The Long-Term Human Capital Consequences of Natural Disasters: Evidence from India

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Motivation

- Climate change and extreme weather events have caused a surge and predicted to increase the frequency and intensity of natural disasters.
- Case studies show adverse effects from exposure to earthquake, tsunami, hurricane in early-life on human capital.

Research Question

1. What are the long-term effects of early-life exposure to multiple natural disasters on human capital in adulthood?
2. What are the heterogeneities of the impacts across natural disaster intensity and severity, and individual's demographics?

Data on Human Capital

India Human Development Survey (IHDS)

- Nationally representative survey.
- Geo information: administrative level 2, district.
- Use 2^{th} wave. Interview year: 2011-2013.
- Restrict to individuals whose households origin are in same district (88%).
- Birth cohort: 1971-1992. Age: 20-40.
- Observations: 59,066 with 51% being female.

	Mean	SD	Mean	SD
	Women		Men	
Age	29.25	6.26	29.26	6.22
Birth year	1983	6.26	1983	6.23
Years of education	6.36	5.10	8.23	4.56
Complete primary sch	0.53	0.50	0.70	0.46
Long-term disease	0.08	0.27	0.05	0.21
Short-term sickness	0.16	0.36	0.09	0.29
Worker of any job	0.47	0.50	0.87	0.33
Salary Worker paid monthly/annually	0.06	0.24	0.21	0.40

Data on Natural Disaster

EM-DAT International Disaster Database

- Record disaster events: type, time, human impact, locations affected.
- One disaster is recorded if: **10+ people killed**; or **100+ people affected**; or **declaration of a state of emergency**; or **call for international assistance**.
- Use district in 2001 Census and construct linkage of location names over years.

Link **480 natural disaster events over 1970-2013 in India** to districts.

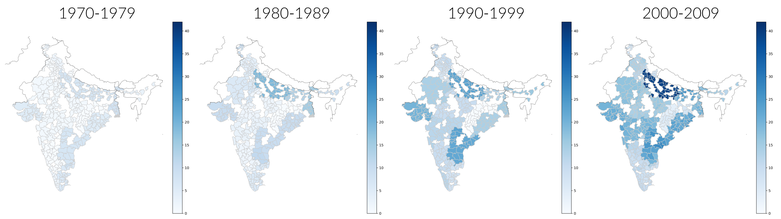
- The median deaths caused by one event is 74.
- The median # of people affected by one event is 50,000.
- Using population by district and year, I construct for each event:
  1. # of affected per 100 pop: the median is 0.16.
  2. # of deaths per 1 mi pop: the median is 1.72.

Example: 2004 Indian Tsunami

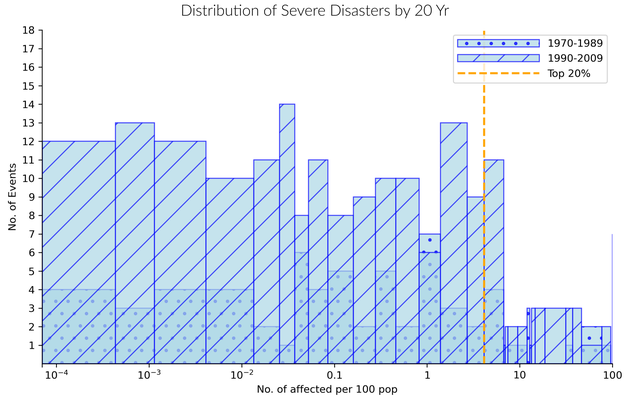
- Identified as event "2004-0659-IND", killing 16,389 and affecting 654,512.
- Ranking 2^{nd} in terms of deaths, but 107^{th} in terms of affected/pop in my sample.

All Disasters

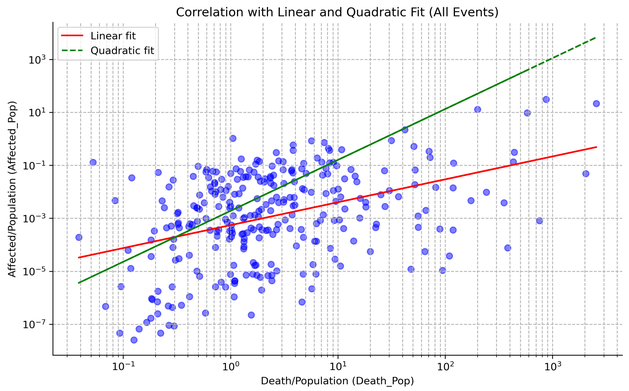
- Aggregate # of all events from EM-DAT by district and year.



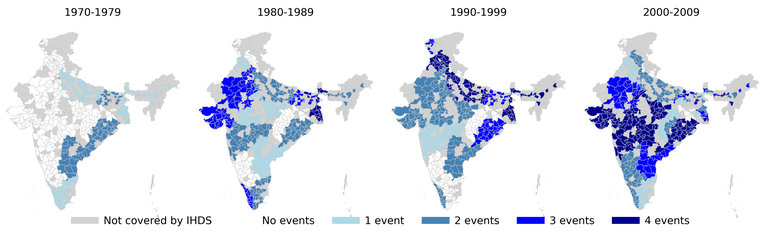
Severe Disasters



- Define severe disaster: affect 4+ per 100 pop (top 20%).
- Results are robust using death/pop.



- Aggregate # of severe disasters by district and year.



Early-life Exposure to Disasters

- Construct the exposure to natural disasters for district-cohort in early-life: year before birth year, birth year, and 2 years after birth year.

	Mean	SD	Min	Max	N
	Women				
# of any disasters	2.57	2.37	0	12	30,304
# of severe disasters	0.51	0.73	0	4	30,304
	Men				
# of any disasters	2.54	2.36	0	12	28,762
# of severe disasters	0.51	0.75	0	4	28,762

Empirical Strategy

$$Y_{idc} = \alpha + \beta \cdot D_{dc,EarlyLife} + X_i'\theta + \mu_d + \phi_c + \epsilon_{idc}, \quad (1)$$

- Two-Way Fixed Effects (TWFE) regression leveraging jointly temporal and spatial variations in disaster exposures across district and birth cohorts.
- β: effects of early-life natural disasters exposures on human capital
- Y_{idc} - outcomes for individual i residing in district d, of cohort c
- $D_{dc,earlyLife}$ - # of disasters for cohort c in district d during early life
- X_i' - individual-specific controls (age, gender, caste/religion, interview yr-mo)
- μ_d, ϕ_c - district FE, cohort FE

Effects of All Disasters

	(1) Years of education	(2) Complete primary sch	(3) Long-term disease	(4) Short-term sickness	(5) Worker any job	(6) Salary worker
All individuals	-0.009	-0.001	0.001	-0.000		
	(0.015)	(0.001)	(0.001)	(0.001)		
Women	-0.007	-0.002	0.000	-0.001	-0.001	0.001
	(0.019)	(0.002)	(0.001)	(0.002)	(0.002)	(0.001)
Men	-0.007	0.000	0.000	0.001	-0.005***	-0.000
	(0.021)	(0.002)	(0.001)	(0.001)	(0.002)	(0.002)

Effects of Severe Disasters

	(1) Years of education	(2) Complete primary sch	(3) Long-term disease	(4) Short-term sickness	(5) Worker any job	(6) Salary worker
All individuals	-0.147***	-0.009**	-0.003**	-0.003		
	(0.040)	(0.004)	(0.001)	(0.002)		
Women	-0.137***	-0.011**	-0.006**	-0.006	0.013***	0.002
	(0.044)	(0.005)	(0.002)	(0.004)	(0.005)	(0.002)
Men	-0.163***	-0.007	-0.001	-0.001	0.001	-0.013**
	(0.055)	(0.006)	(0.002)	(0.003)	(0.004)	(0.005)

Conclusions

- There are significantly negative effects of early-life exposure to natural disasters on human capital in adulthood.
- Early-life exposure to severe disasters leads to lower educational attainment.
- Men are less likely to participate in labor force if exposed.
- Women are less likely to have long-term disease if exposed.
- The effects are driven by severe disasters.

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