

# Shocks and Coping Strategies of Forest-Dependent Households in Rural Kenya

## Motivation

- Dependence on forest resources induces many risks and challenges
  - Deforestation, forest degradation and outcomes of climate change endanger livelihoods and expose communities to shocks: natural disasters, economic, social, political and demographic risks (FAO, 2017; Tirivayi, 2017).
  - Poor households are often unable to cope with risk due to lack of assets or poor health (World Bank, 2001).
- Forest-dependence as key factor in the assessment of vulnerability to shocks

## Research Questions

1. What are the major shocks forest-dependent households in rural Kenya have to face?
2. What are the corresponding coping strategies used by affected households?
3. Which factors determine the coping decision?
4. What are the impacts of coping strategies on household welfare?

## Literature

- Vulnerability to shocks: “exposure to uninsured risk leading to a socially unacceptable level of well-being” (Hoogeveen et al., 2005)
- Divide shocks into four categories: agricultural, economic, social, health (Klasen et al., 2011)
- Categorize shocks by frequency, intensity, persistence of their impact, speed of onset (Morduch, 1999; Dercon, 2002; Hoddinott and Quisumbing, 2010)
- Divide coping strategies into three categories: behaviour-based, asset-based, assistance-based (Heltberg and Lund, 2009)
- Risk-related vulnerability directly linked to poverty (Kamanou and Morduch, 2002): shocks can drag people in and out of poverty (Barret, 2005)
- Coping behaviour influenced by household characteristics such as wealth (Tongruksawattana et al., 2013), household head characteristics such as gender (Nikoloski et al., 2018) and by shock characteristics such as type, frequency and severity (Holzmann and Jorgensen, 2001)

## Methodology

### Choice model: Determinants of coping decision

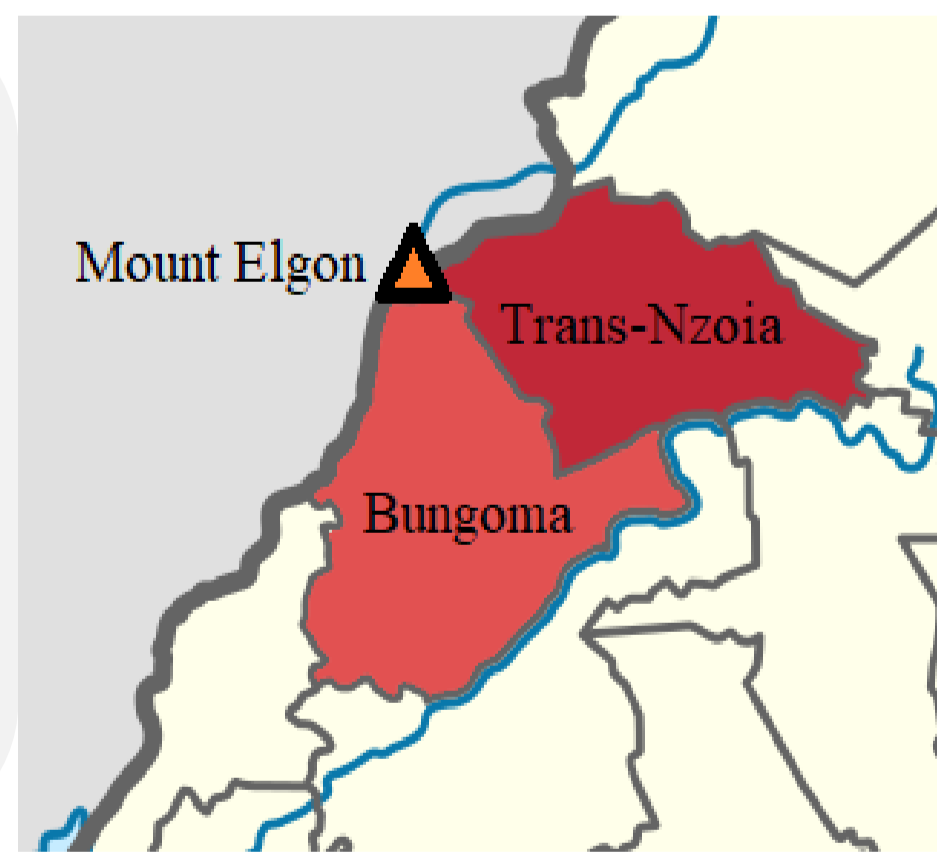
- Univariate probit: choice between coping and not coping
- Multivariate probit: choice between behaviour-based, asset-based and assistance-based coping strategies (Heltberg and Lund, 2009; Tongruksawattana et al., 2013)

### Impact model: Propensity Score Matching: Impact of coping on household welfare

- Difference between household welfare with and without coping action
- Outcome variables: Household expenditure, level of food security, Household Dietary Diversity Score (HDDS)
- Independent variables of univariate choice model
- Stata module by Leuven and Sianesi (2003)

## Data

- Survey addressed the effects of market-based incentives on forest conservation and development in rural areas of Kenya
- conducted in November 2018 by the Jomo Kenyatta University of Agriculture and Technology
- 924 households
- Two provinces: Bungoma and Trans-Nzoia near Mt Elgon



## Regression

### Univariate probit:

$$\Pr(y_i = 1|x_i) = \Phi(\beta_0 + \beta_1 Education_i + \beta_2 Age_i + \beta_3 Female_i + \beta_4 \ln(Assets_i) + \beta_5 HHSize_i + \beta_6 Migrants_i + \beta_7 ShareChildren_i + \beta_8 ShareElderly_i + \beta_9 MemberFUG_i + \beta_{10} ShockImpact_i + \beta_{11} NumberShocks_i + \beta_{12} LossShock_i + \varepsilon_i)$$

### Multivariate probit:

$$\Pr(Y_i = y_i|\beta, \Sigma) = \Phi(\beta_0 + \beta_1 Education_i + \beta_2 Age_i + \beta_3 Female_i + \beta_4 \ln(Assets_i) + \beta_5 HHSize_i + \beta_6 Migrants_i + \beta_7 ShareChildren_i + \beta_8 ShareElderly_i + \beta_9 MemberFUG_i + \beta_{10} ShockImpact_i + \beta_{11} ShockAgricultural_i + \beta_{12} ShockEconomic_i + \beta_{13} ShockHealth_i + \beta_{14} ShockSocial_i + \beta_{15} \ln(LossShock_i) + \varepsilon_i)$$

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## Selected Results

Type	Number of HHs affected	Percentage of HHs affected	Total number of shocks	Average number of shocks per HH
Agricultural	848	91.8	2,228	2.41
Economic	558	60.4	751	0.81
Health	224	24.2	262	0.24
Social	200	21.6	219	0.28
All types	882	95.5	3,460	3.74

Dependent variable: Household coping decision (1: cope, 0: not cope)		
Independent variable	Coefficient	Standard Error
Education (in years)	-0.02	0.06
Age (in years)	0.01	0.01
Female (1: female, 0: male)	-0.02	0.20
Log of total value of assets	-0.01	0.03
Household size	-0.03	0.04
Migrants in HH	0.03	0.08
Share Children in HH	0.77**	0.33
Share Elderly in HH	-0.49	0.49
Member FUG (1: yes, 0: no)	-0.04	0.12
Shock Impact (1: covariate, 0: idiosyncratic)	0.82***	0.24
Number of shocks	0.32***	0.05
Log of loss due to shock	-0.02	0.00
Constant	-0.75	0.50
Number of observations	882	
Pseudo R <sup>2</sup>	0.1584	
LR chi <sup>2</sup>	103.91	
Prob > chi <sup>2</sup>	0.0000	

	NN Matching		Radius Matching		Kernel Matching	
	ATT	Standard Error	ATT	Standard Error	ATT	Standard Error
Household expenditure	12,546	15,771	9,390	11,974	8,574	13,254
Food security	0.05	0.20	-0.17	0.15	-0.11	0.17
HDDS	-0.48*	0.24	-0.35	0.21	-0.36	0.24
Number of treated HH	774		774		774	
Number of untreated HH	108		108		108	
Total number of HH	882		882		882	

\*p<0.1, \*\*p<0.05, \*\*\*p<0.01

## Summary

### Findings regarding research questions:

1. 95.5% of households were affected by at least one shock; dominance of agricultural shocks
2. 88% of shock-affected households take coping actions, behaviour-based strategies are most common
3. Shock characteristics mainly influence the coping decision  
Univariate probit: general decision for coping is positively influenced by frequency and covariate character of shocks  
Multivariate probit: covariate shocks trigger behaviour-based and asset-based strategies, households affected by agricultural shocks are more likely to resort to behaviour-based strategies
4. Household Dietary Diversity Score (HDDS) is negatively influenced by coping → coping can have negative long-term consequences on human development outcomes; in most cases, coping does not have a significant influence on household welfare → coping does not offer desired relief for shock-affected households

## Further Steps

- Collect panel data to enable estimation of chronic and transient poverty and avoid recall problems → more reliable data
- Expand analysis to further developing countries with forest-dependent communities to allow for more generalizable findings
- Include other welfare indicators (e.g. health) as outcome variable in PSM to generate new insights into the impact of coping on human development

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