary, access to government livestock extension service, outbreak of animal diseases, climate changes, theft issue, which affects the farmer's decision. For example, if farmers have more household members, they are more likely to pay a premium for livestock insurance. If farmers have low and small household sizes, they are more willing to pay livestock insurance. Similarly, if farmers have no animal dispensary, they are more willing to pay livestock insurance. If farmers do not have access to livestock extension services, they are very likely to pay livestock

insurance. If farmers have theft issues, climate change problems, and outbreaks of animal diseases, they are more willing to pay livestock insurance. β_i is the vector of Coefficients to be determined, and μ_i is the unobserved error term. Following Velandia et al. (2009) We calculated the marginal effects of particular explanatory variables on the logistic layoff when taking out livestock insurance.

5. Results of the WTP study

5.1. Descriptive analysis of the variable

In descriptive statistics, we use farmer's willingness to pay for the domesticated animals' protection as a dependent variable, specifically whether the ranchers are ready to buy animal protection or something else, where 1 addresses ranchers' ability and 0 non-ability. This study used 17 independent variables categorized into different groups, as shown in Table 1.

Table. 3. Descriptive statistics

Variable	Mean	SD	Min	Max
Dummy for WTP(1/0)	0.275	0.4476348	0	1
Lost animal from any diseases	0.805	0.3971949	0	1
Climate change has serious effect	0.885	0.3198225	0	2
Experience outbreak animal diseases	0.79	0.4083303	0	1
Experience theft animals	0.705	0.4571872	0	1
Adult Male(16-65)	2.08	1.296923	0	8
HHM	7.72	3.352281	0	32
No of earning HHM	1.285	0.5148791	1	3
Access to govt. LES	0.24	0.4281549	0	2
Animal dispensary (1/0)	0.1	0.3007528	0	1
Awareness of livestock insurance	0.3	0.4594075	0	1
Household members	12.405	7.119298	0	40
Rainfall decreased over the year	0.63	0.4840159	0	1
I feel insecure about animals theft	0.905	0.2939507	0	2
Sources of irrigation	1.899	0.9185661	0	1
Decline growth of meat animals	0.95	0.2184919	0	2
Farming experience(Years)	17.715	6.685601	5	40
Exp. productive capacity of animals	0.77	0.4218886	0	1
Number of Observations				204

Socio-economic factors are adult males under 15-65 years old, family size, household size, farming experience, and several earning household members. The classes of hazard chances incorporate danger impressions of floods, robbery, and sicknesses. For admittance to domesticated

animals' augmentation administration, we utilized a dummy variable, where 1 shows the ranch family approached expansion administration and 0 in any case. Moreover, the

The entrance animal protection variable was utilized as a spurious variable coded as 1 for ranch households aware of livestock insurance and 0 otherwise.

The average household size of the farming households was 40. While in occupation, 89.5% are farmers. The economy of central and southern Punjab is agriculture-based. If the number of earning household members is more than 1 or you have migrant members, they are easy in livelihood. Most farmers have animals in south Punjab areas, but their animal dispensary is too far. Therefore, the cost of animal' treatment is high. The police station is too far, which affects theft. 76% of farmers said that they

have not accessed government extension services.

5.2. Estimation Results:

5.2.1. Factor affecting willingness to pay for insurance

The p-values describe the level of significance, and they describe the changes

in acceptance and rejection of the null hypothesis. Smaller values of p indicate more chances of rejection of the null hypothesis and acceptance of the alternative hypothesis. The significance value of p is 0.05 ($p \leq 0.05$). This model explains the probability of farming household WTP if livestock insurance. In Table 4, Marginal effects are estimated to resolve this issue of interpretation because Marginal Effects provide a better understanding and allow us to interpret the estimated coefficients of our explanatory variables.

In this model, adult males significantly positively impact the WTP of livestock insurance. One percent increase in age will increase the probability of WTP of livestock insurance by 5%. This means adult male farmers are interested in taking livestock insurance. The result shows a positive link between adult males of family head and the probability of WTP. Household members have a non-significant negative impact on farmers' WTP of livestock insurance. A one percent decrease in the number of household members will

Table. 4. Factors affecting willingness to pay (WTP)

Variables	Coefficient	Std. err.	P value	Results
Adult Male(16-65)	0.3372566	0.1939345	0.082	Non- significance
HHM	-0.1233208	0.0889497	0.166	Non- significance
No of earning HHM	0.6306402	0.4154448	0.129	Non- significance
HHS	0.0973179	0.0336232	0.004	Significance
Farming experience	0.0548955	0.0308719	0.075	Non- significance
Sources of irrigation	0.8112403	0.2472953	0.001	Significance
Availability animal dispensary	-1.857668	0.8940211	0.038	Significance
Access to govt. LES	-1.137525	0.5781036	0.049	Significance
Decline growth of meat animals	1.308042	1.325785	0.324	Non- significance
Lost animal from any diseases	-0.5015157	0.5413114	0.354	Non- significance
Exp. productive capacity of animals	-0.687556	0.5012913	0.170	Non- significance
Experience outbreak animal diseases	-0.6878652	0.5401823	0.203	Non- significance
Climate changes has serious effect	-1.582511	0.6150679	0.010	Significance
Rainfall decreased over the year	-0.6437733	0.4502273	0.153	Non- significance
Experience theft animals	-1.115131	0.5288828	0.035	Significance
I feel insecure about animals theft	0.1044348	0.7465101	0.889	Non- significance
Awareness of livestock insurance	-1.03398	0.5538988	0.062	Non- significance
Adult Male(16-65)	0.0550464	0.03209	0.086	Non- significance
HHM	-0.0201282	0.0147	0.171	Non- significance
No of earning HHM	0.1029319	0.06615	0.120	Non- significance
HHS	0.015884	0.00557	0.004	Significance
Farming experience	0.0089599	0.00493	0.069	Non- significance
Sources of irrigation	0.1324091	0.03979	0.001	Significance
Availability animal dispensary	-0.1940645	0.05896	0.001	Significance
Access to govt. LES	-0.1579311	0.06645	0.017	Significance
Decline growth of meat animals	0.1476668	0.09254	0.111	Non- significance
Lost animal from any diseases	-0.0890145	0.10381	0.391	Non- significance
Exp. productive capacity of animals	-0.123059	0.09593	0.200	Non- significance
Experience outbreak animal diseases	-0.1245944	0.10654	0.242	Non- significance
Climate changes has serious effect	-0.3323909	0.14215	0.019	Significance
Rainfall decreased over the year	-0.1085005	0.07792	0.164	Non significance
Experience theft animals	-0.2074835	0.10791	0.055	Significance
I feel insecure about animals theft	0.0166216	0.11565	0.886	Non-Significance
Awareness of livestock insurance	-0.148334	0.06872	0.031	Significance

increase the probability of WTP of livestock insurance by 2 percent. The results were that the household members of farmers negatively influence WTP. While household size has a significant impact on smallholder farmers' WTP of livestock insurance. This will increase the probability of WTP by 1 percent. The number of earning household members has a non-significant and positive impact on farmers' WTP of livestock insurance. A one percent decrease in the members of earning households will increase the probability of WTP of livestock insurance by 10 percent. Farming experience significantly impacts the smallholder farmers' WTP of livestock insurance. This will increase the probability of WTP by 0.8 percent. The source of irrigation also has a significant impact on farmers' WTP of livestock insurance. This will increase the probability of WTP by 13 percent. The availability of animal dispensaries has a significant and negative impact on farmers' WTP of livestock insurance. This will decrease the probability of WTP by 19 percent.

Rainfall decreased over the year due to climate changes. Farmers have experience with the productive capacity of animals, and they said growth in animals declines over the year. Most of the farmers have sources of irrigation that help for their productivity of crops and animals. All these factors are considered significant causes of farmers' willingness to pay for livestock insurance.

In Table 4, Marginal effects are estimated to resolve this issue of interpretation because Marginal Effects provide a better understanding and allow us to interpret the estimated coefficients of our explanatory variables. Table 2 shows the important determinants of farmers' WTP of livestock insurance.

6. DISCUSSION

Livestock, such as chicken, meat, and milk, contribute heavily to the revenue stream of countries. Researchers argue that livestock is one of the major parts of agriculture, but the climatic and non-climatic factors create

a disastrous effect on the livestock, and farmers are willing to protect livestock to earn their living (Bishu et al., 2018). However, farmers are reluctant to act due to a lack of knowledge and awareness. Researchers argue that major and minor floods are one of the major causes of livestock loss, and farmers of the current era are willing to spend heavily on insurance programs that reduce the risk of loss. The risk perception against livestock and insurance programs are positively linked, but a couple of criticisms were made against the spending. The results show a positive relationship between the perceived risk of Farmer and the willingness to pay towards insurance programs. However, previous studies show that the farmers who experienced diseases and flood losses are more willing to pay for insurance programs. The researchers argue that insurance programs are a reactive approach and allow the farmer to recover well after a great loss. However, efforts were made to adopt a proactive approach that allows the farmers to protect livestock from loss. The districts of Punjab face a problem of lack of livestock education and awareness (Abbas et al., 2015).

The findings of this study show that the probability of farmers' WTP is increased due to a better understanding of financial institutions and having more technical knowledge. The study results show that farmers with adult males are more likely to pay livestock insurance. Hiwot & Ayalneh (2015) concluded that farmers with more elderly can better understand the problems and take insurance. The farmers having more members for earning are less to take part in livestock insurance. Our study also found similar results to the above-mentioned study that adult males allow the farmers to take insurance. Our study found a significant relationship between farmers' probability of getting agriculture acceptance. The results of our several studies show that farmers with larger households are more likely to take insurance. In our society, household size is

considered an important status symbol. It is widely accepted for collateral taken by financial institutions.

Rainfall decreases due to climate changes, and climate changes have a serious effect on crops and livestock, so they are more likely to take part in livestock insurance. Different components might win for lower upsides of the contingent circulation. For this situation, the WTP is additionally explained by the questioner's age and essential information on protection, as well as the decent impacts of the town. Essential information on protection, specifically, can build WTP by about 60% (Castellani, 2017). A weather index-based insurance product should be explored specifically for floods while seeing the current risk management strategies used by farmers (Hartmann & Andresky, 2013). Farmers with experience with the outbreak of animal diseases are more likely to take livestock insurance. Similarly, farmers who lost an animal due to diseases will likely take livestock insurance. Farmers who experience animal theft are more likely to pay livestock insurance. Similarly, farmers who feel insecure about animal theft are more likely to purchase livestock insurance. Farmers with livestock experience are more likely to take part in livestock insurance. Farmers with access to government extension services are less likely to take livestock insurance.

6.1. Conclusions and policy recommendations

Over the past few decades, Pakistan has seen severe floods, with a wide range of economic effects. Climate change has been associated with an increase in the frequency of flooding events in the country. The nation's current ex-ante structural flood control policy and ex-post relief, compensation, and rehabilitation programs are primarily focused on by the government. This strategy has severely impacted the nation's financial resources because the frequency of flood occurrences is rising. In such a case, employing financial risk mitigation tools might be a

workable plan for long-term flood protection. Historical data, particularly from industrialized nations, indicates that purchasing flood insurance might be a practical way to manage the financial risk related to flood hazards. This approach has two main benefits: (1) it lessens the uncertainty about whether those impacted by floods will receive appropriate public compensation, and (2) it eases the financial strain on public finances. However, it's possible that the flood insurance success stories from well-off countries won't apply to developing nations. It's interesting to notice that, for instance, Pakistan has advanced much in flood insurance research and policy discussion. For Pakistani policymakers, the recent ex-ante study on WTP flood insurance among rural farmers reveals some crucial information.

Farmers experienced several disastrous experiences which compelled them to go for the insurance programs. The study determines that all the variables except a household member, availability of animal dispensary, access to government livestock extension service, lost animal from any diseases, experience productive capacity of animals, experience an outbreak of animals, climate change has a serious effect, rainfall decreased over the year, experience theft animals and awareness of livestock insurance used in this study a negative effect on the farmers WTP of livestock insurance. In this way, the study offers guidelines to the government to stream their policies. The government needs to pay more attention to streamlining its effective policies and enhancing awareness about livestock insurance among farmers. The insurance companies are aware of farmers' insurance, which saves the farmers from many risks like climate, diseases, and theft. Apart from that, the distance factor also matters a lot because we usually get insurance from the nearest sources. Therefore, insurance sources must be established near rural areas. So that smallholder farmers get agricultural insurance on time with no hassle of

traveling. It is also recommended that the government or insurance companies should provide proper training and education to farmers to create awareness and improve their skills. Research and education intended to raise awareness of the technique could lead to higher acceptance rates. This covers education about catastrophes and their mitigation, which is both governmental and private. Another study finding is that the WTP for flood insurance is mostly determined by one's ability to pay rather than by the kind and extent of damages sustained in a prior flood incident. The Government should take the initiative to give the proper livestock insurance plans like crop insurance. They should give subsidies on livestock insurance, which helps the farmers cope with risk. They should also give proper extension service, which helps the farmers with future natural calamities and diseases risk.

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