Do migrations that respond to climate variation improve the living standard of households in rural areas? Evidence from Niakhar (Senegal) using two types of migration

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Outline

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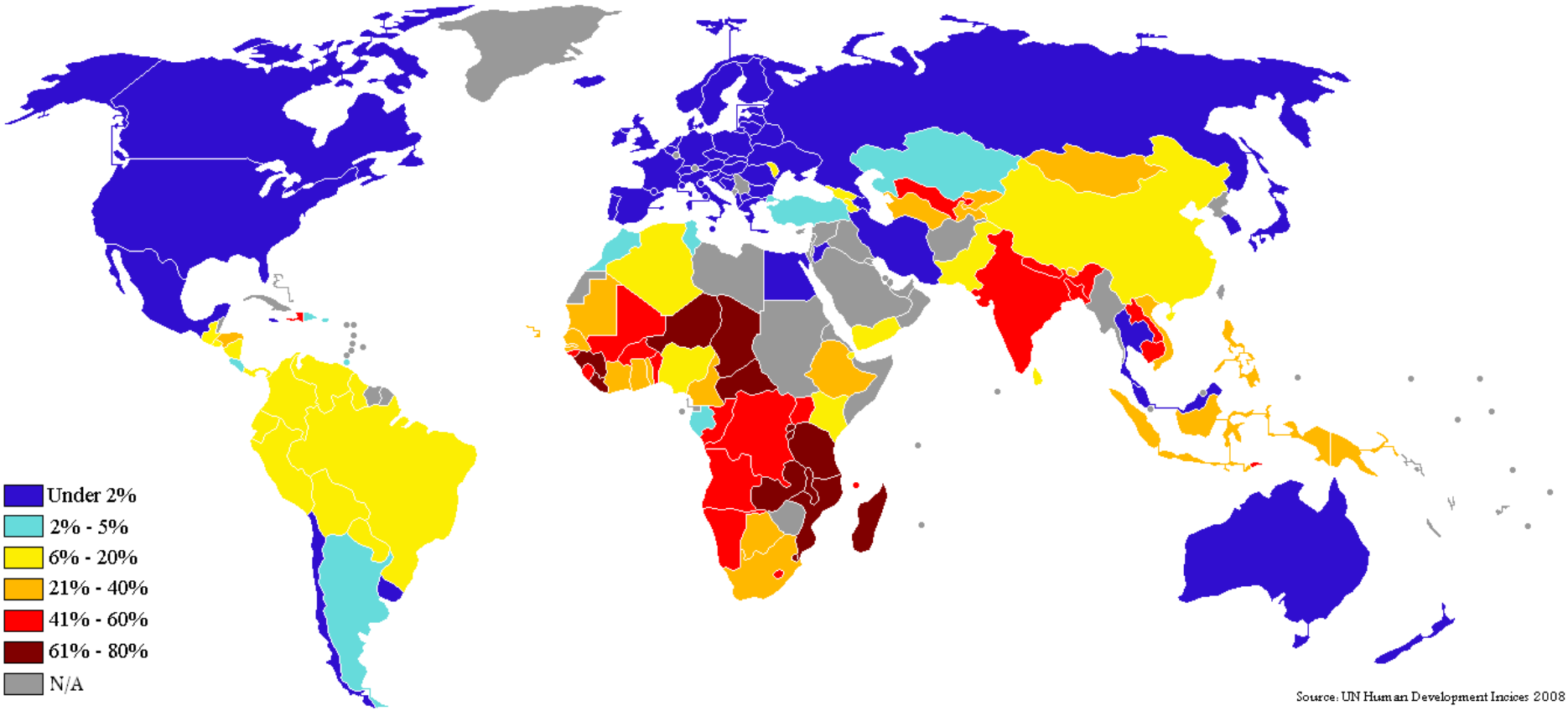
Motivation

Economic vulnerability, a challenge in Sub-Saharan African Countries (*Guillaumont 2006, Karikari 2016*)



Percentage population living with less than 1 dollar a day 2007-2008 *(UN, 2008)*

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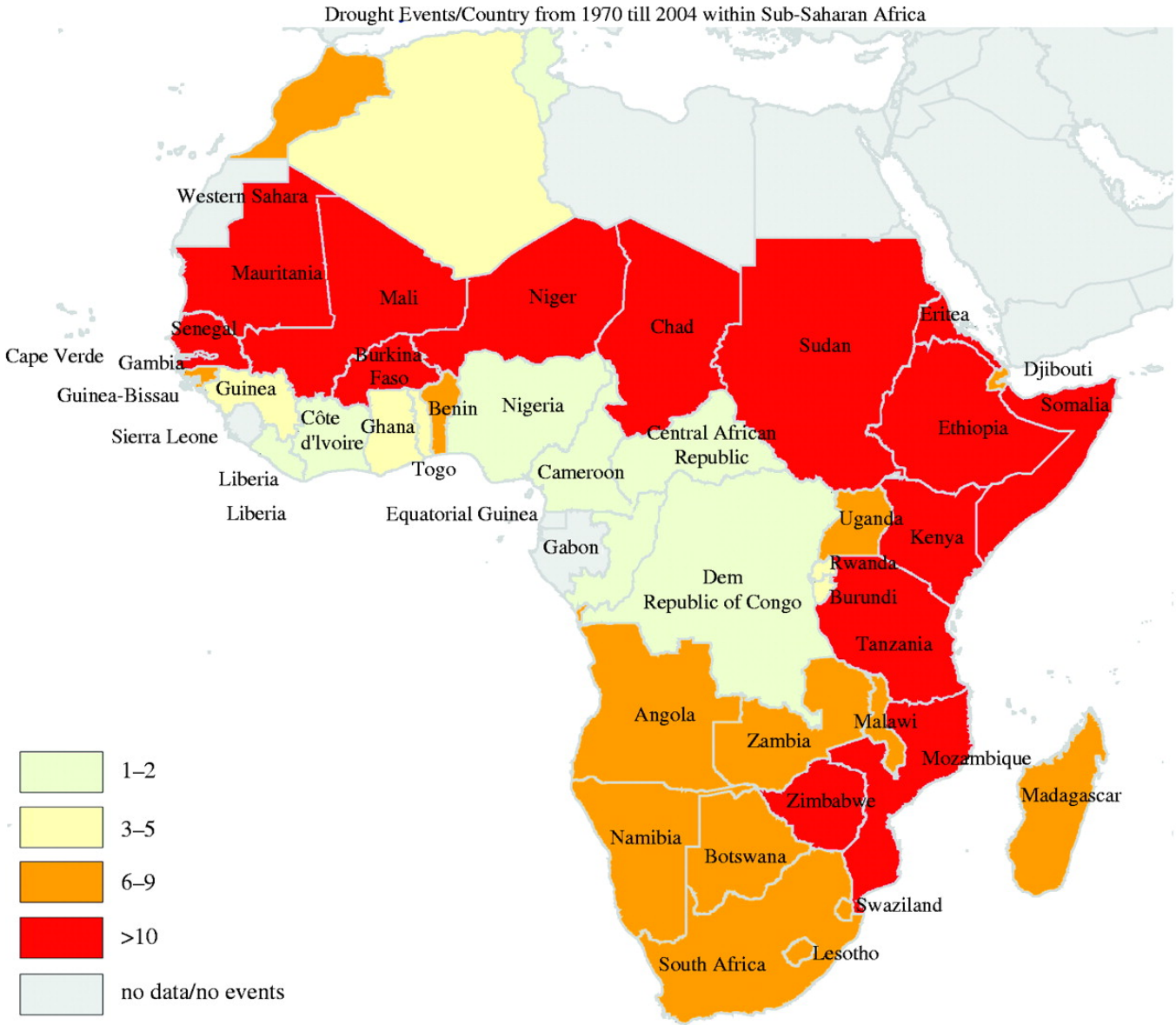

data source: EM-DAT: the OFDA/CREDA International disaster database, Université catholique de louvain, Brussels, Belgium.

Research questions

In this paper we answer these two questions:

Migration, strategy to cope with climate variation in Niakhar?

We investigate how households in Niakhar react to climate variation in term of migration

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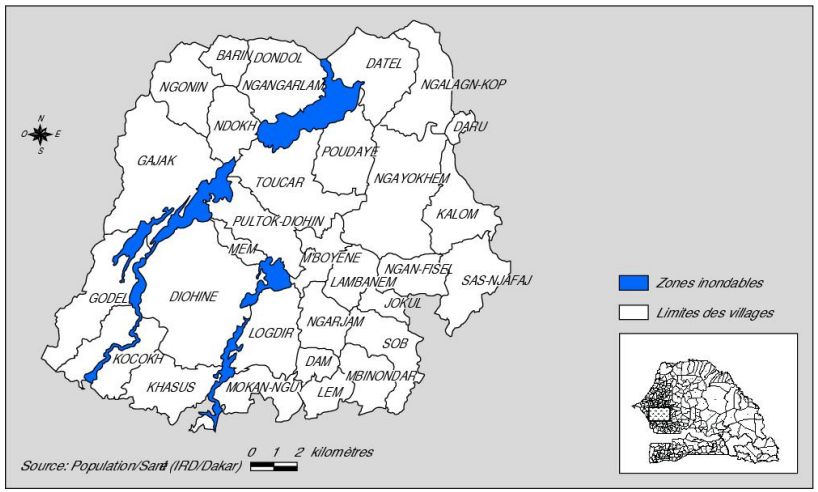
Does migration reduce household poverty in Niakhar?

We analyze the effect of migration on the improvement of household living standard between 2003 and 2014

Outline

Niakhar



Characteristics of Niakhar

- Location: **West of Senegal**
- **30** villages
- Climate: **Sahelian-Sudanese**
- Dominant religion: **Muslim** (77% in 2013)
- Dominant ethnic group: **Sereer** (96.7% in 2013)
- Dominant activity: **Agriculture**
- **Low education rate**: 50% of men & 75% of women aged 15-24 have no school-base education in 2000 *(Delaunay et al. 2013)*

Outline

Data used

1. Niakhar Health and Demographic monitoring data base
2. Niakhar Goods and Equipments Survey data base: 2003 and 2014
3. IRD Senegal Meteorology Data (1998 to 2013)

Types of migrations

We define two type of migration:

- *Short-term migration* :
  - migrant left the household for less than a year, but still consider as resident in the household
- *Long-term migration* :
  - migrant left the household for more than a year, and sometimes definitively

Descriptives statistics on migration

	Long-term	Short-term
Individual level		
Proportion of male migration	0.398	0.575
	(0.036)	(0.036)
Average age of migrant	18.065	25.980
	(14.629)	(10.831)
Education		
No school	0.730	0.587
	(0.044)	(0.034)
Preschool and Primary	0.165	0.223
	(0.022)	(0.012)
Middle and secondary	0.064	0.106
	(0.030)	(0.040)
Koranic	0.030	0.069
	(0.015)	(0.006)
University	0.010	0.014
	(0.005)	(0.004)
Number of individuals involved	**9154**	**14874**
Household level		
Number of migration in a household	0.347	2.745
	(.957)	(2.584)
Number of female migration in a household	0.207	1.149
	(0.624)	(1.469)
Number of male migration in a household	0.140	1.597
	(.495)	(1.773)
Number of households involved	**1599**	**2571**

Living standard measurements

Three asset indexes build to overcome the lack of household income or expenditure in the data

- *Productive assets index* :
  - aggregation of agricultural equipments assets: Cart, Horse, Seeder, Hoe, Sheller
- *Consumer assets index* :
  - aggregation of domestic equipments assets: radio, cooking fuel, tv, bike, moped, car, phone, fridge
- *Housing index*:
  - Proportion of modern houses (roof in metal sheet, cement or fibro-cement and floor in cement) own by the household

Aggregation method

Multiple Correspondence Analysis (*Anderson, 2014*)

Improvement in Living standard

- Productive & Consumer indexes used to rank the households into decile from 1 to 10 in 2003 and in 2014.

Improvement between 2003 and 2014

- Change in rank between 2003 and 2014 for the Productive & consumer indexes
- Change in the proportion for housing index.

Outline

How do households react to climate variation?

climate variation measurements

$$Climate_t = \frac{Climate_{Level,t} - \mu_v^{LR}(Climate_{Level})}{\sigma_v^{LR}(Climate_{Level})}$$

- $Climate_t$: Rainfall per raining days, number of rainy days
- $Climate_{Level,t}$, level of climate variable in the region in year t
- $\mu_v^{LR}(Climate_{Level})$, mean value over the last 5-years prior to year t.
- $\sigma_v^{LR}(Climate_{Level})$, standard deviation over the last 5-years prior to year t.

Effect of climate variation on migration

$$Mig_{hvt} = \beta_0 + \beta_1 Climate_{vt} + \beta_2 Climate_{vt} \times Level_{hv03} + \delta X_{hvt} + \pi_h + \tau_v + \nu_t + \epsilon_{hvt}$$

h = household; v = village; t = year; Mig = Migrations; $Level$ = Living standards; X = Control variables

How do households react to climate variation?

	Short migration		Long Migration	
	Non-Agri Period	Agri, Period	Non-Agri Period	Agri, Period
	(1)	(2)	(3)	(4)
Climate variation				
Rainfall at t		-0.128**		-0.279
		(.0487)		(.1736)
Rainfall at $t-1$	0.219***	-0.274***	-0.0209	-0.0921
	(.0502)	(.0719)	(.1492)	(.3390)
Rainy days at t		0.156		-0.275
		(.1043)		(.2691)
Rainy days at $t-1$	-0.0620	-0.813***	-0.201	-0.608
	(.0652)	(.2208)	(.3263)	(.6853)
Climate variation × 2003 Ind. Level	**Yes**	**Yes**	**Yes**	**Yes**
Household variables	**Yes**	**Yes**	**Yes**	**Yes**
Years fixed effects	**Yes**	**Yes**	**Yes**	**Yes**
Village fixed effects	**Yes**	**Yes**	**Yes**	**Yes**
Household fixed effects	**Yes**	**Yes**	**Yes**	**Yes**
Mean values	**1.235**	**.714**	**.126**	**.205**
Number observation	**2673**	**2667**	**2673**	**2667**

Are migrations improving household living standard?

Conditional change-score model

$$\Delta Level_{hv} = \alpha_1 \Delta Mig_{hv} + \alpha_2 \Delta X_{hv} + \gamma Level_{hv_{03}} + \tau_v + \epsilon_{hv}$$

- $\Delta Level_{hv}$, change in the level of the household living standard
- $Level_{hv_{03}}$, level at the first period
- ΔMig_{hv}, number of migrations occurs in the household between 2003 and 2013.
- ΔX_{hv}, change in household demographic profile

An Instrument for migration: Migration network

Network in the village and in the household:

- Proportion of migration in each village in 2002
- Number of migration in the household between 1991 and 2001

Are migrations improving household living standard?

	Dependent variable: Change in living standards level between 2003 and 2014								
	Productive Index			Consumer Index			Housing Index		
	OLS	IV-GMM	IV-GMM	OLS	IV-GMM	IV-GMM	OLS	IV-GMM	IV-GMM
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Number of migrations, household									
Long term migration	**0.0502*** **	**0.171*** **		**0.0535*** **	**0.215*** **		0.125	**1.632***	
	(.0121614)	(.0460204)		(.0159169)	(.0423117)		(.1398615)	(.7055198)	
Short term migration	**0.0138** **		**0.0469*** **	**0.0148** **		**0.0466*** **	0.0885		0.186
	(.0043572)		(.0054315)	(.0051727)		(.0060887)	(.0629969)		(.106618)
Level at the first period									
Rank, 2003	-0.574***	-0.597***	-0.588***	-0.798***	-0.846***	-0.810***	-0.461***	-0.491***	-0.454***
	(.0221774)	(.0244792)	(.0202956)	(.0348797)	(.0316513)	(.035466)	(.0350559)	(.0356251)	(.0346138)
Changes in household demographies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2603	2603	2603	2604	2604	2604	2332	2332	2332
Village fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Hansen J statistic		2.540	2.707		0.071	2.907		0.778	3.142
Hansen J statistic, p-value		0.2809	0.2583		0.9652	0.2337		0.6779	0.2078
LM statistic, instruments		14.167	17.970		14.704	17.872		15.096	17.724
p-value, LM statistics		0.0027	0.0004		0.0021	0.0005		0.0017	0.0005
Centered R2	0.3166	0.2870	0.3011	0.4725	0.4385	0.4630	0.1496	0.1726	0.1831

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Conclusion

Research questions

- Are migrations a respond to climate variation?
- And how do migration impact socio economic vulnerability in Rural communities?

- Define two types of migration: short-term migration and long-term migration
- Significant association between climate variation and short-term migration
- Short-term migration seems to appear as a defensive response to climate variation
- Positive effect of both migrations on household living standard in Niakhar
- Long-term migration seems to be an explicit strategy to escape from poverty

THANK YOU FOR YOUR ATTENTION