

Role of education in increasing awareness and reducing impact of natural hazards

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Supplementary Materials

Table S1. Values of World Risk Index (WRI) and its components for 171 countries. Derived from the World Risk Report 2016 (UNU. 2016). For WRI and exposure values of Philippines have been used as maximum values because sea level rise as the main potential hazard in Vanuatu and Tonga was not considered in our study.

Rank	Country	World Risk Index	Exposure	Vulnerability	Susceptibility	Lack of coping capacities	Lack of adapting capacities
1	Vanuatu	36.5	63.66	57.34	36.4	81.16	54.45
2	Philippines	28.25	52.46	53.85	33.35	80.03	48.17
3	Tonga	28.23	55.27	51.08	29.15	81.8	42.28
4	Guatemala	20.68	36.3	56.98	37.92	80.84	52.19
5	Bangladesh	19.18	29.98	63.98	45.37	85.44	61.12
6	Solomon Islands	19.18	29.98	63.98	45.37	85.44	61.12
7	Costa Rica	17.33	42.61	40.68	22.98	64.61	34.46
8	El Salvador	17.12	32.6	52.52	32.1	75.35	50.13
9	Cambodia	17.12	27.65	61.9	41.99	86.96	56.74
10	Papua New Guinea	16.74	24.94	67.15	56.06	84.22	61.16
11	Timor-Leste	16.41	25.73	63.76	54.16	81.1	56.02
12	Brunei Darussalam	16.23	41.1	39.48	17.97	63.08	37.4
13	Nicaragua	14.87	27.23	54.63	37.79	81.7	56.02
14	Mauritius	14.78	37.35	39.56	18.94	61.68	38.07
15	Guinea-Bissau	13.75	19.65	69.94	53.21	89.71	66.9
16	Fiji	13.65	27.71	49.28	25.33	75.43	47.08
17	Japan	13.38	45.91	29.14	17.55	38.28	31.58
18	Viet Nam	13.09	25.35	51.64	27.98	76.87	50.05

19	Gambia	12.23	19.29	63.39	46.54	83.19	60.45
20	Jamaica	12.2	25.82	47.27	27.07	72.17	42.57
21	Haiti	12	16.26	73.79	62.24	91.04	68.08
22	Guyana	11.81	22.9	51.56	29.02	79.47	46.18
23	Dominican Republic	11.5	23.14	49.69	29.75	74.44	44.89
24	Niger	11.45	15.87	72.12	61.03	86.79	68.54
25	Benin	11.42	17.06	66.89	52.91	82.07	65.71
26	Chile	11.3	30.95	36.53	20.22	58.54	30.82
27	Chad	11.28	14.89	75.72	64.19	91.88	71.08
28	Cameroon	11.2	18.19	61.59	43.57	85.27	55.92
29	Madagascar	11.2	16.03	69.86	65.81	83.63	60.14
30	Senegal	10.96	17.57	62.4	47.42	80.53	59.26
31	Honduras	10.8	20.01	53.99	35.23	82.14	44.61
32	Burundi	10.59	15.13	70	63.79	87.62	58.6
33	Sierra Leone	10.57	14.65	72.1	58.33	86.11	71.84
34	Indonesia	10.55	19.36	54.48	32.06	80.98	50.4
35	Togo	10.47	15.56	67.31	54.37	85.28	62.27
36	Cape Verde	10.32	20.26	50.95	34.45	70.24	48.17
37	Albania	10.17	21.25	47.87	21.65	74.75	47.23
38	Zimbabwe	10.01	14.96	66.92	57.27	89.19	54.3
39	Djibouti	9.93	16.34	60.75	37.36	82.09	62.8
40	Afghanistan	9.71	13.17	73.73	55.93	93.37	71.89
41	Burkina Faso	9.62	14.32	67.17	55.39	84.06	62.05
42	Cote d'Ivoire	9.29	13.67	67.95	48.44	87.56	67.84
43	Myanmar	9.14	14.87	61.48	37.32	87.21	59.92
44	Mozambique	9.03	12.73	70.89	65.89	84.15	62.64
45	Mali	8.85	12.55	70.52	55.21	85.15	71.21
46	Ghana	8.77	14.48	60.56	45.17	77.63	58.88

47	Uzbekistan	8.67	16.18	53.61	30.79	78.42	51.62
48	Guinea	8.53	12.03	70.94	54.04	89.29	69.51
49	Suriname	8.42	18.12	46.48	28.21	70.96	40.27
50	Kyrgyzstan	8.33	16.63	50.1	27.35	77.09	45.87
51	Netherlands	8.25	30.57	26.98	14.84	42.15	23.96
52	Nigeria	8.24	12.06	68.33	54.63	88.06	62.29
53	Malawi	8.21	12.34	66.53	60.68	83.14	55.78
54	Mauritania	8.17	12.47	65.51	49.35	85.95	61.23
55	United Rep. Tanzania	8.11	12.01	67.51	62.27	83.23	55.03
56	Sudan	8.08	11.86	68.15	52.44	93.05	58.95
57	Liberia	7.9	10.96	72.03	63.36	84.6	68.11
58	Bhutan	7.83	14.81	52.86	30.74	74.8	53.03
59	Swaziland	7.66	12.76	60.03	46.75	80.78	52.55
60	Algeria	7.63	15.82	48.24	22.93	77.02	44.76
61	Ecuador	7.63	16.15	47.23	29.83	73.76	38.09
62	Zambia	7.63	11.37	66.95	62.78	80.3	57.76
63	Ethiopia	7.57	11.12	68.12	57.73	80.24	66.38
64	Congo	7.53	11.65	64.66	55.69	86.16	52.11
65	Trinidad & Tobago	7.49	17.54	42.74	19.66	69.76	39.8
66	Comoros	7.44	10.97	67.82	59.09	84.13	60.23
67	Sri Lanka	7.43	14.79	50.26	25.65	78.52	46.6
68	Panama	7.41	16.45	45.03	27.92	67.87	39.3
69	Rwanda	7.3	11.98	60.9	54.57	79.15	48.99
70	Tajikistan	7.17	12.98	55.22	34.76	76.82	54.08
71	Greece	7.1	21.11	33.62	17.76	51.21	31.89
72	Pakistan	7.07	11.36	62.24	36.89	86.71	63.14
73	India	7.04	11.94	58.91	38.72	80.31	57.71
74	Lesotho	7.03	11.4	61.65	49.66	78.5	56.8

75	Kenya	7	10.69	65.54	55.32	85.62	55.68
76	Serbia	6.91	18.05	38.3	18.47	66.17	30.27
77	Peru	6.91	14.4	48	29.57	73.28	41.16
78	China	6.9	14.43	47.79	27.57	70.03	45.77
79	Colombia	6.83	13.84	49.34	28.82	75.11	44.07
80	Morocco	6.8	13.25	51.34	27.92	75.71	50.4
81	Georgia	6.8	14.69	46.3	28.19	64.81	45.91
82	Central African Rep.	6.78	9.39	72.22	61.54	89.14	65.99
83	Turkmenistan	6.76	13.19	51.24	27.83	75.68	50.21
84	Uganda	6.69	10.16	65.9	56.05	87.68	53.95
85	Angola	6.67	10.18	65.51	50.26	84.69	53.95
86	Belize	6.59	13.31	49.52	28.18	74.23	46.14
87	Romania	6.55	15.17	41.52	22.12	61.36	41.08
88	Malaysia	6.51	14.6	44.6	19.65	67.56	46.59
89	Cuba	6.42	17.45	36.79	19.62	57.2	33.56
90	Thailand	6.38	13.7	46.61	19.87	75.46	44.5
91	Mexico	6.27	13.84	45.27	23.99	72.16	39.65
92	Gabon	6.26	11.95	52.41	33.51	74.53	49.18
93	Eritrea	6.26	8.55	73.18	61.7	88.67	69.18
94	Armenia	6.21	14.51	42.78	21.24	71.09	36.02
95	Bosnia & Herzegovina	6.2	14.02	44.26	20.63	69.64	42.51
96	Northern Macedonia	6.14	14.38	42.7	20.88	64.38	42.83
97	Yemen	6.07	9.04	67.18	45.77	91.03	64.74
98	Azerbaijan	6.04	13.16	45.9	22.39	70.36	44.96
99	Venezuela	5.85	13.15	44.48	23.64	74.24	35.56
100	Lao People Dem. Rep.	5.75	9.55	60.21	41.69	84	54.96
101	Namibia	5.61	10.41	53.92	45.7	71.02	45.04
102	Syrian Arab Rep.	5.58	10.56	52.82	26.28	84.38	47.82

103	Tunisia	5.47	12.45	43.96	21.02	72.51	38.36
104	Hungary	5.46	15.61	34.96	16.76	53.27	34.86
105	Botswana	5.45	10.55	51.62	37.03	67.31	50.52
106	South Africa	5.38	12.08	44.55	30.38	69.58	33.69
107	Turkey	5.34	12.25	43.59	20.54	67.57	42.67
108	Nepal	5.29	9.16	57.73	42.42	80.38	50.4
109	Bolivia	5.04	8.98	56.14	40.91	80.19	47.33
110	Lebanon	5.01	11.14	44.94	20.21	70	44.61
111	Rep. of Moldova	4.92	11.11	44.31	22.92	68.06	41.94
112	Iran	4.88	10.19	47.92	20.05	81.58	42.13
113	Iraq	4.84	8.08	59.82	30.06	89.3	60.1
114	Korea. Rep. of	4.8	14.89	32.26	15.02	46.6	35.14
115	Jordan	4.75	10.53	45.09	22.03	68.79	44.44
116	Equatorial Guinea	4.71	8.22	57.28	30.19	85.09	56.58
117	Ireland	4.52	14.74	30.64	16.05	46.57	29.31
118	Italy	4.48	15.85	32.36	17.27	54.41	25.39
119	Brazil	4.3	9.53	45.09	25.53	66.6	43.15
120	Croatia	4.28	11.53	37.13	18.18	55.97	37.24
121	Bulgaria	4.21	11.66	36.08	17.57	56.56	34.1
122	New Zealand	4.2	15.44	27.22	16.74	43.79	21.13
123	Bahamas	4.19	10.71	39.09	19.06	53.43	44.8
124	Uruguay	4	11.1	36.05	21.56	50.8	35.78
125	Libyan Arab Jamahiriya	4	7.8	51.27	26.16	76.53	51.1
126	Australia	3.93	15.05	26.1	15.05	42.29	20.96
127	United States	3.88	12.25	31.67	16.47	48.57	29.98
128	Russia	3.85	9.38	41.05	21.59	58.8	42.76
129	Kazakhstan	3.74	9.11	41.09	18	63.57	41.72
130	Paraguay	3.74	7.03	53.18	32.32	79.12	48.1

131	Argentina	3.68	9.55	38.55	21.04	59.72	34.9
132	Slovenia	3.64	11.59	31.42	16.02	51.15	27.08
133	Portugal	3.61	10.93	33.01	17.91	48.38	32.73
134	Austria	3.58	13.6	26.31	14.36	37.61	26.95
135	Slovakia	3.57	10.21	34.92	14.53	55.66	34.57
136	United Kingdom	3.54	11.6	30.49	16.57	47.08	27.82
137	Czech Republic	3.46	10.82	32.02	15.07	50.87	30.12
138	Latvia	3.45	9.26	37.3	21.12	55.19	35.57
139	Belgium	3.41	11.66	29.23	15.59	42.38	29.7
140	Kuwait	3.34	9.04	36.98	11.53	66.24	33.17
141	Poland	3.28	9.79	33.51	17.67	53.16	29.68
142	Spain	3.2	10.23	31.27	16.08	52	25.74
143	Canada	3.14	10.25	30.61	15.19	46.45	30.19
144	Belarus	3.12	8.46	36.89	16.87	61.69	32.12
145	Ukraine	3.11	7.5	41.42	19.1	61.15	44.02
146	Lithuania	3.01	8.88	33.91	18.58	49.36	33.78
147	Germany	3.01	11.41	26.37	15.41	37.73	25.97
148	Mongolia	3	6.52	46.07	31.05	64.67	42.47
149	Denmark	2.93	10.87	27	15.08	39.49	26.42
150	Cyprus	2.76	7.44	37.13	14.85	58.05	38.48
151	Oman	2.74	6.41	42.75	15.98	63.51	48.76
152	France	2.69	9.25	29.08	16.13	43.29	27.83
153	Luxembourg	2.52	9.12	27.66	12.87	41.44	28.67
154	Seychelles	2.51	5.99	41.86	22.44	63.2	39.93
155	Switzerland	2.48	9.56	25.98	14.93	37.92	25.1
156	Estonia	2.43	7.23	37.2	18.67	51.15	30.89
157	Israel	2.38	6.41	37.2	19.15	58.93	33.52
158	Norway	2.31	8.58	26.86	14.41	40.05	26.13

159	Egypt	2.29	4.72	48.56	21.34	77.86	46.48
160	Singapore	2.25	7.82	28.78	14.41	49.2	22.73
161	Finland	2.24	8.19	27.38	15.6	39.39	27.17
162	Sweden	2.19	7.97	27.49	15.39	40.9	26.18
163	United Arab Emirates	1.91	5.93	32.27	10.47	56.51	29.84
164	Bahrain	1.78	4.27	41.56	13.04	66.57	45.07
165	Kiribati	1.72	3.05	56.45	42.31	83.69	43.36
166	Iceland	1.56	5.67	27.46	15	43.15	24.21
167	Grenada	1.44	3.13	46.15	24.99	69.03	44.43
168	Barbados	1.21	3.46	34.95	16.85	50.36	37.63
169	Saudi Arabia	1.17	2.93	39.82	15.19	70.05	34.22
170	Malta	0.62	1.65	37.67	15.28	59.58	38.16
171	Qatar	0.08	0.28	30.3	8.97	44.76	37.16

Table S2. Mean scores of PISA 2018 Science test (Schleicher. 2019); values of Word Risk Index (WRI) 2016 (UNU. 2016) and Gross Domestic Product (GDP; USD per capita; World Bank. 2019).

Country ¹	PISA Science scores	WRI	GDP
Singapore	551	2.25	65.233
Estonia	530	2.43	23.660
Japan	529	13.38	40.247
Finland	522	2.24	48.686
Korea	519	4.80	31.762
Canada	518	3.14	46.195
Poland	511	3.28	15.595
New Zealand	508	4.20	42.084
Slovenia	507	3.64	25.739
United Kingdom	505	3.54	42.300
Netherlands	503	8.25	52.488
Germany	503	3.01	46.259
Australia	503	3.93	54.907
United States	502	3.88	65.281
Sweden	499	2.19	51.610
Belgium	499	3.41	46.117
Czech Republic	497	3.46	23.102
Ireland	496	4.52	78.661
Switzerland	495	2.48	81.994
France	493	2.69	40.494
Denmark	493	2.93	59.822
Portugal	492	3.61	23.145
Norway	490	2.31	75.420
Austria	490	3.58	50.277
Latvia	487	3.45	17.836
Spain	483	3.20	29.614
Lithuania	482	3.01	19.456
Hungary	481	5.46	16.476
Russia	478	3.85	11.585
Luxembourg	477	2.52	114.705
Iceland	475	1.56	66.945
Croatia	472	4.28	14.853
Belarus	471	3.12	6.663
Ukraine	469	3.11	3.659
Turkey	468	5.34	9.043
Italy	468	4.48	33.190
Slovak Republic	464	3.57	19.329
Israel	462	2.38	43.641
Malta	457	0.62	29.416
Greece	452	7.10	19.583
Chile	444	11.30	14.897
Serbia	440	6.91	7.402
Cyprus	439	2.76	27.858
Malaysia	438	6.51	11.415
United Arab Emirates	434	1.91	43.103

Brunei Darussalam	431	16.23	31.087
Jordan	429	4.75	4.330
Moldova	428	4.92	4.499
Thailand	426	6.38	7.808
Uruguay	426	4.00	16.190
Romania	426	6.55	12.920
Bulgaria	424	4.21	9.738
Mexico	419	6.27	9.863
Qatar	419	0.08	64.782
Albania	417	10.17	5.353
Costa Rica	416	17.33	12.238
Montenegro	415	n.a.	8.832
Colombia	413	6.83	6.432
North Macedonia	413	6.14	6.093
Peru	404	6.91	6.978
Argentina	404	3.68	10.006
Brazil	404	4.30	8.717
Bosnia and Herzegovina	398	6.20	6.073
Azerbaijan (Baku)	398	6.04	4.794
Kazakhstan	397	3.74	9.731
Indonesia	396	10.55	4.136
Saudi Arabia	386	1.17	23.140
Lebanon	384	5.01	7.784
Georgia	383	6.80	4.769
Morocco	377	6.80	3.204
Kosovo	365	n.a.	4.418
Panama	365	7.41	15.731
Philippines	357	28.25	3.485
Dominican Republic	336	11.50	8.282
Mongolia ²	336	3.00	4.295
Bangladesh ²	292	19.18	1.856
Papua New Guinea ²	272	16.74	2.845
Uganda ²	250	10.16	777
Haiti ²	225	12.00	755

¹ Regional data are provided for China and are not included in the table

² PISA scores are estimated by based on the logarithmic regression curve between the scores of countries in the PISA report (y) and their GDP value (x):

$$y = 19.80 \cdot \ln(x) + 265.4 \quad (R^2 = 0.367. \quad p < 0.05. \quad n = 73)$$

n.a. – not available

Table S3. Values for frequency (F), magnitude (M) and exposure of natural hazards estimated for countries under consideration (EM-DAT, 2020; NOAA, 2020). Exposure indicates the percentage of population affected (Table S1, UNU, 2016).

Country	Droughts		Earthquakes		Floods not related to hurricanes		Hurricanes		Mass movement		Volcanic eruptions		Tsunamis		Total		Exposure (%)
	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	
Bangladesh	1	1	1.5	1	1.5	1	1.5	1.5	2	1.5	0	0	0.5	0	8	6	30
Chile	1	0	1	1.5	1	0.5	1	0	0	1	1.5	1	2	1.5	7.5	5.5	31
Costa Rica	0	0	1.5	1.5	0.5	0	1.5	1	1.5	1	2	1.5	1	1	8	6	43
Estonia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7
Haiti	0.5	0.5	2	2	0.5	0	1.5	1	1.5	1.5	0	0	1	1	7	6	16
Indonesia	1	0	2	1.5	2	0.5	1	1	2	0.5	2	2	2	2	12	7.5	19
Ireland	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	15
Italy	0.5	0	1	0.5	1.5	0	1	0	1	1	2	0.5	0.5	2	7.5	4	16
Japan	0	0	2	2	1.5	0	2	1.5	2	1	2	0.5	2	2	11.5	7	46
Mongolia	1	1.5	0	0	0	0	0.5	0	0	0	0	0	0	0	1.5	1.5	7
New Zealand	0	0	2	2	0.5	0	1	1	1	1	0.5	0.5	0.5	0.5	5.5	5	15
Papua N.G.	0.5	0	1.5	1	0.5	0	1	1	1	1.5	1.5	0.5	1.5	1	7.5	5	25
Philippines	1	0.5	1.5	1.5	2	0.5	2	2	2	0.5	2	1.5	1.5	1.5	12	8	52
Uganda	1	0.5	0	0	0.5	0	0	0	0.5	0	0	0	0	0	2	0.5	10
USA	1.5	1	1.5	1.5	1.5	0.5	2	2	0.5	0.5	1.5	0.5	1	1	9.5	7	12

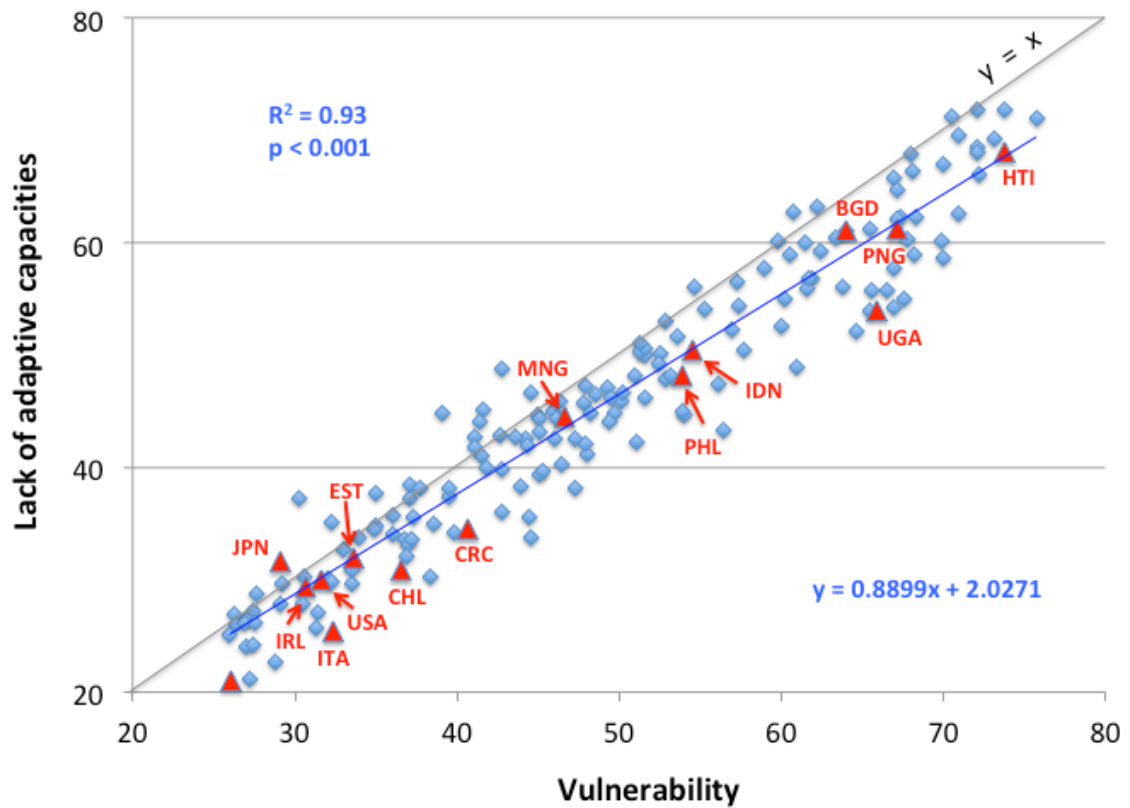


Figure S1. Pearson correlation between vulnerability to natural hazards and lack of adaptive capacities for 171 countries. Data derived from the World Risk Report 2016 (UNU. 2016; Table S1). Countries considered in this paper: BGD – Bangladesh. CHL – Chile. CRC – Costa Rica. EST – Estonia. HTI – Haiti. IDN- Indonesia. IRL – Ireland. ITA – Italy. MNG – Mongolia. NZL - New Zealand. PHI – Philippines. PNG – Papua New Guinea. UGA – Uganda. USA - United States.

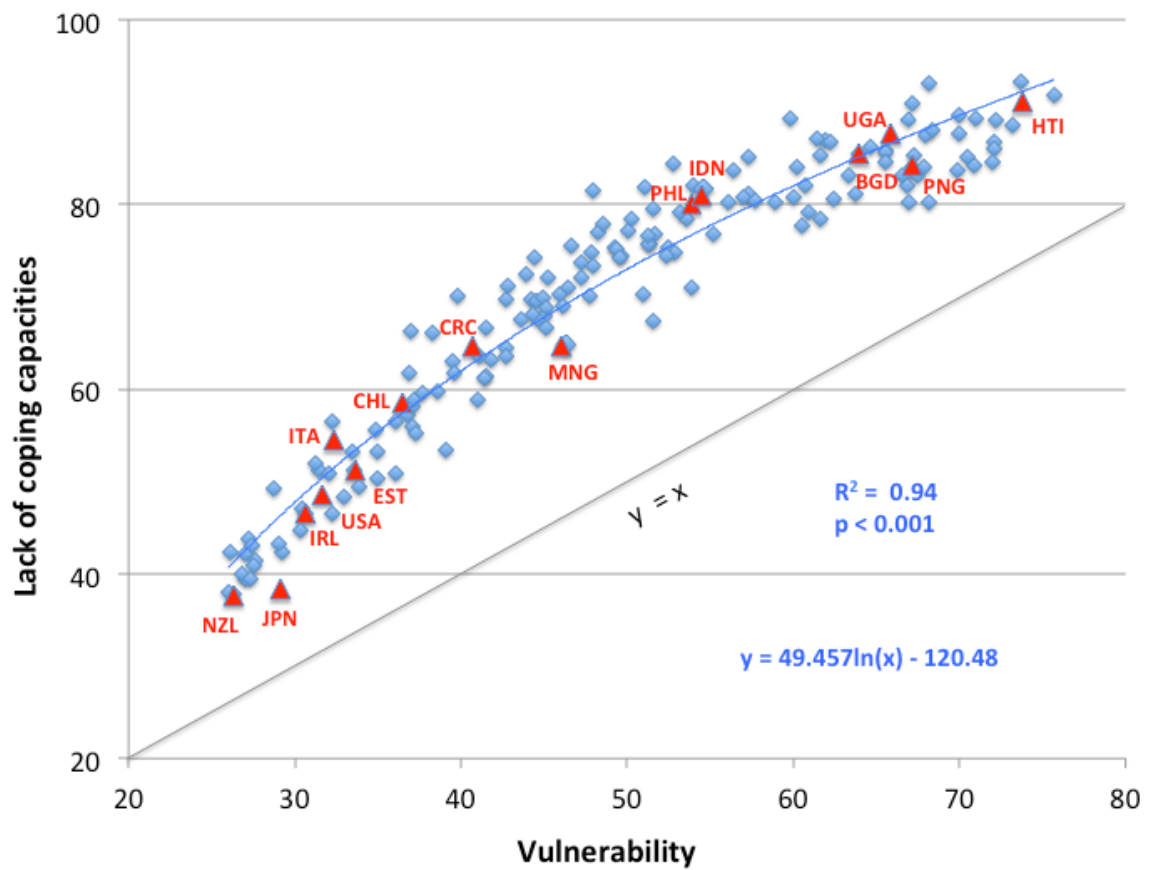


Figure S2. Pearson correlation between vulnerability to natural hazards and lack of coping capacities for 171 countries. Data derived from the World Risk Report 2016 (UNU. 2016; S Table 1). See abbreviations of countries in Fig. S1.

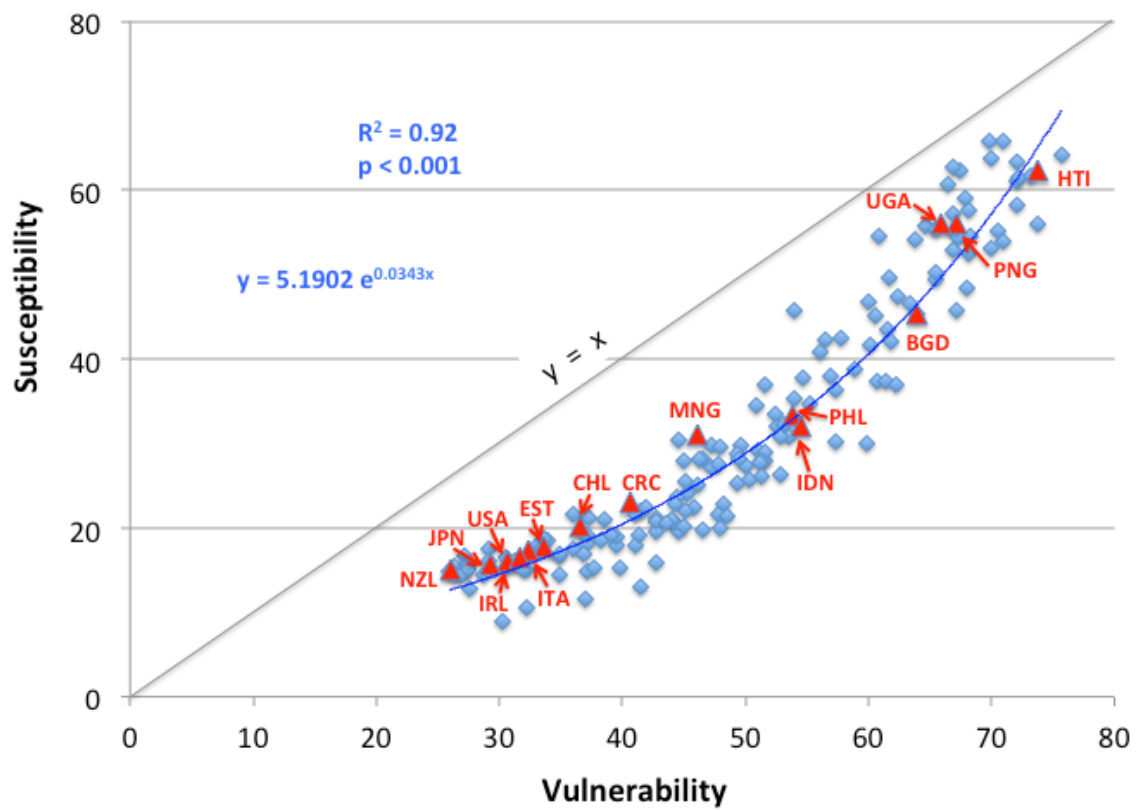


Figure S3. Pearson correlation between vulnerability to natural hazards and susceptibility for 171 countries. Data derived from the World Risk Report 2016 (UNU. 2016; Table S1). See abbreviations of countries in Fig. S1.

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