Building resilience to climate change: Addressing smallholder farmers' food security concerns in Nepal

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Introduction

- Extreme climate events like droughts significantly threaten global food security by reducing agricultural productivity (World Bank, 2022; Roy et al., 2022).
- In Nepal, a country with many smallholder farmers, vulnerability to these climate-related hazards is exacerbated by its fragile topography, climate-sensitive subsistence livelihoods, and low adaptive capacity (Shrestha & Aryal, 2011; Piya, et al., 2013; Government of Nepal, 2021).
- Smallholder farmers, reliant on agriculture for their income are especially vulnerable to food insecurity (Ado et al., 2019).
- In response to this challenge, smallholder farmers are implementing climate change adaptation strategies that focus on improving crop yields, household incomes and overall food security (Dirani et al., 2021; Cole et al., 2018).

Objectives

- To investigate the factors affecting the food security of rural smallholder farmers in Nepal.
- To assess the impact of climate-related extremes (drought) on food security.
- To determine how adopting CCA strategies by smallholders affects food insecurity.

Conceptual Background

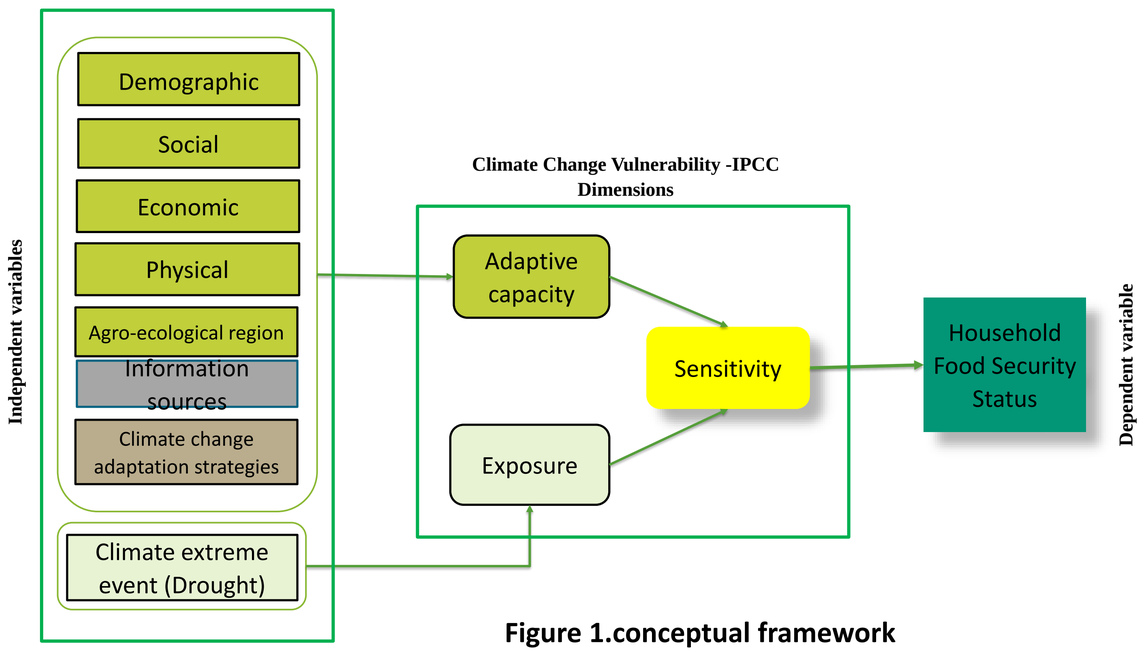

Figure 1.conceptual framework



Fig: Data collection by Author Field survey

Methodology

- Sampling procedure: Multistage; Purposive sampling to select 3 Agro-ecological regions (Mountain region: Mustang district, Hilly region: Baglung district & Plain region: Chitwan District), 9 villages (3 villages from each district)
- Sampling method: Random sampling of 400 smallholder farmers
- Analytical tool: Ordered Logistic Regression Model

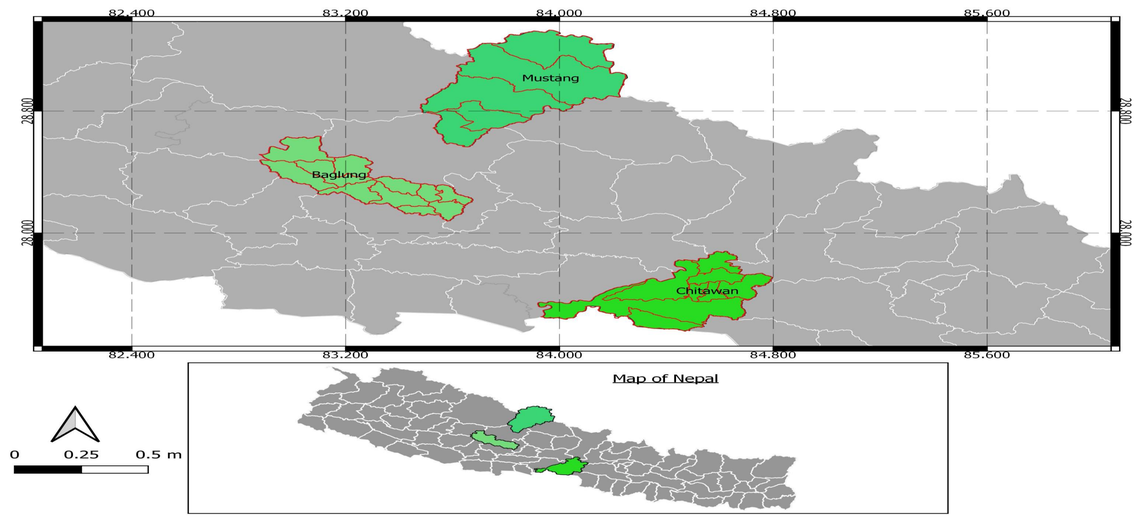

Figure 2. Map of the study area.

Results

Table 1. Ordered Logistic Regression- Results from FCS

Variables		FCS			
		Coef (Std error)	Poor	Borderline	Acceptable
Climate extreme events	Drought impact	**-0.744(0.246) *** **	**0.004(0.002) ** **	**0.014(0.006) ** **	**-0.019(0.008) ** **
CCA strategies	Small-scale irrigation	**1.211(0.477) ** **	**-0.007(0.004) * **	**-0.023(0.011) ** **	**0.03(0.015) ** **
	Agroforestry	-0.579(0.563)	0.004(0.004)	0.013(0.014)	-0.016(0.018)
	Temporary migration	**0.915(0.458) ** **	-0.006(0.004)	-0.02(0.013)	0.026(0.017)
	Off-farm activities	**-0.882(0.456) * **	**0.005(0.003)* **	**0.017(0.01) * **	**-0.022(0.013) * **
	/cut1	-4.784(1.835)			
	/cut2	-3.234(1.809)			

Table 1. Ordered Logistic Regression- Results from RCSI

Variables		RCSI			
		Coef (Std error)	No or low coping	Medium coping	High coping
Climate extreme event	Drought impact	**-0.437(0.175) ** **	**0.055 (0.022)** **	**-0.027(0.011)** **	**-0.028(0.011)** **
CCA strategies	Small-scale irrigation	**-0.646(0.314) ** **	**0.079(0.038)** **	**-0.039(0.019)** **	**-0.04(0.02)** **
	Agroforestry	**-1.388(0.451) *** **	**0.146(0.038)*** **	**-0.073(0.021)*** **	**-0.073(0.02)*** **
	Temporary migration	-0.026(0.319)	0.003(0.04)	-0.002(0.02)	-0.002(0.02)
	Off-farm activities	0.082(0.314)	-0.01(0.039)	0.005(0.019)	0.005(0.02)
	/cut1	-0.703(0.985)			
	/cut2	0.158(0.985)			

Conclusions

- Drought has pushed households into a lower FCS category, indicating greater food insecurity.
- Farmers who perceive the negative impacts of drought tend to be in the low or no coping groups, because they abandon their fields rather than persevere.
- Our research confirms that strengthening climate change adaptation strategies as a key intervention ultimately reduced their levels of food insecurity.
- Farmers engaging in off-farm activities appear to experience increased food insecurity. This could be attributed to a shortage of labour available for agricultural production.

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References

1. Acheampong, P. P., Obeng, E. A., Opoku, M., Brobbey, L., & Sakyiamah, B. (2022). Does food security exist among farm households? Evidence from Ghana. Agriculture & Food Security, 11(1), 1-13. https://doi.org/10.1186/s40066-022-00362-9
2. Chandra, A., Dargusch, P., & McNamara, K. E. (2016). How might adaptation to climate change by smallholder farming communities contribute to climate change mitigation outcomes? A case study from Timor-Leste, Southeast Asia. Sustainability Science, 11, 477-492. https://doi.org/10.1007/s11625-016-0361-9
3. Khanal, U., & Wilson, C. (2019). Derivation of a climate change adaptation index and assessing determinants and barriers to adaptation among farming households in Nepal. Environmental Science & Policy, 101, 156–165. https://doi.org/10.1016/J.ENVSCI.2019.08.006
4. Masud, M. M., Azam, M. N., Mohiuddin, M., Banna, H., Akhtar, R., Alam, A. S. A. F., & Begum, H. (2017). Adaptation barriers and strategies towards climate change: Challenges in the agricultural sector. Journal of Cleaner Production, 156, 698–706. https://doi.org/10.1016/J.JCLEPRO.2017.04.060