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## **Intensity of water conservation technology adoptions in Nepal**

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# Intensity of water conservation technology adoptions in Nepal

*Dependra Bhatta, Krishna P. Paudel, Rajan Dhakal, and Kai Liu*



# Outline

- Introduction
- Data
- Methods
- Results and discussions
- Conclusions

# Introduction

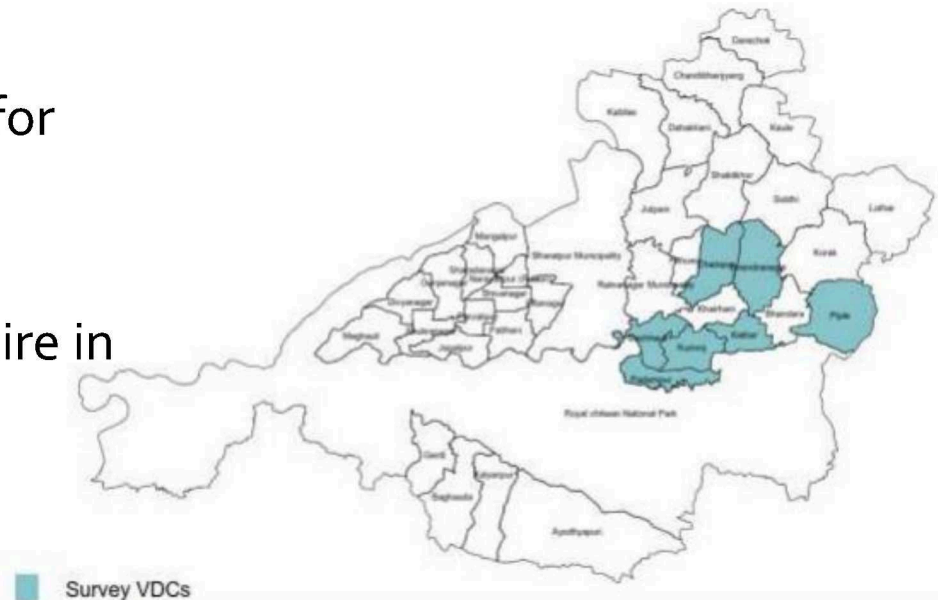
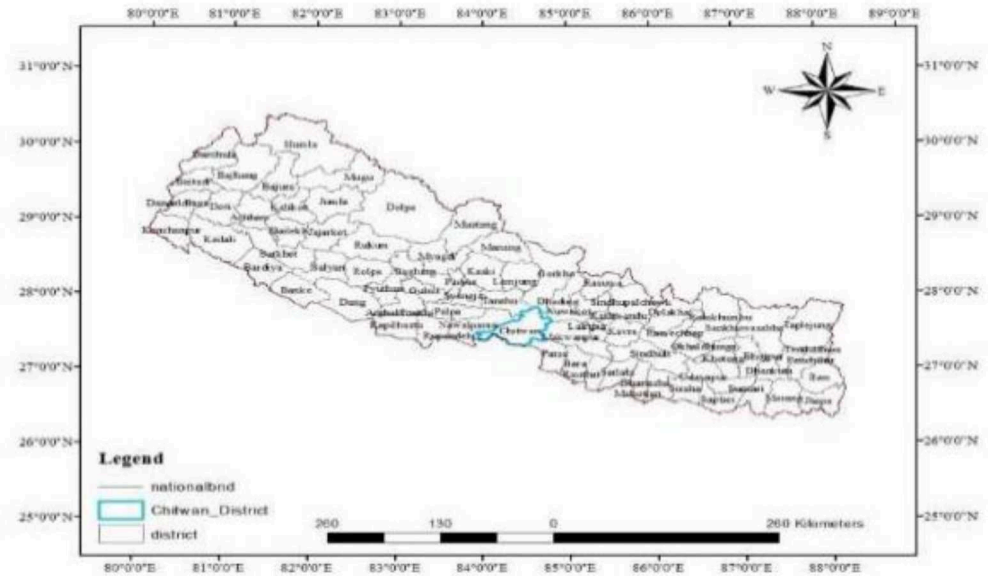
- Water scarcity is a critical concern in agriculture production throughout the world.
- Demand for water from competing sources will impact agricultural production (Molden et al. 2001).
- Water conservation technology adoption is on the rise around the world (Johansson 2000).

# Objectives

- To examine the determinants of intensity of water conservation technology adoption using parametric Poisson quasi likelihood (PQL), and semiparametric and nonparametric models.

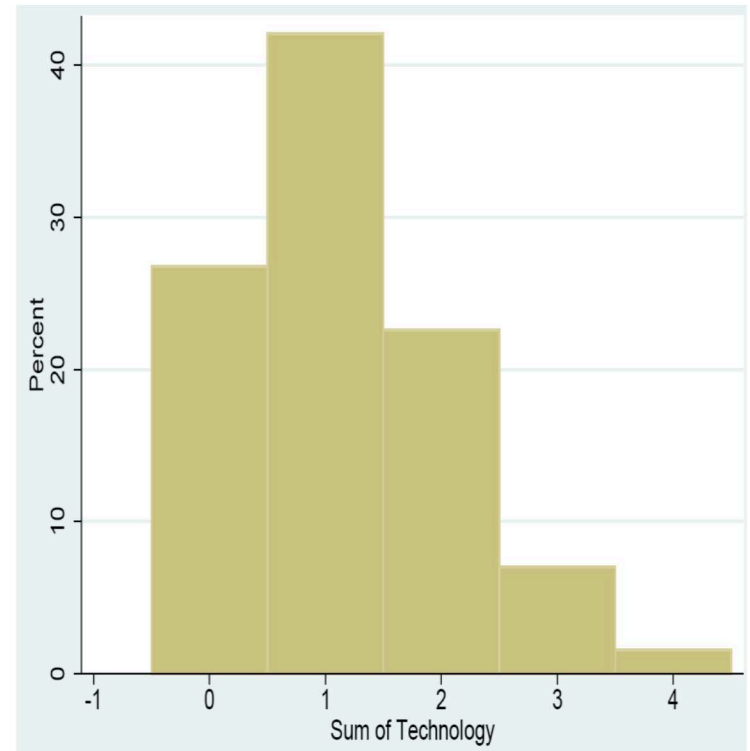
# Data

- HH survey conducted in Eastern Chitwan, Nepal
- 385 houses were randomly selected for interview
- Focus group of testing of questionnaire in Kumroj and Pithuwa VDCs



# Data

Technology	Number of farmers adopting the technology
1. Establishment of permanent water ways	66
2. Use of digging pits	20
3. Farmer-managed irrigation system	181
4. Rainwater harvesting system	31
5. Drip irrigation system	1
6. Wastewater reuse for agriculture	122
7. Plastic mulching in vegetable plot	15
8. Building dams	5



# Methods

- In many studies, technology adoption is modeled using a binary dependent variable model (Fernandez-Cornejo et.al 2001)
- When farmers adopt multiple technologies and if the goal is to explain the intensity of technology adoption, we need to use variants of the Poisson model
- Parametric
  - Negative binomial
  - Zero inflated negative binomial
  - Poisson Quasi Likelihood
- Semiparametric
- Nonparametric

# Results

## Marginal effects from parametric models

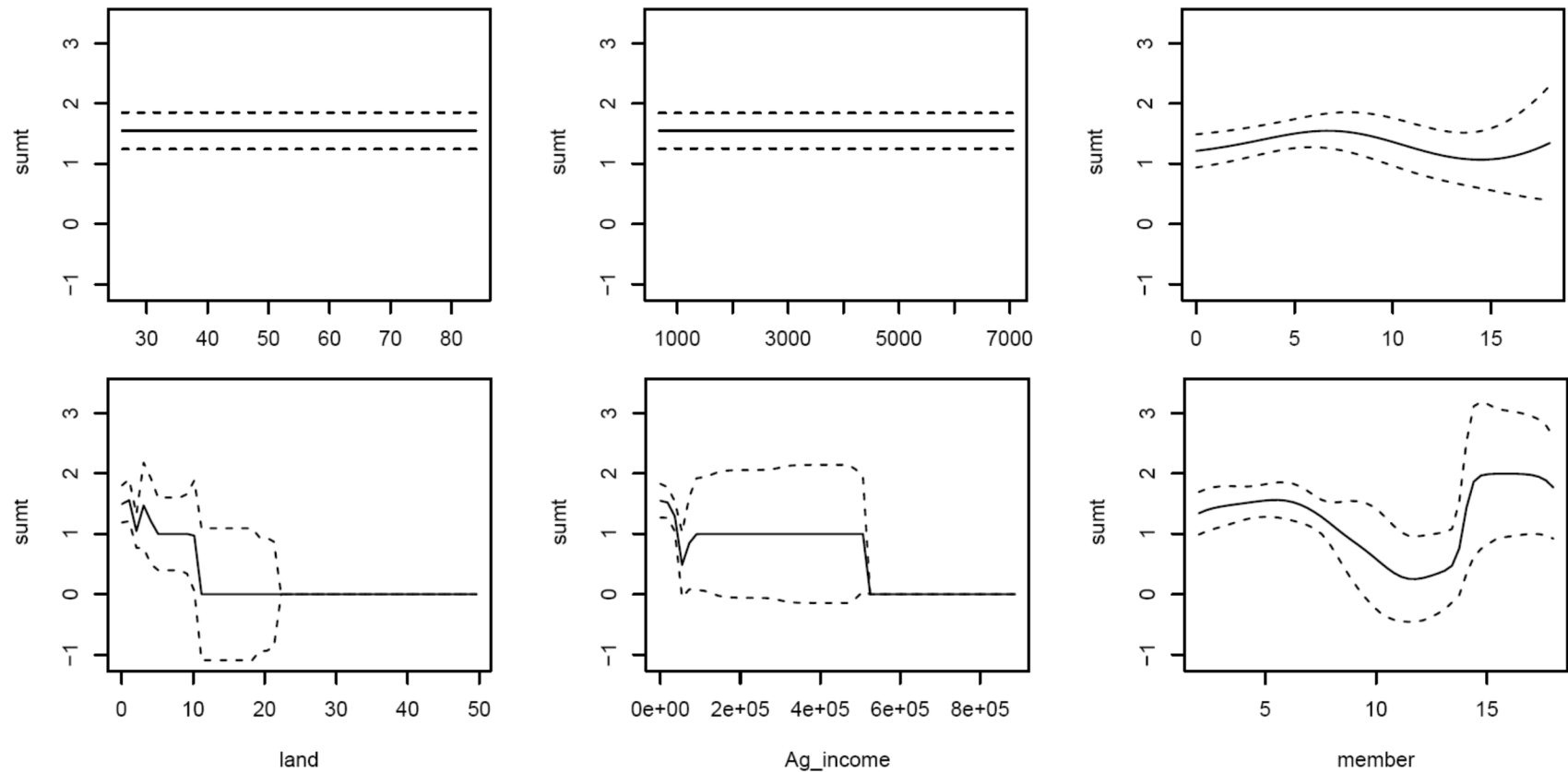
Variables	Negative Binomial	Zero Inflated Negative Binomial	Poisson Quasi Likelihood
Age	-0.0498** (0.0246)	-0.0498 (0.0368)	-0.0544** (0.0241)
Age(sq)	0.000421* (0.000222)	0.000421 (0.000342)	0.000474** (0.000220)
Edu	0.0140 (0.0154)	0.0140 (0.0176)	3.676 (6.210)
Land	-0.0613 (0.0529)	-0.0613 (0.0780)	-0.0656 (0.0521)
Ag Income	-0.00000619 (0.00000571)	-0.00000619 (0.00000708)	-0.00000571 (0.00000557)
Is Ag main source of income?	0.318** (0.130)	0.318** (0.156)	0.336** (0.132)
Food sufficiency last year?	0.366** (0.150)	0.366* (0.198)	0.320** (0.152)
Ag Ext. Visit	-0.148 (0.159)	-0.148 (0.167)	-0.142 (0.159)
Land frag	0.0843 (0.0640)	0.0843 (0.0900)	0.0836 (0.0637)
Family labor	0.0105 (0.0106)	0.0105 (0.0193)	0.00896 (0.0105)
Constant	1.264* (0.690)	1.264 (0.983)	2.628*** (0.942)

Standard errors in parentheses

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

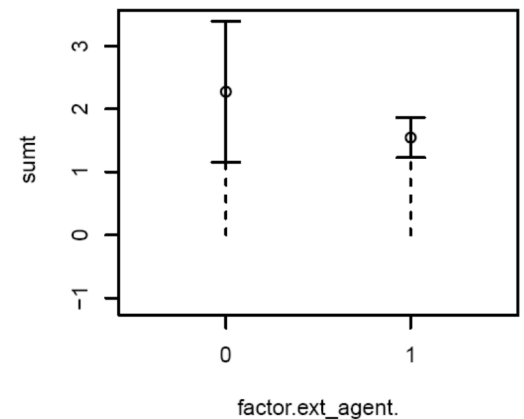
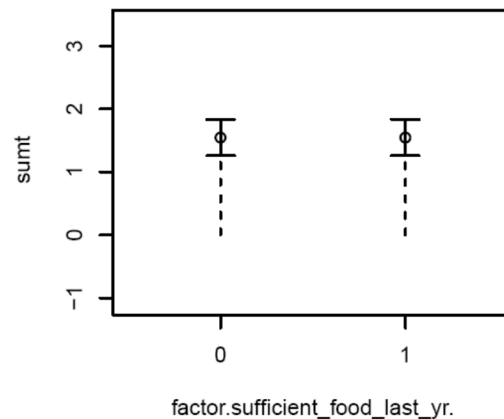
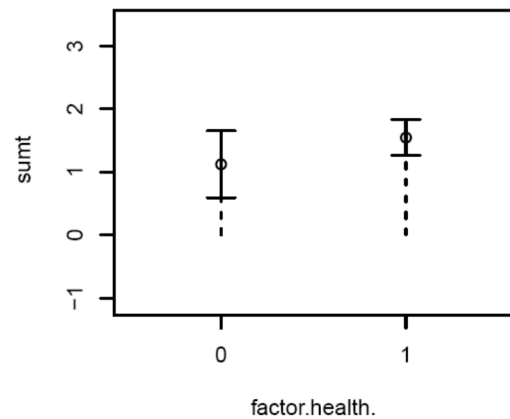
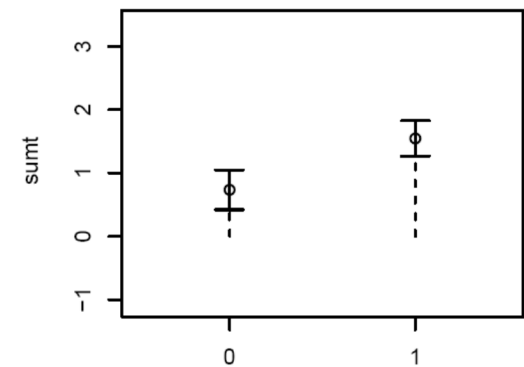
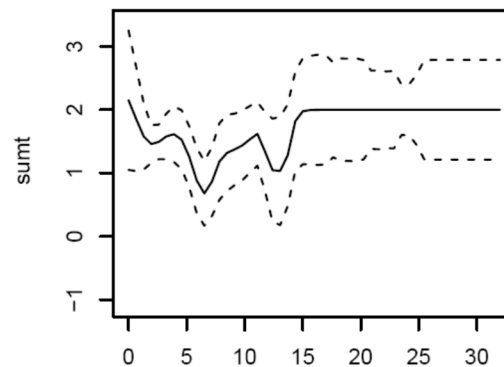
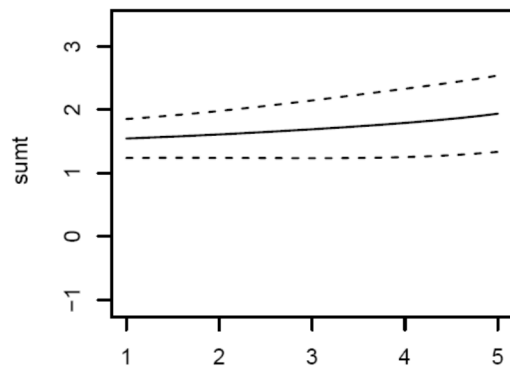
# Results

## Non-parametric model partial regression plots



# Results

## Non-parametric model partial regression plots



# Results

## Semi- parametric regression

Variables	Estimate
Age	-0.04 (0.04)
Age square	0.00
Health	-0.34 (0.31)
Ag main source of income	<b>0.32 *</b> <b>(0.16)</b>
Sufficient food availability in the previous year	<b>0.39 *</b> <b>(0.20)</b>
Constant	1.07 (0.97)

# Conclusions

- Water conservation practices can help to overcome water scarcity in cultivable seasons.
- Farmers with sufficient food supply in the previous year and farmers with majority of income coming from agricultural sources adopt more conservation technology.

- Parametric model is misspecified.
- A semiparametric model is a better model to understand the factors affecting the intensity of water conservation practices adoption.



# THANK YOU!

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