

# Multidimensional household vulnerability assessment in semi-arid areas of Mali

**Alcade C. Segnon** (IESS-UG/ICRISAT/FSA-UAC)  
Edmond Totin (UNAB)  
Robert B. Zougmore (ICRISAT)  
Enoch G. Achigan-Dako (FSA-UAC)  
Benjamin D. Ofori (IESS-UG)  
Chris Gordon (IESS-UG)



## Background

### Semi-arid areas (SARs) of West Africa: hotspots of climate change

- ❖ Substantial **multi-decadal variability** (both in time and space) with prolonged dry periods (e.g., 1980s)
- ❖ **Seasonal variability** in rainfall patterns
- ❖ Strong **ecological, economic and social impacts**, making socio-ecological systems particularly vulnerable

### Continued & stronger trends in the future

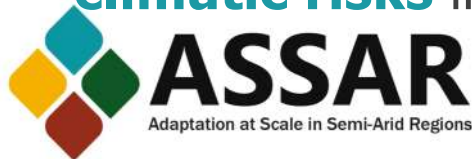


# Background

## Climate risks: only one layer of Vulnerability in SARs

- ❖ Biophysical, socioeconomic, institutional and political, at different scales to shape vulnerability in SARs
- ❖ Little attention to **multiple & interacting** nature of driving forces climate VA
- ❖ Crucial if adaptation is to be **effective and sustained**
- ❖ “Insights from multiple-scale, interdisciplinary work to improve the **understanding** of the barriers, enablers and limits to **effective, sustained and widespread** adaptation”
- ❖ To develop a unique and systemic understanding of the **processes and factors** that impede adaptation and cause vulnerability to persist.

Study aims to **assess household vulnerability to climatic and non-climatic risks** in SARs of Mali



# Methodological approach

## IPCC AR4 conceptualization of vulnerability

Vulnerability = function of exposure, sensitivity & adaptive capacity

## Multidimensional LV approach (Gerlitz et al 2017)

- ❖ Livelihood Vulnerability Index (LVI) (Hahn et al 2009) modified and expanded to include non-climatic shocks
- ❖ Framed within AR4 framing of vulnerability
- ❖ 10 components and 3 dimensions
- ❖ Identification of indicators and vulnerabilities across dimensions through PRA

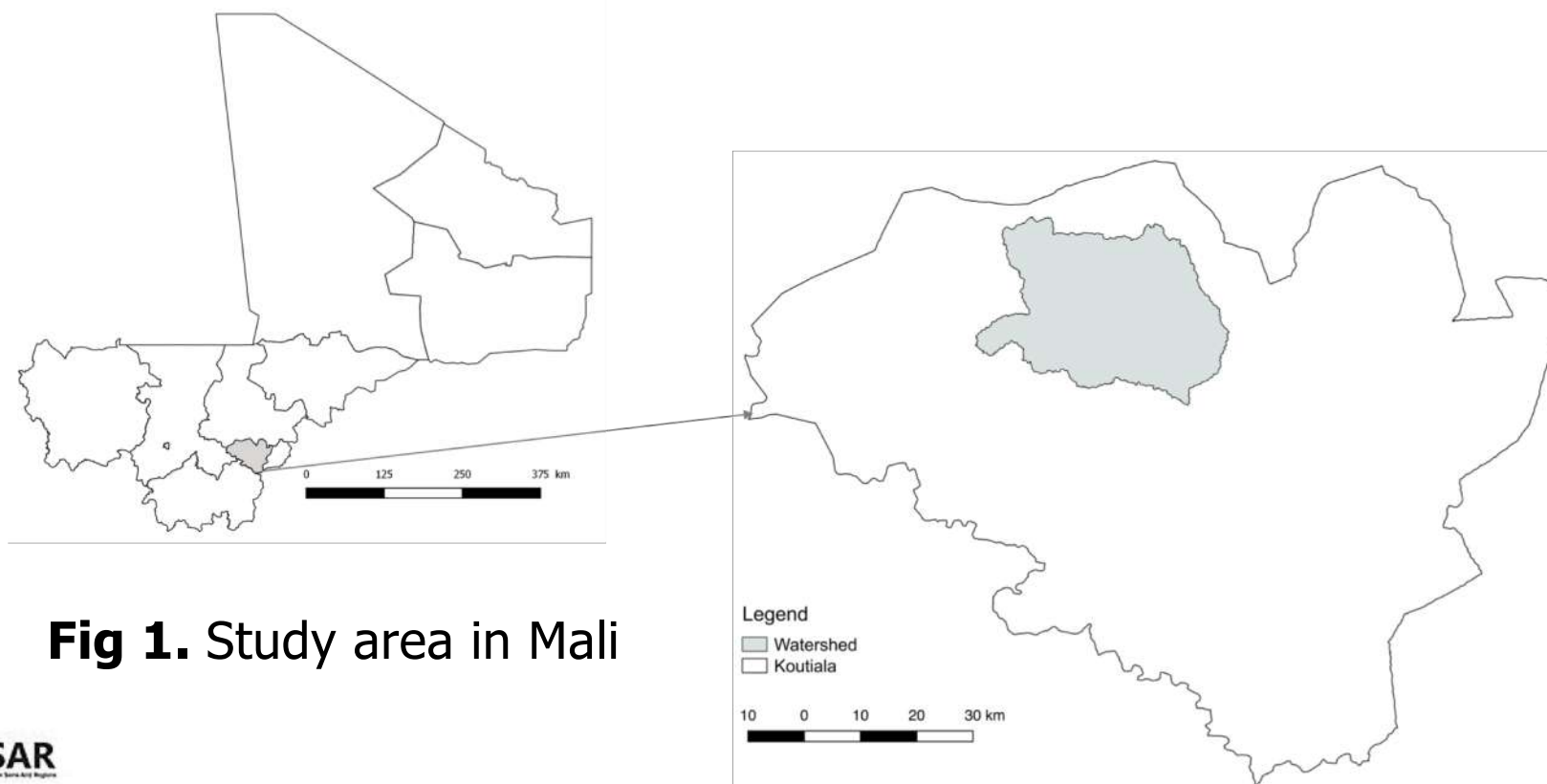
## Vulnerability typology approach (Sietz et al 2011, 2017)

- ❖ Standardization/Normalization of indicators
- ❖ FAMD analysis: a PCA-type, but accommodate simultaneously quanti. & quali. variables
- ❖ Hierarchical Cluster Analysis (HCA)
- ❖ Reduce dimensionality & identification of homogeneous archetypes



# Study area & Data collection

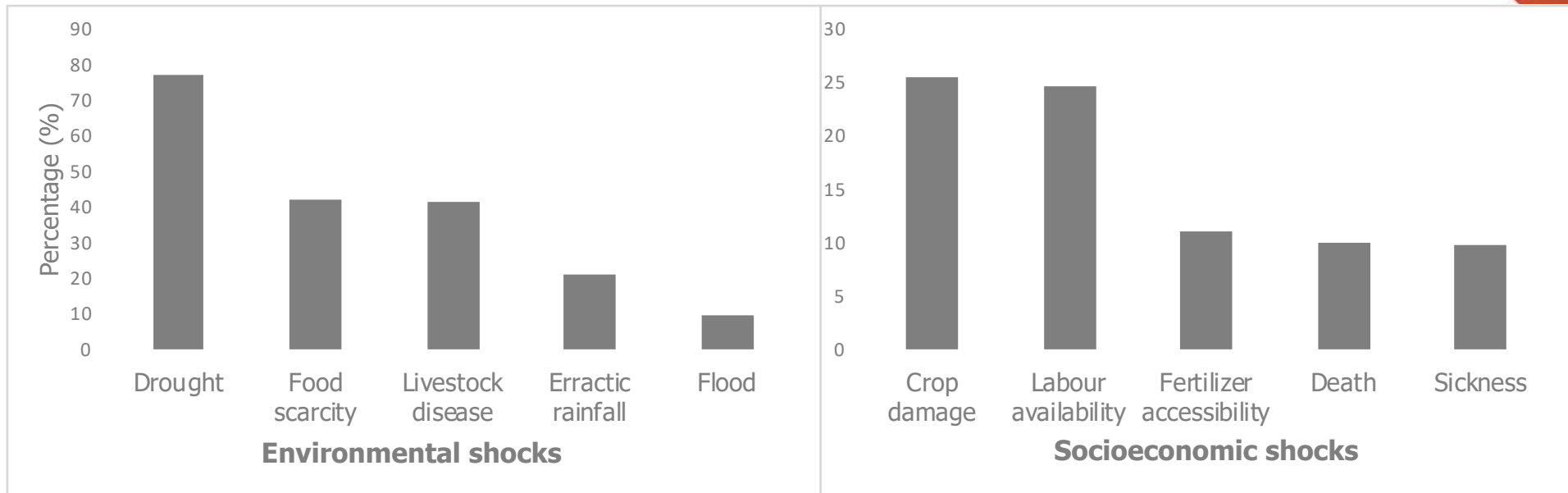
- ❖ Study conducted in Koutiala cercle (Sikasso region), Mali
- ❖ Household surveys: 501 households randomly selected in 10 villages



**Fig 1.** Study area in Mali

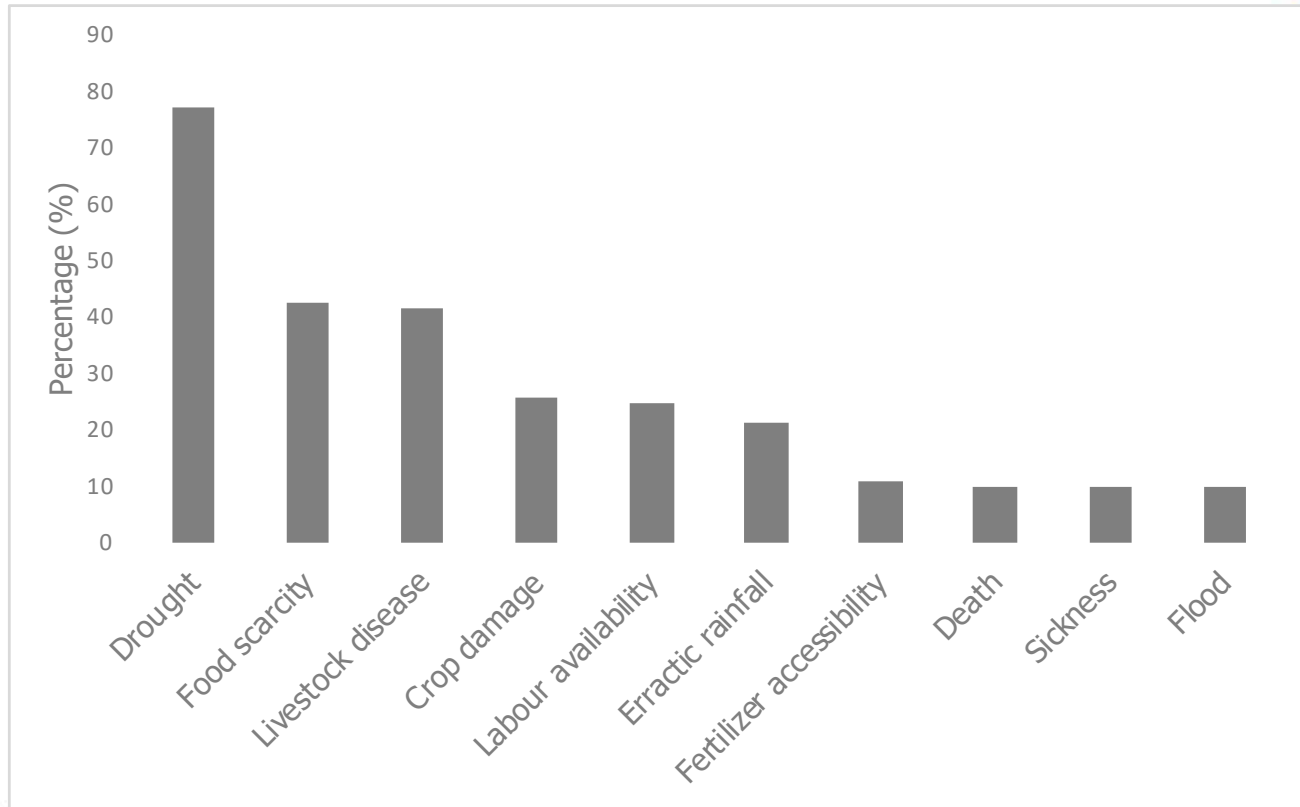
# Main findings

Farmers in SARs are exposed to a wide range of shocks



# Main findings

Climatic risks are **just one** among many



# Adaptive capacity

Dimensions	Components	Indicators	Frequency	Range	Mean (Median)
Adaptive capacity	Socioeconomic profile	<b>Dependency ratio</b>	>63% DR>1; 39% DR>=1.5	0.167- 6.5	1.42 (1.25)
		Education			
		Age		19-84	48.33 (48)
	Livelihood strategies	<b>Agricultural livelihood diversity</b>		1-4	1.98 (2)
		<b>Non-agricultural livelihood diversity</b>		0-3	0.8 (1)
	Social networks	<b>Diversity of CBOs</b> membership		0-4	1.19 (1)
		#HH member in leadership position			
		Political voice			
		Political accessibility			
	Physical accessibility	Road quality			
		Road practicability			
	Resources	<b>Total land</b> (ha)		1-41.8	11.55 (10.27)
		<b>Livestock</b> (TLU)		0-54.7	6.32 (4.20)
		<b>Diversity of animal type</b>		0-5	3.218 (4)
<b>Agricultural equipment</b> (plough, cart, seed drill, sprayer, draught animal [oxen], donkey)					



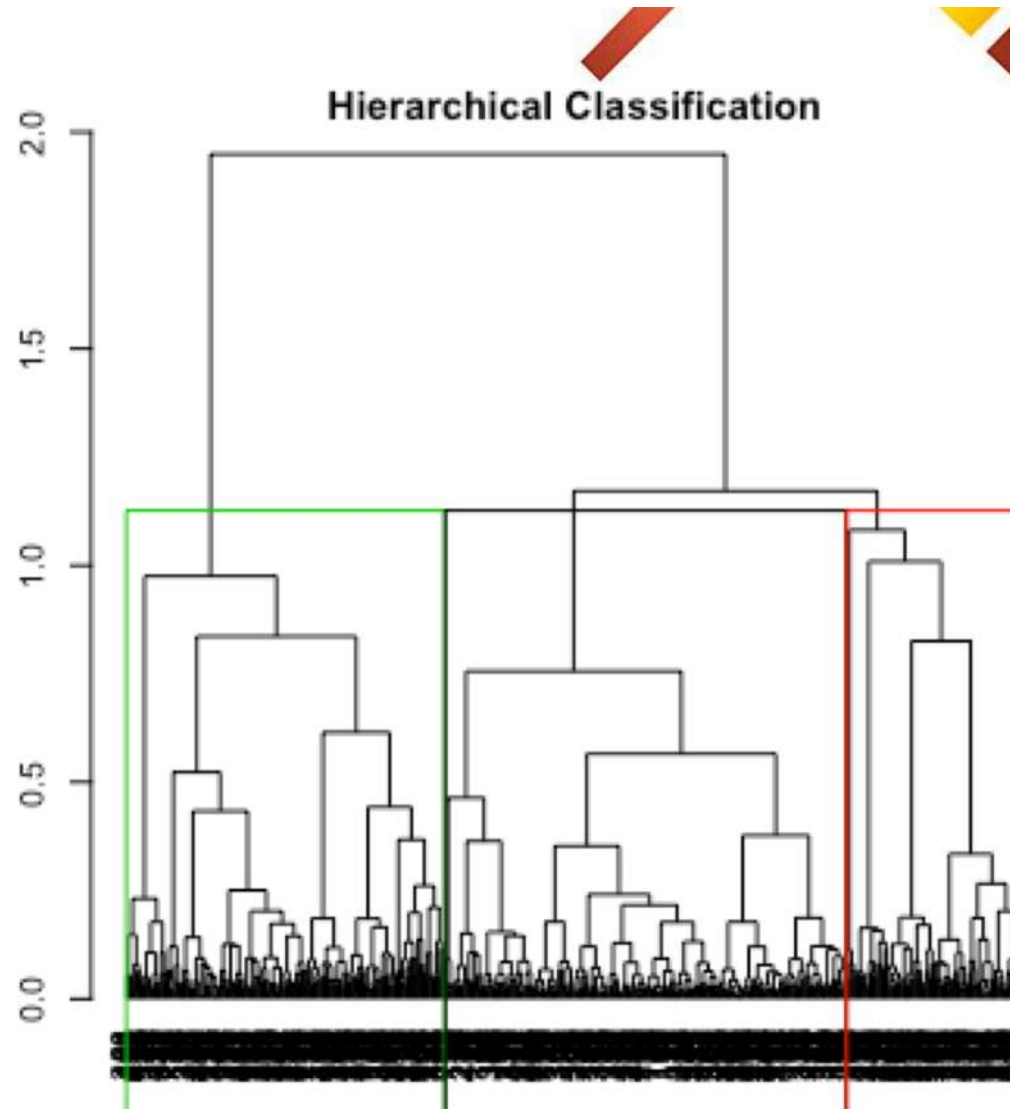
# Sensitivity

Dimensions	Components	Indicators	Frequency	Range	Mean (Median)	
Sensitivity	Food security	Food self-sufficiency	OwnProd 25.35; Own_BuyLow: 63.27; Own_BuyHigh: 11.38			
		Number of month <b>HH struggle to get sufficient food</b>		0-8	1.97 (2)	
		<b>Diversity of cultivated crop</b>		2-22	10.42 (10)	
	Health & Sanitation	Drinking water				
		Sanitation				
		Health facility accessibility				
		Illness				
		Chronic illness				
	Water security	Number of month HH struggle to get sufficient water			0-9	1.671 (1)
		Diversity of water source				

## Main findings

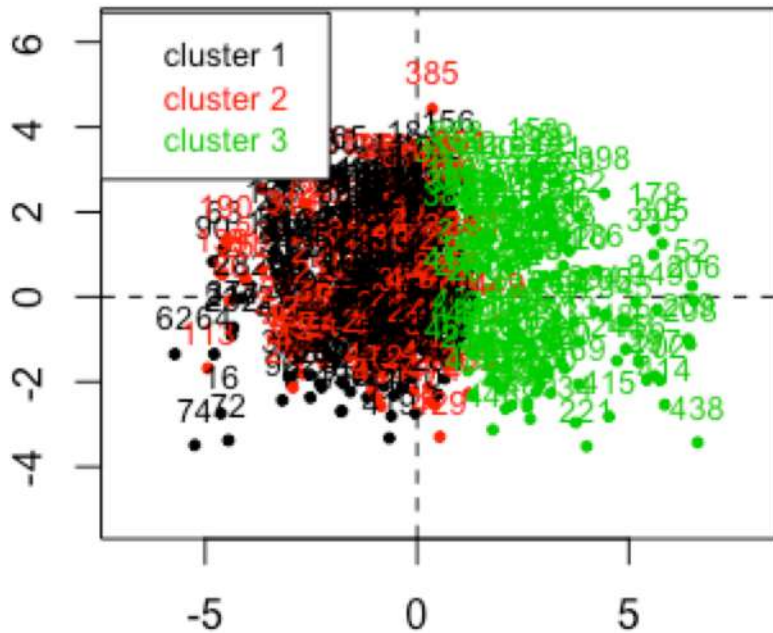
three archetypes  
of vulnerability

**C1: 51.50%**  
**C2: 19.96%**  
**C3: 28.52%**

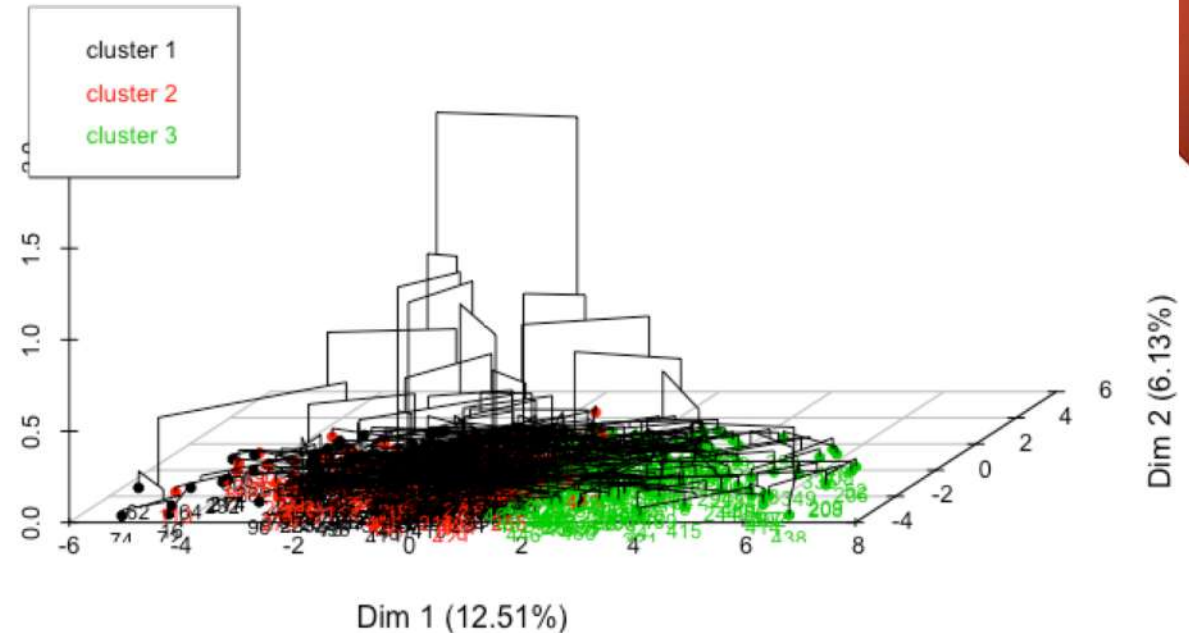


# Main findings

Factor map



Hierarchical clustering on the factor map



Dim 1 (12.51%)



- ❖ Description of the cluster to tell the story of what **it means to be in any of the C**
- ❖ Shocks **not specific** to any C

Contact: **Alcade C. Segnon** (alcadese@gmail.com)

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