Natural disasters and child health

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ONLINE APPENDIX

Note A1

In order to unpack the gender differential observed in table 3 in the main text, we explore two potential factors: the role of agriculture and the preference for sons. Both these factors could have a differential impact on the way the child receives nutrition, care and other resources. The IFLS community surveys document whether communities engage in crop farming activities. We therefore construct an indicator variable for communities that have members employed as crop farmers using the IFLS3 (pre-disaster) wave. We interact the exposure variable with the indicator $\boldsymbol{I}$ in equation (2). We summarize the results in table A6 in this appendix. Children (who are exposed to natural disasters) in communities that did not engage in crop farming are 0.26 standard deviations shorter overall (panel A, column 1) and girls are 0.40 standard deviations shorter (column 3). The linear combination of $\boldsymbol{\beta_1}$, $\boldsymbol{\beta_2}$ and $\boldsymbol{\beta_3}$ reveals that girls who are exposed to disasters and are from crop farming communities are 0.724 standard deviations shorter.

Panel B in table A6 shows that the children of non-crop farming communities are about 10 per cent more likely to be stunted (column 1). The effect increases to 18 per cent when limited to only girls (column 3). The linear combination emphasizes a higher statistically significant disadvantage among girls in crop farming communities as they are 32 per cent more likely to be stunted. With the new model, the size of the sample of children drops to 1,208 observations out of which 23 per cent (287 children) are from non-crop farming communities. Out of these children, 70 per cent have experienced at least one type of natural disaster. Based on the gender disaggregation, 74 (66) per cent of the girls (boys) from non-crop farming communities experienced at least one type of natural disaster.

Our next attempt is to check whether son preference leads to poor child health in girls. We now focus exclusively on the girls and divide them into two subgroups: those with (surviving) brothers and those without. If son preference is a factor, we should see relatively worse child health outcomes for girls with brothers. There are 628 girls in our sample, out of which 316 have at least one brother. We summarize the results for these two groups in table A7. For HAZ we do not find a drastic difference between the two subgroups since they are both likely to be 0.20 to 0.25 standard deviations shorter (panel A). However, we find that girls who have brothers are statistically 10 per cent more likely to be stunted (panel B, column 2). To avoid over-interpreting, we consider this result as only suggestive of son preference. The lack of overwhelming evidence to this effect is consistent with the findings of Levine and Kevane (2003) who support the case of no "missing daughters" in Indonesia.

References

Levine D and Kevane M (2003) Are investments in daughters lower when daughters move away ? Evidence from Indonesia. World *Development* **31**(6), 1065–1084.

Table A1. The covariate balance between exposed and non-exposed households and communities

Variable	Not exposed		Exposed		Difference	p-value
	Mean	SD	Mean	SD		
Panel A: Households						
Rooms per capita	1.183	(0.653)	1.121	(0.818)	0.062	0.185
Household per capita expenditure (monthly)	163143	177959	177025	164710	-13882	0.201
Availability of (%):						
Good floor quality	0.794	(0.405)	0.842	(0.365)	-0.048	0.047
Good roof quality	0.988	(0.109)	0.915	(0.279)	0.073	0.000
Good ventilation	0.817	(0.387)	0.702	(0.458)	0.115	0.000
Electricity	0.97	(0.170)	0.972	(0.166)	-0.001	0.894
Refrigerator	0.107	(0.310)	0.132	(0.338)	-0.024	0.234
TV	0.605	(0.489)	0.652	(0.477)	-0.047	0.127
Observations	504		494			
Panel B: Communities						
Availability of (%):						
Formal bank	0.256	(0.439)	0.337	(0.476)	-0.081	0.252
Medicine post	0.074	(0.264)	0.129	(0.338)	-0.055	0.240
Distance to city center > median distance (%)	0.317	(0.468)	0.302	(0.462)	0.015	0.838
Observations	82		86			

Source: IFLS panel. Sample: Households and communities of children on Java Island aged 0-12 in 2007.

Table A2. Effects of natural disaster types on child stature – *without* the 2007 tsunami affected children

	Total	Boys	Girls
	(1)	(2)	(3)
Panel A: Height-for-Age Z score			
Number of different disaster types exposed to	-0.049	0.033	-0.186**
	(0.053)	(0.070)	(0.084)
R-squared	0.193	0.342	0.283
Observations	1,255	631	624
Panel B: Probability of being stunted			
Number of different disaster types exposed to	0.007	-0.026	0.066**
	(0.023)	(0.030)	(0.032)
R-squared	0.152	0.320	0.255
Observations	1,255	631	624

Notes: Estimates of the effect of exposure to natural disasters on child height (standardized) and probability of being stunted, using the fixed effects model in equation (1). Standard errors (in parentheses) are clustered at the community level. All regressions control for child characteristics, pre-disaster parent and household factors listed in table 2 in the main text, and include religion dummies, birth year, birth month, and pre-disaster municipality of residence fixed effects.

**Significant at 5%.

Source: IFLS panel. Sample: Children on Java Island aged 0-12 in 2007 who did not experience the June 2007 tsunami.

Table A3. Effects of natural disaster *types* on child stature (full version of table 3 in main text)

	Height-for-Age Z score			Probability of being stunted		
	Total	Boys	Girls	Total	Boys	Girls
	(1)	(2)	(3)	(4)	(5)	(6)
Number of different disaster types exposed to	-0.050	0.032	-0.186**	0.007	-0.026	0.067**
	(0.052)	(0.070)	(0.083)	(0.023)	(0.030)	(0.032)
Child Characteristics						
Gender	0.042			-0.021		
	(0.060)			(0.025)		
Birth order	-0.099**	-0.074	-0.116**	0.037**	0.025	0.034
	(0.038)	(0.060)	(0.056)	(0.016)	(0.024)	(0.026)
Oldest child	0.060	0.025	0.126	0.012	0.015	-0.006
	(0.093)	(0.131)	(0.133)	(0.039)	(0.057)	(0.064)
Birth weight	0.257***	0.406***	0.133	-0.067**	-0.123***	-0.016
	(0.074)	(0.077)	(0.090)	(0.028)	(0.037)	(0.029)
Delivered at home	-0.048	-0.036	-0.021	-0.041	-0.051	-0.038
	(0.091)	(0.146)	(0.118)	(0.041)	(0.063)	(0.047)
Weeks breast fed	0.001	0.001	0.002	-0.001	-0.000	-0.001*
	(0.001)	(0.002)	(0.002)	(0.000)	(0.001)	(0.001)
Breastfeeding info. missing	0.060	0.199	-0.217	-0.052	-0.041	0.038
	(0.160)	(0.265)	(0.202)	(0.076)	(0.077)	(0.113)
Anemic	-0.131*	-0.270**	-0.008	0.040	0.092	0.002
	(0.068)	(0.133)	(0.082)	(0.033)	(0.065)	(0.039)
Pre-disaster parents' characteristics						
Iron pills	-0.006	-0.249*	-0.049	-0.020	0.151**	-0.046
	(0.096)	(0.148)	(0.137)	(0.045)	(0.065)	(0.071)
Prenatal visits to the health facility:						
1st checkup during 1st trimester	-0.252	-0.433	-0.377	-0.006	0.203**	-0.085
	(0.220)	(0.265)	(0.374)	(0.108)	(0.102)	(0.165)
1st checkup during 2nd trimester	-0.329	-0.334	-0.550	0.033	0.183	0.002
	(0.265)	(0.299)	(0.459)	(0.123)	(0.125)	(0.203)
1st checkup during 3rd trimester	-	-	-			
Mother's height	0.007***	0.006**	0.006**	-0.002	-0.002	-0.000
	(0.002)	(0.003)	(0.003)	(0.001)	(0.002)	(0.001)
Father's height	0.000	0.001	0.001	-0.000	-0.001*	-0.000
	(0.001)	(0.001)	(0.001)	(0.000)	(0.000)	(0.000)
Mother's age at birth	0.006	0.000	0.007	-0.001	0.002	-0.000
	(0.009)	(0.012)	(0.015)	(0.004)	(0.006)	(0.006)
Father's age at birth	0.012	0.010	0.017	-0.001	0.000	-0.003

	(0.009)	(0.012)	(0.012)	(0.003)	(0.005)	(0.005)
Mother employed	-0.046	-0.016	-0.141	0.029	-0.022	0.091**
	(0.071)	(0.102)	(0.096)	(0.029)	(0.043)	(0.043)
Father employed	0.000	0.126	-0.027	0.038	0.233	-0.001
	(0.165)	(0.456)	(0.237)	(0.090)	(0.171)	(0.106)
Parents' years of education	0.011**	0.015*	0.006	-0.002	-0.002	-0.000
(combined)	(0.005)	(0.008)	(0.009)	(0.002)	(0.004)	(0.004)
Pre-disaster household characteristics						
Locality	-0.139	-0.265	-0.086	0.068	0.101	0.060
	(0.109)	(0.177)	(0.107)	(0.048)	(0.062)	(0.058)
Rooms per person	0.043	0.052	0.066	-0.007	-0.001	-0.031
	(0.042)	(0.057)	(0.063)	(0.016)	(0.021)	(0.030)
Per capita household	-0.000	-0.000	0.000	-0.000	-0.000	-0.000
expenditure	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Availability of:						
Good floor quality	0.160	0.052	0.182	-0.090**	-0.059	-0.054
	(0.098)	(0.161)	(0.125)	(0.045)	(0.073)	(0.061)
Good roof quality	0.023	-0.295	0.199	0.026	0.072	0.012
	(0.143)	(0.218)	(0.199)	(0.056)	(0.076)	(0.085)
Good ventilation	-0.004	-0.086	-0.026	0.009	-0.018	0.081
	(0.081)	(0.133)	(0.115)	(0.037)	(0.054)	(0.054)
Electricity	0.006	0.265	0.043	0.072	-0.070	0.054
	(0.135)	(0.216)	(0.268)	(0.072)	(0.122)	(0.069)
Refrigerator	0.081	0.184	0.093	-0.014	-0.029	-0.098
	(0.109)	(0.182)	(0.156)	(0.038)	(0.061)	(0.063)
Television	0.183**	0.381***	0.011	-0.093***	-0.203***	0.013
	(0.072)	(0.108)	(0.101)	(0.032)	(0.045)	(0.049)
Constant	-4.361***	-3.719***	-3.938***	1.225***	0.535	1.244***
	(0.791)	(0.933)	(1.121)	(0.374)	(0.427)	(0.442)
Observations	1,262	634	628	1,262	634	628
R-squared	0.193	0.342	0.283	0.149	0.322	0.251

Notes: Estimates of the effect of exposure to natural disasters on child height (standardized), using the fixed effects model in equation (1). Standard errors (in parentheses) are clustered at the community level. All regressions include religion dummies, birth year, birth month, and pre-disaster municipality of residence fixed effects.

***Significant at 1%; **significant at 5%; *significant at 10%.

Source: IFLS panel. Sample: Children on Java Island aged 0-12 in 2007.

Table A4. Effects of exposure to *floods or earthquakes* on child stature

	Total	Boys	Girls
	(1)	(2)	(3)
Panel A: Height-for-Age Z score			
Exposed to flood or earthquake	-0.057	0.112	-0.243*
	(0.092)	(0.137)	(0.130)
R-squared	0.193	0.342	0.280
Observations	1,262	634	628
Panel B: Probability of being stunted			
Exposed to flood or earthquake	0.018	-0.040	0.097*
	(0.038)	(0.048)	(0.052)
R-squared	0.158	0.312	0.252
Observations	1,262	634	628

Notes: Estimates of the effect of exposure to floods or earthquakes on child height (standardized) and probability of being stunted, using the fixed effects model in equation (1). Standard errors (in parentheses) are clustered at the community level. All regressions control for child characteristics, pre-disaster parent and household factors listed in table 2 in the main text, and include religion dummies, birth year, birth month, and pre-disaster municipality of residence fixed effects.

* Significant at 10%.

Source: IFLS panel. Sample: children on Java Island aged 0-12 in 2007.

Table A5. Effects of *economic loss categories* from natural disasters on child stature

	Height-for-Age Z score	Probability of being stunted
	(1)	(2)
Hh. experienced low economic loss	-0.239	0.105
	(0.188)	(0.072)
Hh. experienced high economic loss	-0.512**	0.135*
	(0.243)	(0.082)
R-squared	1,262	1,262
Observations	0.197	0.151

Notes: Estimates of the effect of household economic loss categories due to natural disasters on child height (standardized) and probability of being stunted, using the fixed effects model as shown in equation (1). The omitted group is households with no recorded economic loss. Low economic indicates are households that endured damages less than 10 million Indonesian Rupiah. High economic loss refers to households with recorded damages greater than or equal to 10 million Indonesian Rupiah. Standard errors (in parentheses) are clustered at the community level. All regressions control for child characteristics, pre-disaster parent and household factors listed in table 2 in the main text, and include religion dummies, birth year, birth month, and pre-disaster municipality of residence fixed effects.

** Significant at 5%; * Significant at 10%.

Source: IFLS panel. Sample: Children on Java Island aged 0-12 in 2007.

Table A6. Heterogeneous effects based on *community farming activity*

	Total	Boys	Girls
	(1)	(2)	(3)
Panel A: Height-for-Age Z score			
Number of different disaster types exposed to	-0.263**	-0.073	-0.403***
	(0.122)	(0.209)	(0.150)
In *ex-ante* crop farming communities	-0.457**	-0.172	-0.559**
	(0.180)	(0.269)	(0.234)
Number of different disaster types exposed to * crops	0.221*	0.096	0.238
	(0.128)	(0.233)	(0.184)
R-squared	0.199	0.354	0.294
Observations	1,208	608	600
Panel B: Probability of being stunted			
Number of different disaster types exposed to	0.096**	-0.021	0.176***
	(0.039)	(0.057)	(0.061)
In *ex-ante* crop farming communities	0.154**	0.012	0.264***
	(0.063)	(0.082)	(0.091)
Number of different disaster types exposed to * crops	-0.086*	-0.001	-0.112
	(0.045)	(0.070)	(0.069)
R-squared	0.153	0.322	0.269
Observations	1,208	608	600

Notes: Estimates of child health disaggregated by the type of community based on *ex-ante* crop farming activities using the fixed effects model as shown in equation (2). Standard errors (in parentheses) are clustered at the community level. All regressions control for child characteristics, pre-disaster parent and household factors listed in table 2 in the main text, and include religion dummies, birth year, birth month, and pre-disaster municipality of residence fixed effects.

***Significant at 1%. **Significant at 5%. *Significant at 10%.

Source: IFLS panel. Sample: children on Java Island aged 0-12 in 2007.

Table A7. Heterogeneous effects based on *son preference*

	Girls	
	Without brothers	With brothers
	(1)	(2)
Panel A: Height-for-Age Z score		
Number of different disaster types exposed to	-0.247**	-0.205**
	(0.105)	(0.100)
R-squared	0.513	0.390
Observations	312	316
Panel B: Probability of being stunted		
Number of different disaster types exposed to	0.069	0.100**
	(0.043)	(0.041)
R-squared	0.469	0.388
Observations	312	316

Notes: Estimates of the heterogeneous effect of exposure to natural disasters on girls using the fixed effects model as shown in equation (1). Standard errors (in parentheses) are clustered at the community level. All regressions control for child characteristics, pre-disaster parent and household factors listed in table 2 in the main text, and include religion dummies, birth year, birth month, and pre-disaster municipality of residence fixed effects.

**Significant at 5%.

Source: IFLS panel. Sample: Girls on Java Island aged 0-12 in 2007.