

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

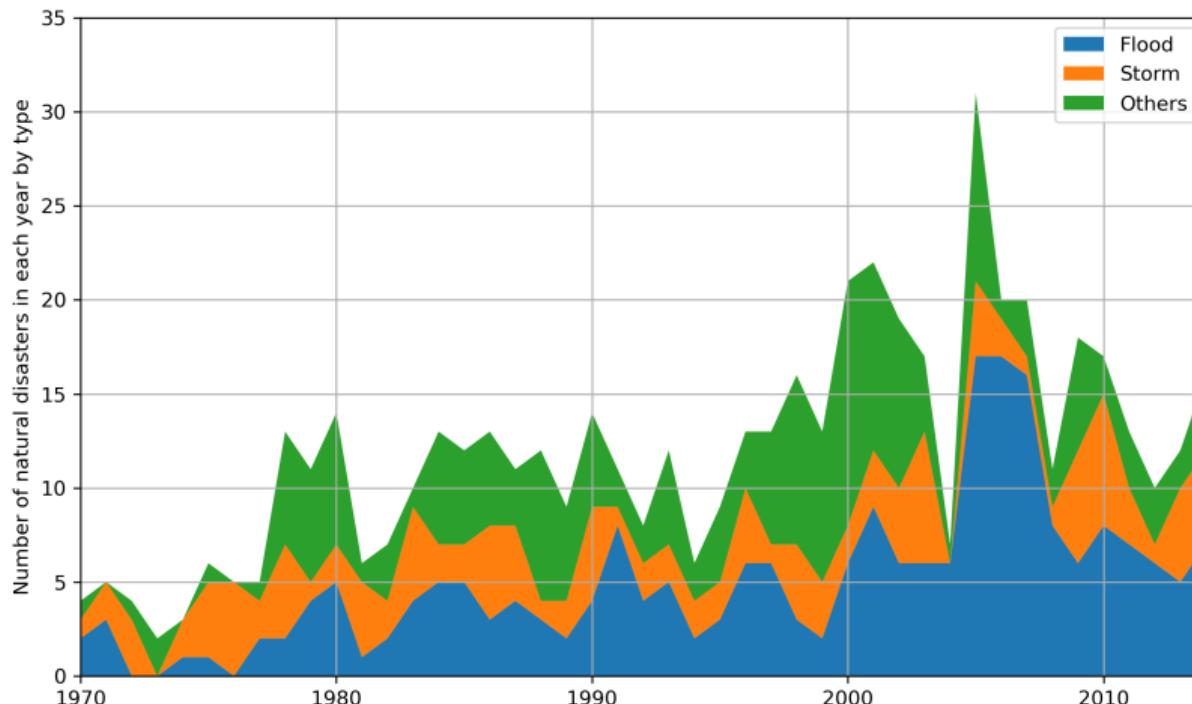
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- In recent decades, climate change has led to a surge in natural disasters, with both their frequency and severity projected to increase ([United Nations 2021](#))



**Figure 1:** # of natural disasters in India since 1970

- Many studies on disaster and human capital use single events like 2004 tsunami
  - In disaster-prone regions, individuals may experience multiple disasters

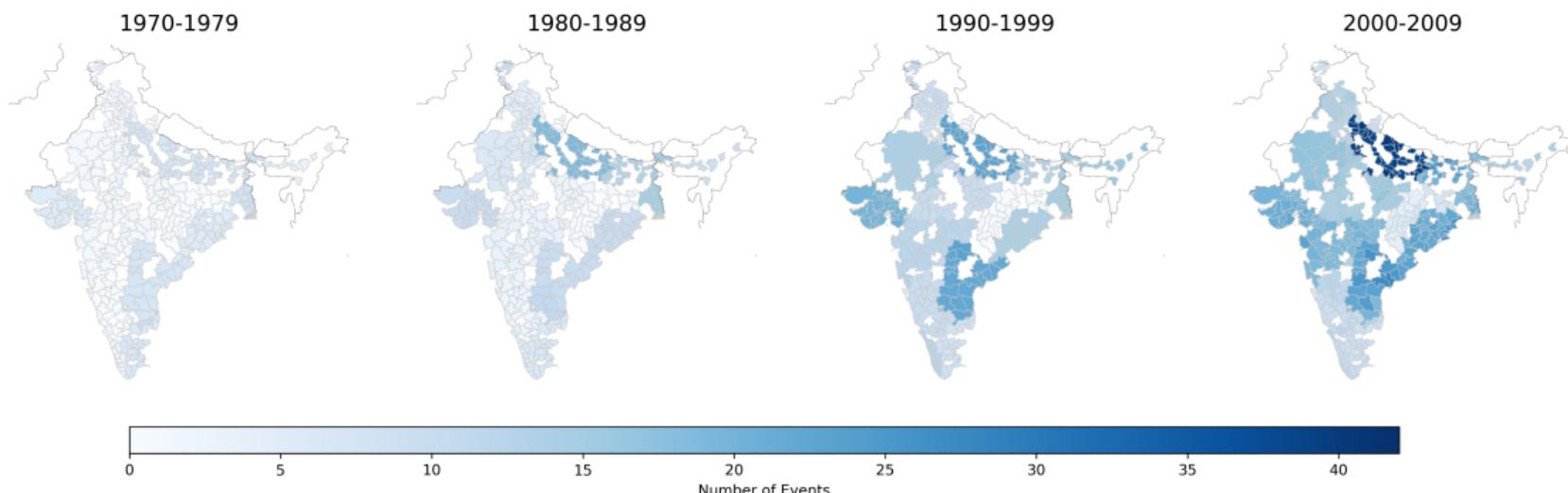


Figure 2: # of natural disasters for districts

Note: This considers all disasters recorded in EM-DAT data. Districts not covered in my sample are blank

This paper

**What are the long-term effects of early-life exposure to natural disasters on human capital during adulthood?**

1. Consider multiple disasters: floods, storms, earthquakes, ...
  2. Use data from India, an economically and socially diverse developing country
  3. Link about 500 disasters from 1970-2013 to over 59,000 individuals from a nationally representative survey in India
  4. Apply Difference-in-Differences strategy to examine effects of early-life disaster exposure on education, health, and labor outcomes for individuals aged 20-40

## Potential mechanisms

- Fetal Origin Hypothesis: Conditions in critical periods of fetal development can have lasting effects on health and well-being
    - ▶ Central-nervous systems and brains undergo rapid growth between 8 and 25 weeks post-conception ([Almond, Edlund, & Palme 2009](#))
    - ▶ In utero exposure to disaster affects birth outcomes ([Glynn et al. 2001](#); [Tan et al. 2009](#); [Torche 2011](#); [Oyarzo et al. 2012](#); [Currie 2013](#))
  - Negative shocks in **early life (in utero to age 2)**
    - ▶ Reduce labor productivity and income and worsen health ([Almond 2006](#); [Maccini & Yang 2009](#); [Liu et al. 2015](#); [Shah & Steinberg 2017](#); [Karbownik & Wray 2019](#))
    - ▶ Lead to different effects for vulnerable population ([Bhalotra 2010](#); [Jayachandran & Kuziemko 2011](#); [Sivadasan & Xu 2021](#))

# Preview of results

Early-life exposure to severe disasters...

- Significantly affects educational attainment
  - ▶ Reduces likelihood of completing primary school
  - ▶ Exposure to one additional disaster results in loss of 2 mo. of education
  - ▶ Repeated disaster exposure has significant effects
  - ▶ Effects observed for both genders
- Exhibit lower likelihood of having long-term disease → better health
  - ▶ Not observed for men
- Reduces labor force participation for men, particularly in salaried jobs
  - ▶ Opposite effect for women

# Related literature and contribution

- Study effects of **multiple disasters** on human capital
  - ▶ Expand case studies on single events ([Cho & Kim 2023](#); [Ciraudo 2020](#)); Fewer studies examine multiple disasters and study specific disaster types ([Opper et al. 2023](#); [Currie & Rossin-Slater 2013](#); [Norling 2022](#))
- Study **long-term effects** of early-life shock
  - ▶ Some studies suggest early-life impacts can fade over time ([Currie & Almond 2011](#); [Almond, Currie, & Duque 2018](#)), while others argue that childhood harms can increase proportionally as individuals age due to the cumulative nature of human capital production ([Hanushek & Rivkin 2012](#); [Todd & Wolpin 2003](#))
- Explore **heterogeneity** across individual and disaster characteristics
  - ▶ Few papers consider intensity of disasters ([Caruso 2017](#))
  - ▶ Gender-differentiated effects ([Maccini & Yang 2009](#); [Sivadasan & Xu 2021](#))

# Data overview

- Emergency Events Database (EM-DAT)
- India Human Development Survey (IHDS)
- Link EM-DAT disaster data to IHDS individuals by district and birth cohort
  - ▶ Sample construction
  - ▶ Measure: disaster characteristics
  - ▶ Measure: early-life disaster exposure

# Data on natural disasters

EM-DAT International Disaster Database from 1900

- Used by 60% of macroeconomic studies in 2000-2013 on disaster and development ([Lazzaroni & Bergeijk 2014](#))
  - ▶ GDP growth ([Botzen, Deschenes, & Sanders 2019](#); [Klomp & Valckx 2014](#)), income and institutions ([Kahn 2005](#)), firm-level outcomes ([Leiter, Oberhofer, & Raschky 2009](#)), growth retardation ([Thamarapani 2021](#)), poverty and well-being ([Edmonds & Noy 2018](#))
- Sources: UN agencies, insurance companies, research institutes, press agencies
- **One natural disaster event is recorded if it caused**
  - ▶  $\geq 10$  people dead,
  - ▶ or  $\geq 100$  people affected,
  - ▶ or declaration of state of emergency,
  - ▶ or call for international assistance

# Data on natural disasters

EM-DAT International Disaster Database

- **Context variables:** disaster type, locations affected (states, districts) 
- **Impact variables:** deaths, affected (injured, missing, homeless) 

DisNo.	Disaster Type	Location	Start Year	Start Month	Start Day	End Year	End Month	End Day	Total Deaths	Total Affected
1984-0124-IND	Earthquake	Cachar district (Assam)	1984	12	31	1984	12	31	20	10900
1990-0103-IND	Flood	Jammu, Kargil district (Kashmir)	1990	3	21	1990	3	22	69	
1990-0580-IND	Storm	Ganjam district (Orissa)	1990	11		1990	11		250	1,500,000

Table 1: Natural disaster examples

## Data on human capital

India Human Development Survey (IHDS)

- Widely used to explore evolving daily lives of Indian households (Azam & Bhatt 2015; Chatterjee & Sennott 2021; Heyes & Saberian 2022; Mohanty & Gebremedhin 2018)
  - Nationally representative panel data
    - ▶ Conducted in 2 waves: 2004-2005, 2011-2013
    - ▶ Households: > 41,000
    - ▶ Individuals: > 150,000
  - Geographic information: administrative level 2, district 
    - ▶ India 2001 Census division: 592 districts
    - ▶ Average geographical size of district in India: 2,500 to 6,000  $km^2$
    - ▶ Average pop size of district in India: 1 to 2 million
    - ▶ Comparison with *Capital Region of Denmark*: 2,500  $km^2$ , 1.9 million pop

## Sample construction and data limitation

- Restrict analysis to natural disasters occurring 1970-2013 
  - ▶ Location information availability increases significantly since 1970 from 60% to 90%
- Use IHDS wave 2 for older cohorts and longer post-early-life periods
  - ▶ Ages: 20-40; Birth cohorts: 1971-1992
  - ▶ 68,421 individuals are included
- Limit sample to individuals from households that have not moved across districts 
  - ▶ Location of birth is not observed
  - ▶ Use location of household residence when surveyed as location of birth
  - ▶ Keep individuals whose households have not moved across districts (87%): 59,066

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## Sample overview

- Interview time: Oct 2011 to Dec 2012 (88% surveyed in 2012)
  - Age: 20-40 with average being 29
  - Women: 30,304      Men: 28,762

	Mean	SD	Mean	SD
	Women		Men	
Years of education (never=0)	6.36	5.10	8.23	4.56
Complete primary school	0.53	0.50	0.70	0.46
Diagnosed with long-term disease	0.08	0.27	0.05	0.21
Worker with any job	0.47	0.50	0.87	0.33
Salary worker paid monthly or annually	0.06	0.24	0.21	0.40

Table 2: Summary statistics of outcomes

## Measure: disaster characteristics

- There is large variation in severity of disasters 
- Define severe disaster
  - ▶ Map each disaster event to district-year using time and location
  - ▶ For each event, calculate (# of people affected) / (population in districts affected)
  - ▶ One disaster is “severe” if it affects more than 4 people out of 100 pop (ranks in top 20%)

	Deaths	Affected	Deaths per 1 mi pop	Affected per 100 pop
0.6	100	200,000	3	0
0.7	161	572,680	5	1
0.8	250	2,460,000	9	4
0.9	669	9,836,500	41	13
0.99	9,710	123,240,000	682	100

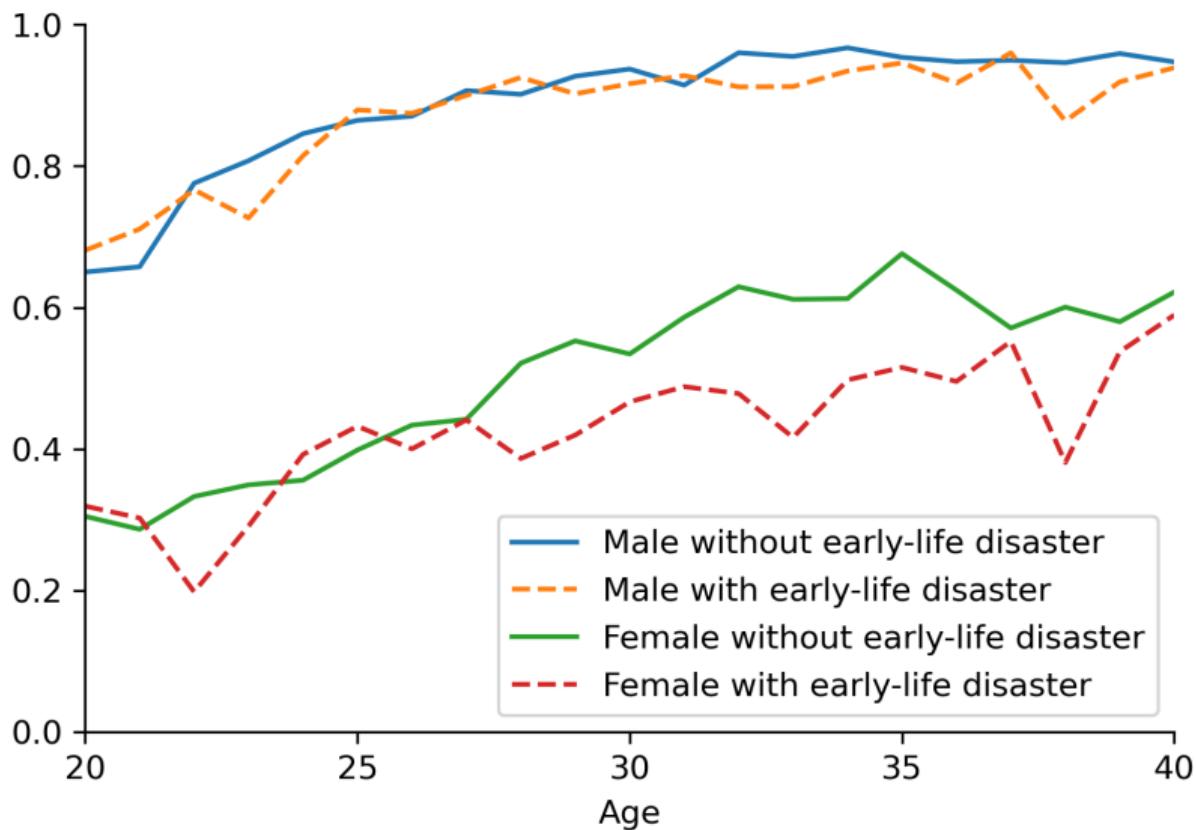
Table 3: Quantile distribution of disasters regarding human impacts

## Measure: early-life disaster exposure

- For each district-birth cohort, generate early-life disaster exposure
  - 38% individuals exposed to severe disasters in early-life
    - ▶ 27% exposed to 1 disaster; 9% exposed to 2+ disasters
    - ▶ For those exposed, average # of disasters = 1.33

	Mean	SD	Min	Max
<b># of severe disasters exposed</b>				
Early-life	0.51	0.74	0	4
In utero	0.11	0.32	0	2
Birth year	0.13	0.34	0	2
Age 1	0.13	0.34	0	2
Age 2	0.14	0.35	0	2

**Table 4:** Summary statistics of disaster exposures



**Figure 3: Share of people working for any job**

# Estimation strategy

Explore jointly the spatial and temporal variation in early-life disaster exposure

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

- $Y_{idc}$  - human capital outcomes for individual  $i$  in district  $d$  of birth cohort  $c$
- $D_{dc, EarlyLife}$  - # of disasters experienced from in utero to age 2
- $X'_i$  - individual-specific control variables such as gender, age, caste and religion, interview year and month
- $\mu_d, \phi_c$  - vector of district FE, birth cohort FE, respectively
- $\epsilon_{idc}$  - error term, assumed to be random and idiosyncratic, with standard errors clustered at the district level

# Effects of severe disasters for all individuals

	(1) Years of education	(2) Complete primary sch	(3) Long-term disease	(4) Work for any job	(5) Salary worker
<b>All individuals</b>					
# of disasters in early-life	-0.147*** (0.040)	-0.009** (0.004)	-0.003** (0.001)	0.007** (0.003)	-0.005* (0.003)
Female	-1.887*** (0.074)	-0.171*** (0.007)	0.035*** (0.003)	-0.405*** (0.011)	-0.145*** (0.006)
Mean	7.27	0.61	0.06	0.67	0.13
Observations	58964	58964	59053	59053	59053

- Each column represents separate regression controlling for gender, age, caste and religion, interview year/mo., with district FE and birth cohort FE
- This assumes being exposed to one additional disaster has linear effect

## Effects of severe disasters: Gender-specific analysis

	(1) Years of education	(2) Complete primary sch	(3) Long-term disease	(4) Work for any job	(5) Salary worker
<b>Women</b>					
# of disasters in early-life	-0.137*** (0.044)	-0.011** (0.005)	-0.006** (0.002)	0.013*** (0.005)	0.002 (0.002)
Mean	6.36	0.53	0.08	0.47	0.06
<b>Men</b>					
# of disasters in early-life	-0.163*** (0.055)	-0.007 (0.006)	-0.001 (0.002)	0.001 (0.004)	-0.013** (0.005)
Mean	8.23	0.70	0.05	0.87	0.21

- Education burden of exposure is observed for both women and men
- Women exposed show higher prob. of being diagnosed with long-term disease
- Opposite effects are observed on working status across gender

## Non-linear effects

	(1) Years of education	(2) Complete primary sch	(3) Long-term disease	(4) Work for any job	(5) Salary worker
<b>Women</b>					
Dummy: exposed to 1 disaster	-0.161 ** (0.075)	-0.006 (0.007)	-0.006 (0.004)	0.016 ** (0.008)	-0.002 (0.004)
Dummy: exposed to 2 disasters	-0.187 * (0.104)	-0.016 (0.011)	-0.015 *** (0.006)	0.016 (0.011)	0.004 (0.006)
Dummy: exposed to 3+ disasters	-0.672 *** (0.226)	-0.075 *** (0.020)	-0.009 (0.014)	0.067 *** (0.025)	0.021 (0.014)
Mean	6.36	0.53	0.08	0.47	0.06
<b>Men</b>					
Dummy: exposed to 1 disaster	-0.221 *** (0.077)	-0.011 (0.008)	-0.000 (0.003)	0.017 ** (0.007)	-0.014 ** (0.007)
Dummy: exposed to 2 disasters	-0.281 ** (0.113)	-0.005 (0.011)	-0.002 (0.005)	0.001 (0.009)	-0.028 ** (0.011)
Dummy: exposed to 3+ disasters	-0.480 (0.294)	-0.034 (0.027)	-0.005 (0.008)	-0.028 (0.024)	-0.028 (0.026)
Mean	8.23	0.70	0.05	0.87	0.21

## Effects on employment of women controlling for spousal income

	(1) Work for any job	(2) Salary worker
Dummy: exposed to 1 disaster	0.012 (0.009)	0.006 (0.004)
Dummy: exposed to 2 disasters	0.014 (0.013)	0.009 (0.006)
Dummy: exposed to 3+ disasters	0.054* (0.031)	0.012 (0.013)
Spouse income 2nd quartile	-0.052* (0.027)	0.016* (0.009)
Spouse income 3rd quartile	-0.001 (0.025)	0.013 (0.009)
Spouse income 4th quartile	-0.122*** (0.025)	0.019** (0.008)
Mean	0.47	0.06

- There is U-shaped link between woman being employed and husband's salary ([Azim Premji Univ. Report 2023](#))

# Robustness checks

- Alternative outcomes
  - ▶ Complete secondary school, complete high school
  - ▶ Have short-term sickness
  - ▶ Full-time worker with any job, full-time salary worker
- Alternative specifications
- Alternative definition of severe disasters
  - ▶ Use other measures such as deaths, Affected
  - ▶ Use other thresholds such as top 10%

# Robustness checks

Robustness checks for women: Complete secondary sch

Control: gender, age, caste, int yr, int mo; FE: c, d

Control: gender, age, caste; FE: c, d

Control: gender, age, caste; FE: c, d, int yr X int mo

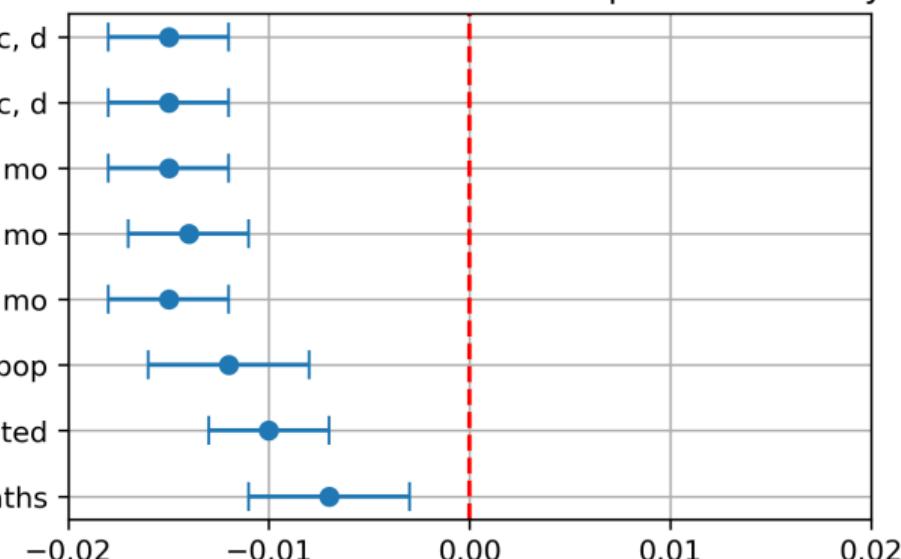
Control: gender, caste; FE: age, d, int yr, int mo

Control: gender, caste; FE: c, d, int yr, int mo

Affected per 100 pop

Total affected

Total deaths



# Heterogeneity by types of disasters

	(1) Years of education	(2) Complete primary sch	(3) Long-term disease	(4) Work for any job	(5) Salary worker
<b>Women</b>					
Earthquake	-0.148 (0.348)	-0.004 (0.036)	-0.038*** (0.005)	-0.059* (0.032)	0.022* (0.013)
Drought	-0.047 (0.076)	0.001 (0.007)	-0.004 (0.004)	0.007 (0.009)	-0.002 (0.004)
Storm	-0.206** (0.096)	-0.014 (0.011)	-0.008 (0.005)	0.013 (0.012)	0.005 (0.006)
Flood	-0.155** (0.064)	-0.016** (0.006)	-0.006 (0.004)	0.017** (0.007)	0.002 (0.003)
<b>Men</b>					
Earthquake	0.419 (0.320)	0.021 (0.016)	0.027 (0.035)	-0.024 (0.068)	-0.007 (0.013)
Drought	-0.063 (0.068)	0.009 (0.007)	0.000 (0.003)	0.005 (0.006)	-0.009 (0.007)
Storm	-0.246** (0.124)	-0.006 (0.013)	-0.004 (0.004)	0.029*** (0.007)	-0.001 (0.010)
Flood	-0.190** (0.087)	-0.016* (0.009)	-0.001 (0.003)	-0.011* (0.006)	-0.019*** (0.007)

# Summary of findings

1. Early-life disaster exposure significantly negatively affects educational attainment
  - ▶ Reduces likelihood of completing primary school
  - ▶ Assuming linear effect, exposed to 4 disasters  $\Rightarrow \frac{1}{2}$  year of education loss
2. Women exposed show lower likelihood of being diagnosed with long-term disease
3. Early-life disaster exposure reduces labor force participation for men
  - ▶ Particularly in salaried jobs
4. There are cumulative effects of disaster exposure
5. Exposure to repeated exposures has higher impact
6. Floods and storms could be driving effects

## Next steps

- **Labor outcomes:** hours of working, income, and wealth are to be explored
- **Heterogeneity analysis:** Beyond gender differences, examine heterogeneous effects by socio-economic status and urban-rural residency
- **Underlying mechanisms:** Access to health care and additional health indicators for eligible women, such as height and weight, can be explored, but not for men

# Thank you!

Email: [yjiezhang@outlook.com](mailto:yjiezhang@outlook.com)

Website: <https://yujiezhangcon.github.io/>

- About me: Ph.D. Candidate in Economics at University of Houston
- Explore the intersections between climate change, human capital, and social inequality through transnational comparative studies and large-scale data analysis
- Working papers: (1) Effects of disasters on education (2) Population burden of extreme temperatures and pollution risks

# Context variables (EM-DAT disaster data)

- Example showing 3 natural disasters in India (continued in next slide)

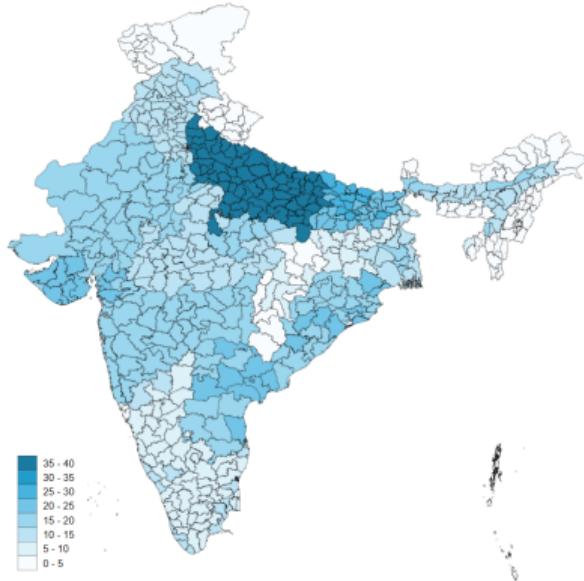
DisNo.	Disaster Type	Event Name	Location	Origin	Magnitude	Magnitude Scale	Latitude	Longitude
1984-0124-IND	Earthquake	Ground movement	Cachar district (Assam)		6	Moment Magnitude	24.4	92.34
1990-0103-IND	Flood	Flash flood	Jammu, Kargil district (Kashmir)	Brief torrential rain		Km2		
1990-0580-IND	Storm	Tropical cyclone	Ganjam district (Orissa)			Kph		

# Impact variables (EM-DAT disaster data)

- Example showing 3 natural disasters in India (continued from last slide)

DisNo.	Start Year	Start Month	Start Day	End Year	End Month	End Day	Total Deaths	No. Injured	No. Affected	No. Homeless	Total Affected	Damage, Adjusted ('000 USD)
1984-0124-IND	1984	12	31	1984	12	31	20	100	800	10000	10900	
1990-0103-IND	1990	3	21	1990	3	22	69					
1990-0580-IND	1990	11		1990	11		250		1500000		1500000	263055

## Natural disaster and district



**Figure 4:** # of natural disasters recorded in EM-DAT 2001-2010



Figure 5: Population density

# Disaster events information availability

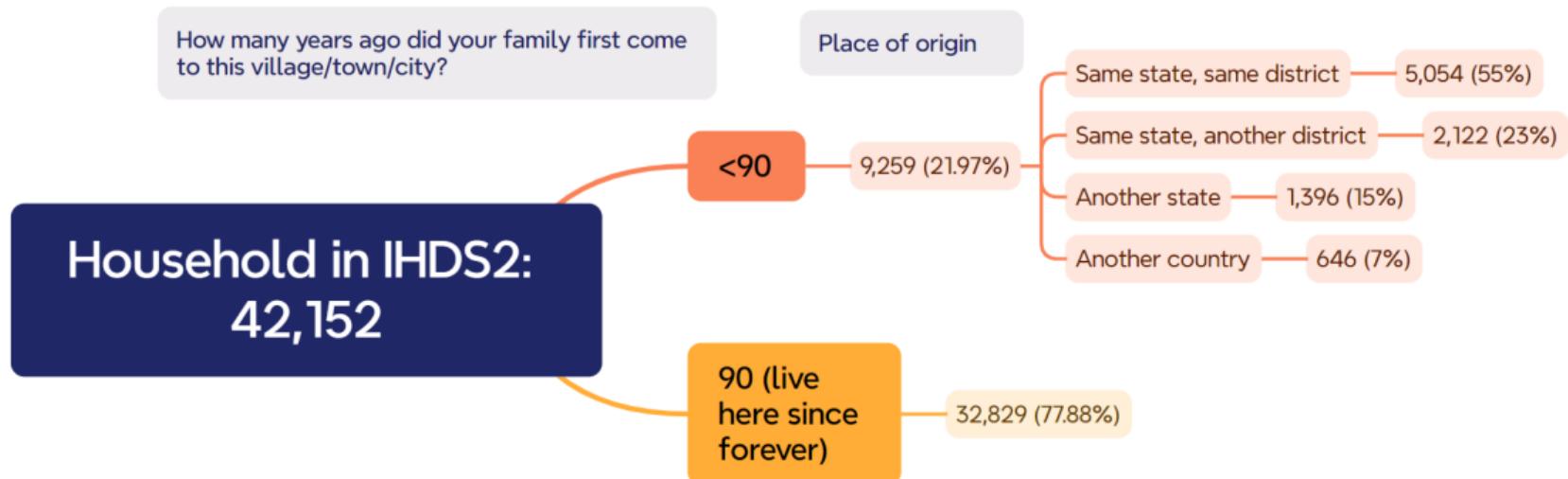


Year	Event No.	Share of Events with Location Info	Deaths (Avg.)	Affected (Avg.)
1900-1909	3	66.67%	856,667	NA
1910-1919	1	100.00%	300	NA
1920-1929	10	60.00%	358,338	347,337
1930-1939	3	66.67%	20,111	NA
1940-1949	8	100.00%	257,801	16,000
1950-1959	28	50.00%	277	229,565
1960-1969	41	63.41%	44,649	5,877,478
1970-1979	58	93.10%	767	9,820,981
1980-1989	107	90.65%	314	10,783,917
1990-1999	115	99.13%	465	4,039,702
2000-2009	184	100%	357	4,626,611
2010-2019	162	100.00%	143	4,417,043

# Location history information in IHDS

## Household-level migration information

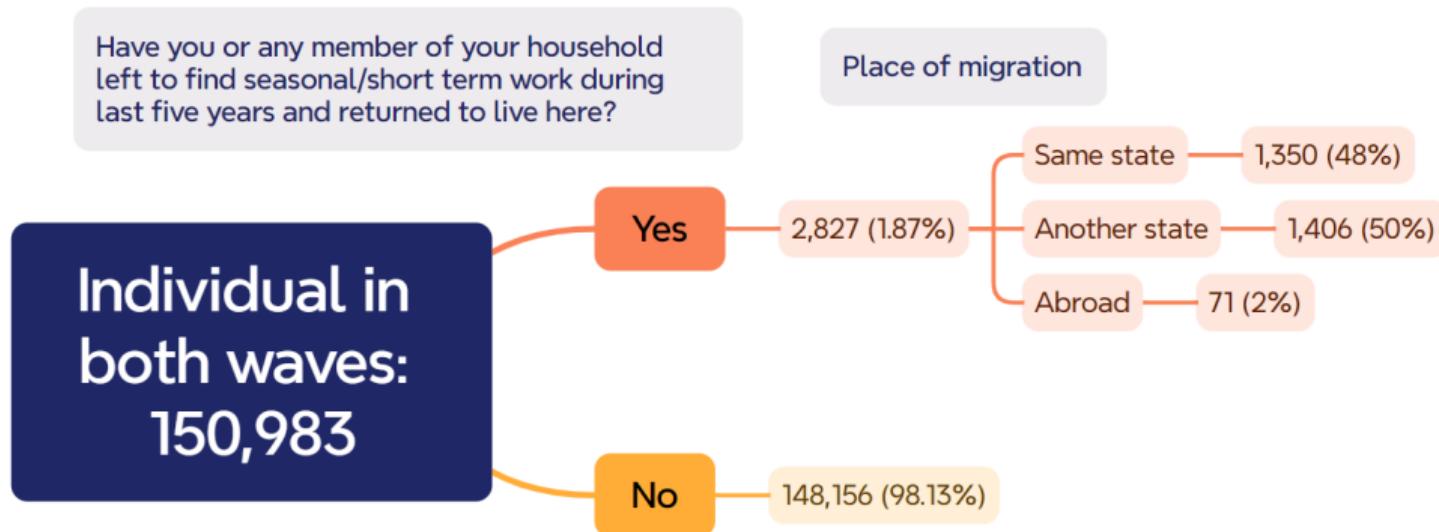
Both IHDS 1 and 2 ask about migration history for households



# Location history information in IHDS

## Individual-level migration information

Only IHDS 2 asks individuals about migration history in recent 5 years



# Sample overview

Interviewed in 2011-2012

	Mean	SD	Min	Max	N
Female	0.51	0.50	0	1	59,066
Age	29.26	6.24	20	40	59,066
Interview year	2011.88	0.32	2011	2012	59,066
<b>Women</b>					
Years of education (never=0)	6.36	5.10	0	15	30,273
Upper primary school completed	0.53	0.50	0	1	30,273
Have or had long-term disease	0.08	0.27	0	1	30,304
Worker with any job	0.47	0.50	0	1	30,304
Salary worker paid monthly or annually	0.06	0.24	0	1	30,304
<b>Men</b>					
Years of education (never=0)	8.23	4.56	0	15	28,704
Upper primary school completed	0.70	0.46	0	1	28,704
Have or had long-term disease	0.05	0.21	0	1	28,762
Worker with any job	0.87	0.33	0	1	28,762
Salary worker paid monthly or annually	0.21	0.40	0	1	28,762

	Deaths	Affected	Deaths per 1 mi pop	Affected per 100 pop
0.1	15	82	0	0
0.2	25	779	0	0
0.3	37	5,005	1	0
0.4	50	20,000	1	0
0.5	74	50,000	2	0
0.6	100	200,000	3	0
0.7	161	572,680	5	1
0.8	250	2,460,000	9	4
0.85	386	4,045,036	16	7
0.9	669	9,836,500	41	13
0.95	1,196	24,810,000	108	37
0.96	1,454	29,496,127	123	46
0.97	1,756	32,849,040	227	77
0.98	2,938	39,280,000	390	96
0.99	9,710	123,240,000	682	100
1	20,005	300,000,000	2,558	100

Table 5: Quantile distribution of disasters in terms of human impacts

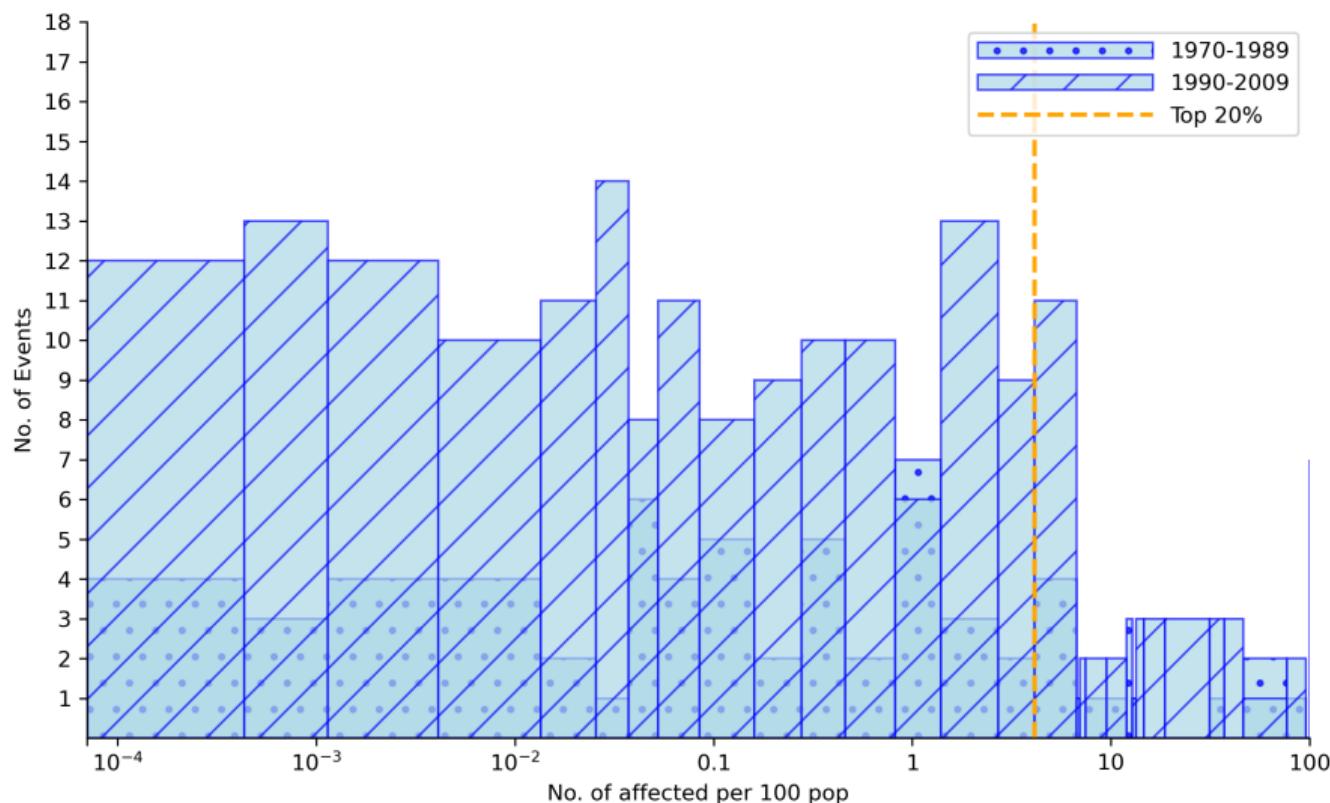


Figure 6: Distribution of disaster events by severity

- Aggregate # of severe events for district over 10-year window

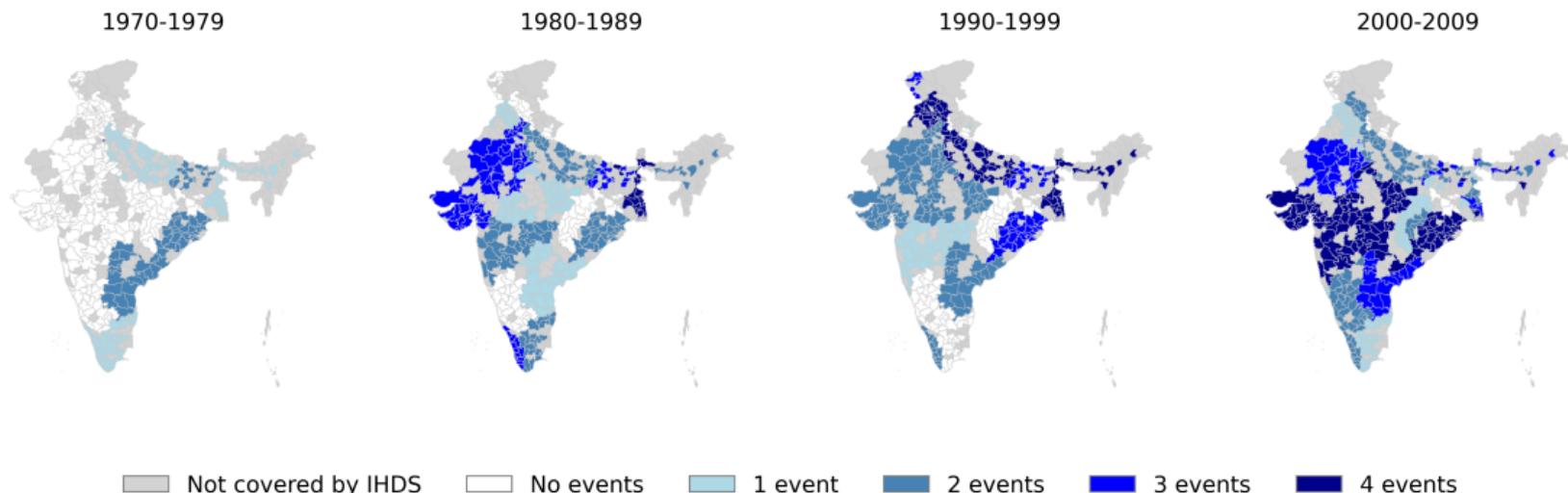


Figure 7: # of severe disasters in India

## Sample overview by gender

	Mean	SD	Min	Max	N
<b>Women</b>					
Age	29.25	6.26	20	40	30,304
Interview year	2011.88	0.32	2011	2012	30,304
Interview month	5.75	2.99	1	12	30,304
Birth year	1982.63	6.26	1971	1992	30,304
Hindu upper caste	0.20	0.40	0	1	30,298
Hindu marginalized caste	0.64	0.48	0	1	30,298
Muslim	0.14	0.35	0	1	30,298
<b>Men</b>					
Age	29.26	6.22	20	40	28,762
Interview year	2011.89	0.32	2011	2012	28,762
Interview month	5.78	2.96	1	12	28,762
Birth year	1982.63	6.23	1971	1992	28,762
Hindu upper caste	0.20	0.40	0	1	28,755
Hindu marginalized caste	0.64	0.48	0	1	28,755
Muslim	0.14	0.35	0	1	28,755

# Educational and health outcomes

	Mean	SD	Min	Max	N
<b>Women</b>					
Ever attended school	0.70	0.46	0	1	30,274
Years of education (never=0)	6.36	5.10	0	15	30,273
Lower primary school completed	0.64	0.48	0	1	30,273
Upper primary school completed	0.53	0.50	0	1	30,273
Have or had long-term disease	0.08	0.27	0	1	30,304
Sick in last mo. (diarrhea, fever, cough)	0.16	0.36	0	1	30,304
<b>Men</b>					
Ever attended school	0.87	0.34	0	1	28,715
Years of education (never=0)	8.23	4.56	0	15	28,704
Lower primary school completed	0.80	0.40	0	1	28,704
Upper primary school completed	0.70	0.46	0	1	28,704
Have or had long-term disease	0.05	0.21	0	1	28,762
Sick in last mo. (diarrhea, fever, cough)	0.09	0.29	0	1	28,762

# Labor outcomes

	Mean	SD	Min	Max	N
<b>Women</b>					
Worker with any job	0.47	0.50	0	1	30,304
Salary worker paid monthly or annually	0.06	0.24	0	1	30,304
Full-time worker with any job	0.08	0.26	0	1	30,304
Full-time salary worker paid monthly or annually	0.03	0.18	0	1	30,304
<b>Men</b>					
Worker with any job	0.87	0.33	0	1	28,762
Salary worker paid monthly or annually	0.21	0.40	0	1	28,762
Full-time worker with any job	0.43	0.50	0	1	28,762
Full-time salary worker paid monthly or annually	0.16	0.37	0	1	28,762

## Summary statistics on disaster exposures

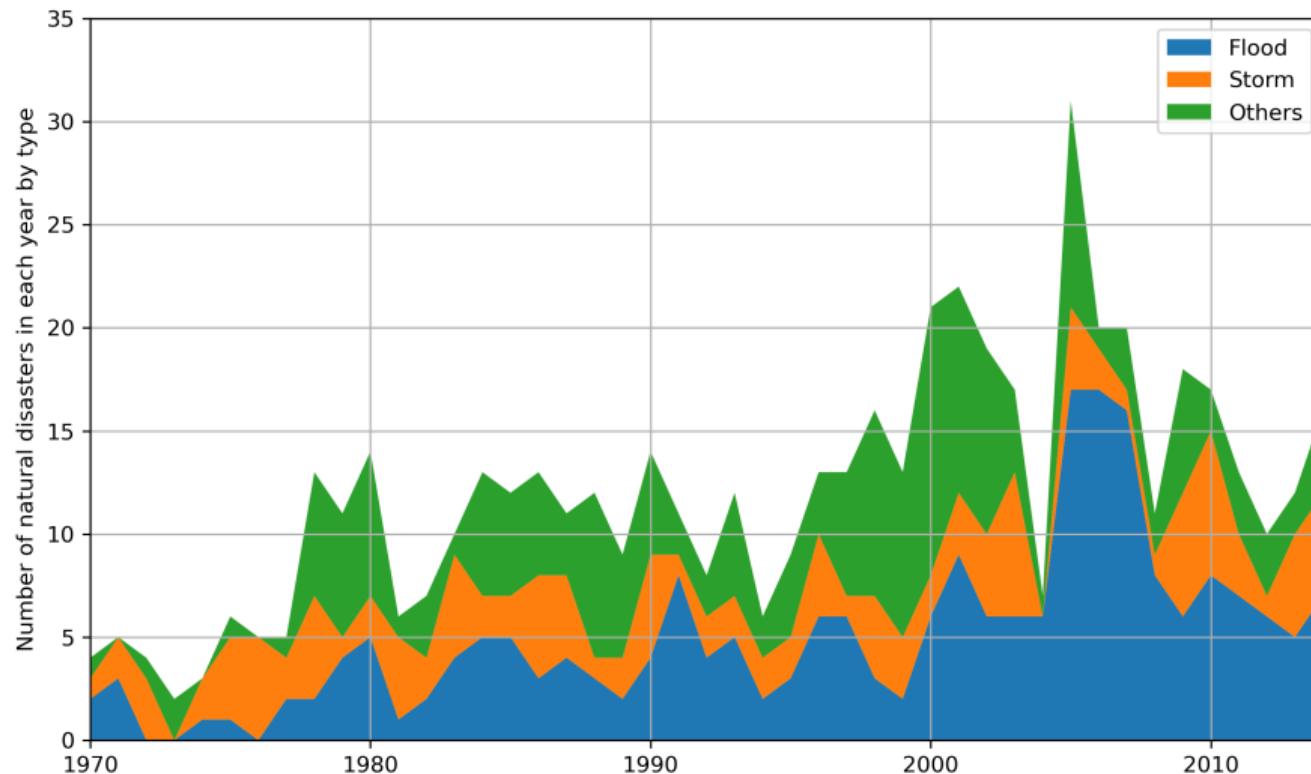
- 38% of individuals are exposed to severe disasters in early-life
- 27% are exposed to 1 disaster; 9% are exposed to 2 disasters
- For individuals exposed, average # of disasters exposed to is 1.33

	Mean	SD	Min	Max
<b># of severe disasters exposed</b>				
Early-life	0.51	0.74	0	4
In utero	0.11	0.32	0	2
Birth year	0.13	0.34	0	2
Age 1	0.13	0.34	0	2
Age 2	0.14	0.35	0	2

# Summary statistics on disaster exposures by gender

	Mean	SD	Min	Max	N
<b>Women</b>					
<b>No. of severe disasters</b>					
Early-life	0.51	0.73	0	4	30,304
In utero	0.11	0.32	0	2	30,304
Birth year	0.13	0.34	0	2	30,304
Age 1	0.13	0.34	0	2	30,304
Age 2	0.14	0.35	0	2	30,304
<b>Men</b>					
<b>No. of severe disasters</b>					
Early-life	0.51	0.75	0	4	28,762
In utero	0.11	0.32	0	2	28,762
Birth year	0.13	0.34	0	2	28,762
Age 1	0.13	0.34	0	2	28,762
Age 2	0.14	0.35	0	2	28,762

# Heterogeneity by types of disasters



Disasters	# of Events	1st quartile	Mean	3st quartile	SD
<b>Flood</b>	205				
Deaths		30	276	225	612
Affected		15,000	4,857,821	3,000,000	12,979,584
<b>Storm</b>	117				
Deaths		23	448	117	1,901
Affected		2,000	1,197,424	485,910	2,882,593
<b>Epidemic</b>	53				
Deaths		46	298	296	578
Affected		205	11,095	5,642	28,942
<b>Extreme temperature</b>	42				
Deaths		82	285	275	443
Affected		25	25	25	0
<b>Mass movement (wet)</b>	35				
Deaths		26	87	87	96
Affected		92	239,945	8,850	662,277
<b>Earthquake</b>	16				
Deaths		23	3,313	1,404	6,564
Affected		5,712	1,900,127	526,547	5,257,667

Table 6: Disaster characteristics 1970-2013

# Effects of any disasters on education and health

	(1) Ever educated	(2) Years of education	(3) Complete low primary sch	(4) Complete upper primary sch	(5) Long- term disease	(6) Short- term sickness
<b>All individuals</b>						
Early-life shock	-0.002* (0.001)	-0.009 (0.015)	-0.002 (0.001)	-0.001 (0.001)	0.001 (0.001)	-0.000 (0.001)
<b>Women</b>						
Early-life shock	-0.002 (0.002)	-0.007 (0.019)	-0.002 (0.002)	-0.002 (0.002)	0.000 (0.001)	-0.001 (0.002)
<b>Men</b>						
Early-life shock	-0.003* (0.001)	-0.007 (0.021)	-0.002 (0.002)	0.000 (0.002)	0.000 (0.001)	0.001 (0.001)

# Effects of any disasters on labor force participation

	(1) Worker with any job	(2) Salary worker	(3) Full-time worker with any job	(4) Full-time salary worker
<b>Women</b>				
Early-life shock	-0.001 (0.002)	0.001 (0.001)	-0.001 (0.001)	-0.000 (0.001)
Mean	0.47	0.06	0.08	0.03
<b>Men</b>				
Early-life shock	-0.005*** (0.002)	-0.000 (0.002)	-0.001 (0.002)	-0.002 (0.002)
Mean	0.87	0.21	0.43	0.16

# Non-linear effects on education and health

	(1) Ever educated	(2) Years of education	(3) Complete low primary sch	(4) Complete upper primary sch	(5) Long- term disease	(6) Short- term sickness
<b>Women</b>						
Dummy: exposed to 1 disaster	0.008 (0.007)	-0.161** (0.075)	0.002 (0.007)	-0.006 (0.007)	-0.006 (0.004)	-0.011* (0.006)
Dummy: exposed to 2 disasters	0.002 (0.010)	-0.187* (0.104)	-0.007 (0.011)	-0.016 (0.011)	-0.015*** (0.006)	-0.010 (0.008)
Dummy: exposed to 3+ disasters	-0.042* (0.024)	-0.672*** (0.226)	-0.042* (0.024)	-0.075*** (0.020)	-0.009 (0.014)	-0.016 (0.018)
<b>Men</b>						
Dummy: exposed to 1 disaster	-0.012** (0.006)	-0.221*** (0.077)	-0.015** (0.007)	-0.011 (0.008)	-0.000 (0.003)	-0.006 (0.004)
Dummy: exposed to 2 disasters	-0.008 (0.008)	-0.281** (0.113)	-0.015 (0.010)	-0.005 (0.011)	-0.002 (0.005)	0.002 (0.006)
Dummy: exposed to 3+ disasters	-0.024 (0.017)	-0.480 (0.294)	-0.037 (0.025)	-0.034 (0.027)	-0.005 (0.008)	0.000 (0.016)

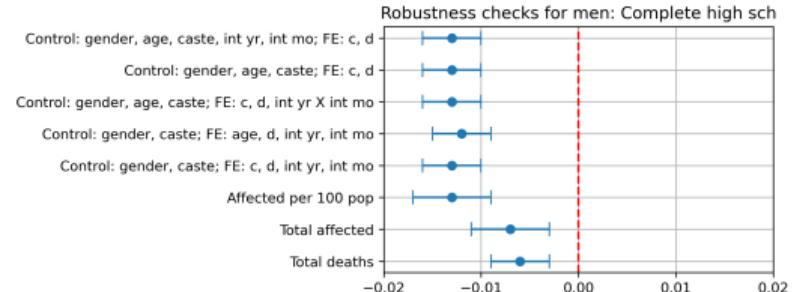
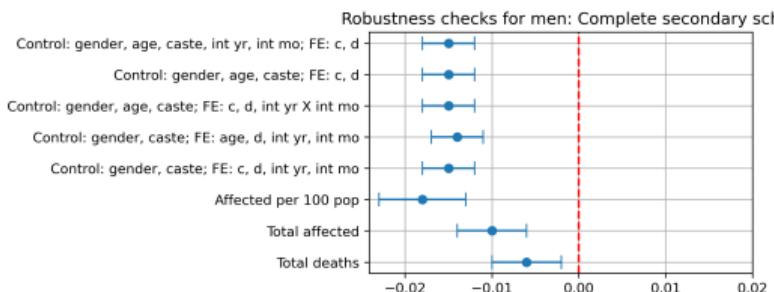
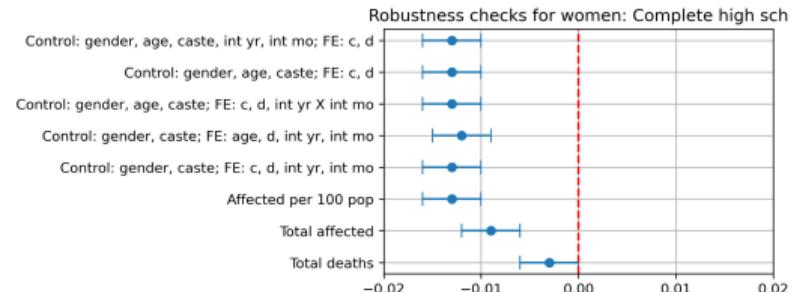
# Non-linear effects on labor force participation

	(1) Worker with any job	(2) Salary worker	(3) Full-time worker with any job	(4) Full-time salary worker
<b>Women</b>				
Dummy: exposed to 1 disaster	0.016** (0.008)	-0.002 (0.004)	0.004 (0.004)	-0.004 (0.003)
Dummy: exposed to 2 disasters	0.016 (0.011)	0.004 (0.006)	0.003 (0.006)	-0.002 (0.004)
Dummy: exposed to 3+ disasters	0.067*** (0.025)	0.021 (0.014)	0.033** (0.013)	0.011 (0.012)
Mean	0.47	0.06	0.08	0.03
<b>Men</b>				
Dummy: exposed to 1 disaster	0.017** (0.007)	-0.014** (0.007)	-0.005 (0.008)	-0.012* (0.007)
Dummy: exposed to 2 disasters	0.001 (0.009)	-0.028** (0.011)	-0.008 (0.013)	-0.030*** (0.010)
Dummy: exposed to 3+ disasters	-0.028 (0.024)	-0.028 (0.026)	-0.029 (0.028)	-0.021 (0.025)
Mean	0.87	0.21	0.43	0.16

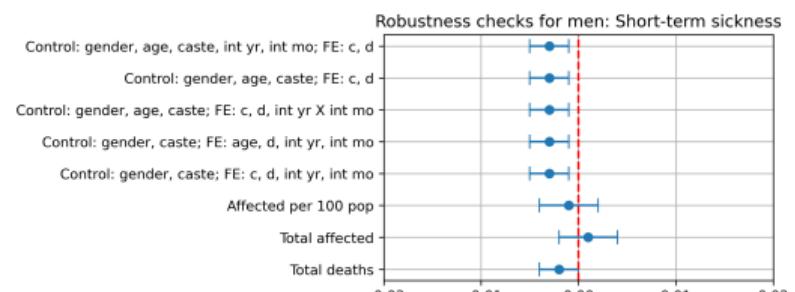
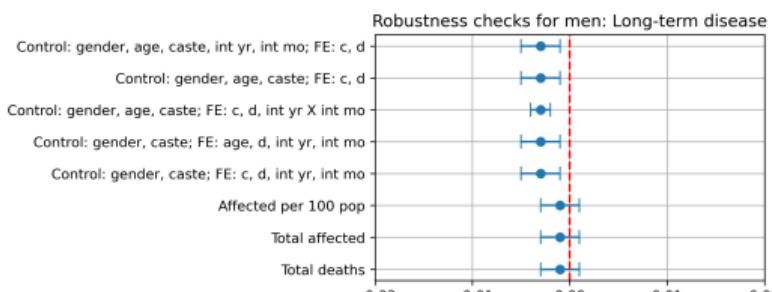
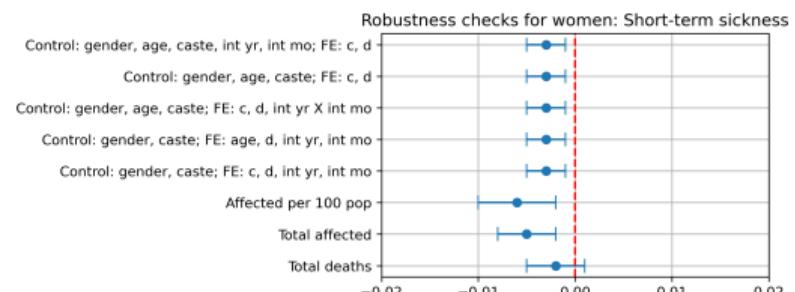
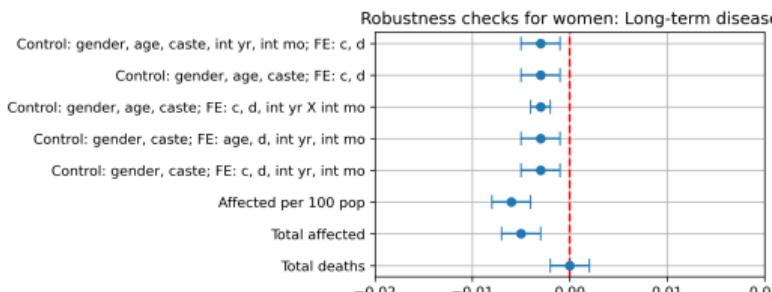
## Control for spousal characteristics, men

	(1) Worker with any job	(2) Salary worker	(3) Full-time worker with any job	(4) Full-time salary worker
Dummy: exposed to 1 disaster	-0.002 (0.005)	-0.017** (0.009)	-0.017* (0.010)	-0.016** (0.007)
Dummy: exposed to 2 disaster	0.002 (0.007)	-0.021* (0.012)	-0.001 (0.015)	-0.025** (0.011)
Dummy: exposed to 3+ disaster	-0.023 (0.021)	-0.001 (0.029)	0.019 (0.040)	0.005 (0.028)
Spouse year of edu	-0.002*** (0.000)	0.015*** (0.001)	0.006*** (0.001)	0.014*** (0.001)
Spouse work for anything	0.036*** (0.005)	-0.054*** (0.009)	-0.062*** (0.012)	-0.057*** (0.008)
Spouse income 2nd quartile	-0.001 (0.007)	0.034*** (0.010)	0.008 (0.015)	0.034*** (0.010)
Spouse income 3rd quartile	-0.003 (0.007)	0.007 (0.013)	0.033** (0.017)	0.021* (0.012)
Spouse income 4th quartile	-0.043*** (0.012)	0.018 (0.019)	0.041* (0.024)	0.037** (0.018)
Mean	0.87	0.21	0.43	0.16
Observations	18492	18492	18492	18492

# Robustness checks: women/men, education



# Robustness checks: women/men, health



# Robustness checks: women/men, labor force participation

