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EXTENDED ABSTRACT
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Climate Change and Agricultural Sector in the Sudurpaschim Province of Nepal: What Determines the Adoption of Climate Adaptation Practices?

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Nepal is highly vulnerable to the impacts of climate change, despite its minimal contribution of just 0.027% to global greenhouse gas emissions. The impacts of climate change are highly visible in the agricultural sector, affecting productivity, food security, and income. Climate variability and change are adversely affecting various aspects of the agricultural production system in Nepal, which necessitates the adoption of strategies for climate adaptation and resilience building. Agricultural producers face the challenge of deciding to adopt a combination of practices that simultaneously improve resource management, build resilience, and mitigate climate-induced risks, rather than implementing one practice at a time. The right combination of multiple climate change adaptation practices is crucial to improve farm productivity and reduce the negative impacts of climate change. The objective of this study was to identify different demographic, institutional, perceptual, and farm-specific variables that determine the adoption of twenty adaptation practices in Sudurpaschim Province of Nepal. For this study, we used data from the Climate Change Impact Survey of 2016 with a sample size of 700 households. Because of the count nature of the data, it was analyzed using Poisson regression model initially. A diagnostic test was performed that showed the presence of overdispersion of count data, which was then corrected by using the Negative Binomial Regression (NBR) model. A goodness of fit test using the log-likelihood value was used to compare the Poisson and NBR. The log-likelihood values indicated a larger value for NBR than Poisson regression, implying that the NBR model fits the data well. Instead of reporting NBR results as a regression coefficient, measuring the effect of the independent variable on the dependent variable was carried out through the Incidence Rate Ratio (IRR). The IRR of the NBR regression model was computed and reported to show the impact of explanatory variables in terms of a percentage change in the observed response variable (number of climate adaptation practices adopted). In principle, the IRR represents the change in the response variable in terms of a percentage change, with the precise percentage determined by how much the IRR is either above or below 1. In interpreting and explaining the coefficient of a given variable, all other variables are held constant.

About 27 percent of the households had female household heads, with an average of 2 years of schooling per household head. Each household had an average of 7 members, 26 years of farming experience, and 0.70 ha of land holding. Approximately 35 percent of the households were receiving remittances. Farmers adopted 20 different farm-based and non-farm-based practices at varying levels. Eighty-eight percent of the farming households adopted one or more adaptation practices. The households adopted, on average, six and a maximum of 16 practices. Over 50 percent of the households practiced mixed cropping, used improved seeds, and changed their planting/cultivation dates. The most frequently adopted adaptation practice was mixed cropping patterns, while the use of risk-sharing measures such as insurance for crops and livestock was the least frequently adopted practice.

The variables associated with demography, institution, and farm characteristics influenced the adoption practices (Table 1). The influential variables were the number of years of experience in farming, membership in a cooperative organization (where membership equals 1, 0 otherwise), support and services received from an agriculture service center (where service receiver equals 1, 0 otherwise), the number of members in the household, perception of summer temperature increase (where those perceiving increment equals 1, 0 otherwise), and ecological variable (where the Terai region equals 1, 0 otherwise). The gender of the household head (male = 1, 0 otherwise), size of operational landholding, number of years of schooling, and membership of any member of the household in community-based organizations (1 for member, 0 otherwise) were positive but not significant. If a farmer's experience in farming and the number of household members were to increase by one unit, the rate of adoption of practices would be expected to increase by a factor of 1.004 and 1.030, respectively. The households with members in cooperatives, compared to those without members, and those receiving support from ASCs, compared to those not receiving support, were expected to have a higher rate of adoption of practices by 1.264 and 1.352 times, respectively. Furthermore, the households located in Terai, compared to other ecological zones, and perceiving summer temperature increase, compared to those not perceiving an increase, had a higher adoption rate of 1.709 and 1.517 times, respectively.

As climate change has affected the agricultural sector more than other sectors in Nepal, it is important to consider the variables determining the adoption of climate change adaptation practices as a comprehensive package, with policy interventions to increase agricultural productivity and

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reduce farmers' exposure to risk. Policies should be geared towards enhancing the capacity of farmers through education and skills training on multiple climate change adaptation practices. The significant effect of social networks, like association with cooperative organizations, highlights the need for strengthening social ties. This involves promoting networks and relationships within and outside these organizations. By enhancing their capacity to organize, coordinate, and communicate, households can better implement adaptation practices. The adoption of multiple climate adaptation practices by the farming household is very low at present. In this context, it is necessary to increase the investment in the development and dissemination of climate-resilient agricultural technologies suited to varied agro-climatic conditions and enterprises. Additionally, facilitating quality production inputs, such as seeds, breeds, fertilizers, and irrigation materials, through a joint effort of public, private, and cooperative sectors is crucial.

Table 1. Incidence rate ratio of the negative binomial regression model for Sudurpaschim Province in 2016, Nepal.

Variables influencing adoption of adaptation practices	IRR	Std. error	z	p>|z|
Gender of HH head	1.100	0.074	1.43	0.153
Operational land holding size	1.001	0.001	1.26	0.207
No. of years of schooling	1.004	0.008	0.593	0.988
Ecological region	1.709	0.106	8.67	0.000
No. of members living together	1.030	0.009	3.23	0.001
No. of years of experience in Farming	1.004	0.001	2.65	0.008
Membership in cooperatives	1.264	0.080	3.66	0.000
Membership in community-based organizations	0.971	0.067	0.42	0.675
Service received from Agri-service center	1.352	0.097	4.19	0.000
Perception of summer temperature increase	1.517	0.247	2.56	0.010
Constant				
	1.6060	0.01586	4.80	0.003
/lnalpha	-1.0184	0.096		
alpha |	0.3612	0.0347		

Note: LR test of alpha=0: chibar^2(01) = 379.47 Prob >= chibar^2 = 0.000

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