

## Supplemental Material

**Table S1.** Minimum mortality temperature (MMT) for stroke mortality in all 25 countries.

**Table S2.** Estimates of excess deaths from the coldest and hottest 2.5% of temperatures, presented as number of deaths for every 1000 ischemic and hemorrhagic stroke deaths.

**Table S3.** Estimates of excess deaths from all non-optimal temperatures (hot and cold), presented as number of deaths for every 1000 ischemic and hemorrhagic stroke deaths.

**Table S4.** Relative risk of ischemic and hemorrhagic stroke deaths comparing the 1<sup>st</sup> percentile (extreme cold) and 99<sup>th</sup> percentile (extreme heat) to the minimum mortality temperature (MMT).

**Table S5.** Pooled relative risk ischemic and hemorrhagic stroke deaths comparing the 1<sup>st</sup> percentile (extreme cold) and 99<sup>th</sup> percentile (extreme heat) to the minimum mortality temperature (MMT) stratified by high and low Gross Domestic Product (GDP) per capita group of countries.

**Table S1.** Minimum mortality temperature (MMT) for stroke mortality in all 25 countries

	<b>ISCHEMIC STROKE</b>	<b>HEMORRHAGIC STROKE</b>
	MMT (°C)	MMT (°C)
Brazil	25.0	27.3
Canada	19.4	21.3
Costa Rica	23.3	25.1
Cyprus	26.7	29.7
Ecuador	21.8	25.8
Estonia	16.0	19.8
Finland	18.0	21.3
Guatemala	20.6	22.0
Italy	24.5	28.4
Japan	25.0	27.3
Kuwait	37.9	39.5
Moldova	21.0	25.0
Panama	28.4	30.3
Paraguay	27.8	30.7
Philippines	28.8	30.1
Portugal	21.4	26.3
South Africa	22.0	24.0
Spain	23.6	27.2
Switzerland	21.5	23.6
Taiwan	28.5	30.3
Thailand	28.7	30.4
UK	16.0	19.9
Uruguay	24.0	28.0
US	24.6	26.1
Vietnam	29.3	30.7

**Table S2.** Estimates of excess deaths from the coldest and hottest 2.5% of temperatures, presented as number of deaths for every 1000 ischemic and hemorrhagic stroke deaths.

	ISCHEMIC STROKE						HEMORRHAGIC STROKE					
	Coldest 2.5% of days			Hottest 2.5% of days			Coldest 2.5% of days			Hottest 2.5% of days		
	Excess	95% eCI		Excess	95% eCI		Excess	95% eCI		Excess	95% eCI	
Brazil	18.68	10.73	24.36	2.62	1.33	3.69	9.82	7.74	11.69	-0.07	-0.54	0.29
Canada	5.64	4.42	6.65	0.71	-0.14	1.35	6.90	5.78	7.72	0.18	-0.24	0.52
Costa Rica	3.35	-0.01	6.16	2.62	-2.83	6.64	6.45	3.10	9.18	-0.40	-1.69	0.55
Cyprus	11.24	7.43	14.04	2.69	-0.18	4.79	10.57	8.13	12.30	0.38	-0.38	1.04
Ecuador	6.33	3.54	8.55	6.30	1.02	9.98	7.18	4.05	9.71	-0.31	-1.48	0.67
Estonia	7.08	4.43	9.15	2.92	0.46	4.79	8.82	6.59	10.56	1.13	0.14	1.99
Finland	5.64	1.25	9.25	0.39	-3.34	3.31	7.00	3.60	9.90	-0.53	-2.33	0.93
Guatemala	7.94	1.67	12.52	2.66	-0.38	5.07	8.11	2.76	12.48	-0.25	-1.05	0.48
Italy	7.40	1.51	11.82	1.87	-3.21	5.88	10.33	6.86	13.11	0.18	-0.36	0.67
Japan	10.04	9.53	10.43	1.85	1.38	2.22	12.82	12.49	13.07	1.12	0.90	1.33
Kuwait	13.72	5.33	19.82	-0.80	-5.13	2.13	16.27	9.95	20.84	3.74	-1.91	7.88
Moldova	10.52	4.75	15.06	3.84	-3.23	8.52	11.88	8.47	14.70	5.14	1.72	7.75
Panama	8.46	3.14	12.54	6.46	-4.72	14.80	6.22	2.43	8.99	-0.63	-3.52	1.65
Paraguay	11.41	4.89	16.41	4.00	-1.86	8.15	11.50	7.01	14.90	1.57	-0.23	3.27
Philippines	8.13	5.83	9.82	5.65	2.10	8.23	8.93	6.65	10.69	0.88	-0.50	2.08
Portugal	13.21	11.28	15.01	9.50	8.19	10.64	10.40	8.65	11.94	-0.06	-0.58	0.46
South Africa	8.09	7.33	8.57	3.60	2.89	4.09	10.10	9.31	10.73	1.10	0.62	1.48
Spain	11.26	9.28	12.85	5.15	3.71	6.37	10.93	9.41	12.18	0.37	-0.28	0.95
Switzerland	5.43	2.99	7.34	3.54	1.26	5.17	4.79	2.35	6.54	-3.70	-5.26	-2.51
Taiwan	10.26	5.90	13.47	0.94	-5.05	5.04	10.72	7.34	13.41	0.25	-1.74	1.95
Thailand	6.62	5.70	7.32	3.24	1.44	4.39	9.64	9.06	10.14	1.15	0.61	1.61
UK	5.80	4.75	6.65	2.27	1.46	2.96	6.59	5.60	7.45	-0.82	-1.27	-0.48
Uruguay	9.44	2.91	14.95	3.18	-5.46	9.11	9.97	5.53	13.46	1.65	-0.76	3.70
US	5.31	4.87	5.64	1.24	0.82	1.50	7.32	6.91	7.59	-0.39	-0.59	-0.26
Vietnam	3.21	0.59	5.42	1.13	-13.96	10.78	6.05	3.69	8.20	1.35	-3.80	5.16
<b>Total</b>	<b>9.07</b>	<b>8.58</b>	<b>9.39</b>	<b>2.19</b>	<b>1.85</b>	<b>2.39</b>	<b>11.19</b>	<b>10.94</b>	<b>11.36</b>	<b>0.71</b>	<b>0.54</b>	<b>0.83</b>

**Table S3.** Estimates of excess deaths from all non-optimal temperatures, presented as number of deaths for every 1000 ischemic and hemorrhagic stroke deaths. Non-optimal temperatures are any temperatures above (all hot) and below (all cold) the minimum mortality temperature (MMT).

	ISCHEMIC STROKE						HEMORRHAGIC STROKE					
	All Cold Temperatures			All Hot Temperatures			All Cold Temperatures			All Hot Temperatures		
	Excess	95% eCI		Excess	95% eCI		Excess	95% eCI		Excess	95% eCI	
Brazil	56.33	37.98	72.05	7.41	3.87	10.72	91.26	64.67	116.21	-0.08	-0.53	0.32
Canada	129.55	106.83	151.47	0.86	-0.29	1.84	173.63	155.82	188.70	0.17	-0.23	0.54
Costa Rica	20.69	-11.28	51.91	10.58	-10.97	28.50	107.48	30.87	180.56	-0.42	-1.81	0.64
Cyprus	110.64	74.29	145.68	6.05	-0.12	10.93	175.32	140.40	203.04	0.38	-0.43	1.07
Ecuador	58.15	8.27	99.01	17.13	6.36	26.03	118.21	56.37	174.18	-0.34	-1.55	0.75
Estonia	117.90	82.83	146.09	4.84	0.10	8.37	216.58	178.87	249.21	1.14	0.06	1.99
Finland	123.11	42.40	199.13	0.39	-3.57	3.65	199.41	130.95	257.03	-0.56	-2.33	0.95
Guatemala	50.60	-13.98	108.44	6.36	0.11	12.13	111.76	10.75	192.26	-0.27	-1.05	0.38
Italy	88.37	23.61	143.34	3.72	-7.46	13.73	189.05	145.74	227.32	0.18	-0.42	0.73
Japan	136.69	129.71	142.28	4.49	3.63	5.26	224.32	218.91	229.33	1.32	1.02	1.58
Kuwait	157.80	-47.79	322.47	-0.82	-5.16	2.18	205.55	117.67	287.65	4.55	-2.50	9.89
Moldova	153.09	80.12	212.59	8.23	-3.71	18.36	268.37	192.04	341.19	5.36	1.87	8.14
Panama	32.83	-0.88	62.31	18.94	-8.39	44.28	115.44	31.04	190.58	-0.70	-3.68	2.15
Paraguay	77.66	19.00	129.92	11.77	-0.91	23.29	170.57	100.56	232.80	1.63	-0.35	3.52
Philippines	36.70	14.09	57.44	16.19	7.64	23.61	107.75	69.82	141.80	0.90	-0.62	2.11
Portugal	118.51	95.69	139.43	17.37	14.71	19.85	182.99	155.71	209.99	-0.06	-0.62	0.43
South Africa	93.48	83.45	101.51	10.67	9.13	11.91	208.92	191.54	221.82	1.28	0.78	1.70
Spain	121.89	96.90	144.51	10.65	7.29	13.53	194.47	171.23	214.44	0.40	-0.34	1.09
Switzerland	80.37	46.00	110.99	4.07	1.28	6.26	170.25	130.35	204.47	-3.83	-5.51	-2.69
Taiwan	91.56	45.03	132.65	5.55	-4.81	14.75	146.65	107.68	183.13	0.25	-1.70	1.94
Thailand	37.03	23.81	48.16	12.22	8.85	14.67	142.40	127.30	154.88	1.30	0.62	1.85
UK	68.82	53.34	80.99	3.37	1.76	4.71	174.23	157.88	189.27	-0.84	-1.34	-0.45
Uruguay	340.31	87.61	552.87	28.34	-29.88	74.01	739.36	475.71	969.31	6.74	-3.74	15.77
US	82.41	76.35	87.49	2.94	1.41	4.08	157.78	150.63	163.28	-0.39	-0.59	-0.22
Vietnam	18.08	-11.46	42.99	11.81	-16.27	34.26	105.15	23.79	186.21	1.36	-3.95	5.50
<b>Total</b>	<b>113.80</b>	<b>109.35</b>	<b>117.35</b>	<b>5.25</b>	<b>4.59</b>	<b>5.66</b>	<b>201.05</b>	<b>197.02</b>	<b>204.48</b>	<b>0.84</b>	<b>0.63</b>	<b>1.01</b>

**Table S4.** Relative risk of ischemic and hemorrhagic stroke deaths comparing the 1<sup>st</sup> percentile (extreme cold) and 99<sup>th</sup> percentile (extreme heat) to the minimum mortality temperature (MMT).

	ISCHEMIC STROKE						HEMORRHAGIC STROKE					
	Cold (1 <sup>st</sup> vs. MMT)			Heat (99 <sup>th</sup> vs. MMT)			Cold (1 <sup>st</sup> vs. MMT)			Heat (99 <sup>th</sup> vs. MMT)		
	RR	95% CI		RR	95% CI		RR	95% CI		RR	95% CI	
Brazil	1.26	1.18	1.35	1.24	1.09	1.40	1.46	1.32	1.61	1.00	0.96	1.05
Canada	1.31	1.21	1.42	1.10	1.02	1.18	1.43	1.30	1.58	1.01	0.98	1.03
Costa Rica	1.30	1.20	1.40	1.13	1.07	1.20	1.37	1.24	1.52	1.00	1.00	1.01
Cyprus	1.41	1.30	1.52	1.12	1.04	1.20	1.51	1.39	1.64	1.02	0.99	1.05
Ecuador	1.18	1.11	1.25	1.31	1.10	1.55	1.32	1.19	1.45	1.01	0.93	1.10
Estonia	1.33	1.20	1.48	1.15	1.04	1.28	1.50	1.31	1.72	1.05	0.97	1.13
Finland	1.26	1.17	1.35	1.11	1.02	1.20	1.35	1.23	1.49	0.99	0.96	1.01
Guatemala	1.38	1.21	1.58	1.09	1.04	1.14	1.38	1.17	1.63	1.00	1.00	1.00
Italy	1.36	1.28	1.43	1.11	1.04	1.18	1.49	1.41	1.58	1.02	0.99	1.04
Japan	1.35	1.28	1.42	1.12	1.03	1.21	1.51	1.42	1.59	1.04	1.00	1.08
Kuwait	1.54	1.29	1.85	1.00	0.83	1.22	1.80	1.45	2.22	1.16	0.97	1.38
Moldova	1.45	1.28	1.64	1.15	1.00	1.33	1.75	1.49	2.06	1.16	1.04	1.29
Panama	1.39	1.26	1.52	1.26	1.03	1.53	1.43	1.27	1.61	0.96	0.84	1.08
Paraguay	1.47	1.33	1.62	1.15	1.05	1.26	1.63	1.45	1.84	1.04	1.00	1.09
Philippines	1.25	1.16	1.34	1.27	1.02	1.58	1.40	1.27	1.54	1.05	0.90	1.23
Portugal	1.31	1.24	1.38	1.13	1.07	1.19	1.43	1.34	1.52	1.00	0.98	1.01
South Africa	1.39	1.28	1.52	1.22	1.09	1.35	1.53	1.37	1.72	1.05	0.98	1.12
Spain	1.32	1.26	1.39	1.15	1.07	1.24	1.46	1.38	1.53	1.00	0.98	1.04
Switzerland	1.22	1.08	1.38	1.16	0.95	1.42	1.26	1.05	1.50	0.83	0.73	0.94
Taiwan	1.34	1.25	1.44	1.16	1.02	1.33	1.48	1.37	1.60	1.02	0.94	1.11
Thailand	1.32	1.22	1.43	1.22	1.08	1.38	1.45	1.32	1.61	1.02	0.96	1.09
UK	1.22	1.12	1.34	1.14	1.04	1.24	1.30	1.15	1.46	0.95	0.91	1.00
Uruguay	1.41	1.31	1.51	1.16	1.07	1.25	1.55	1.42	1.69	1.04	1.00	1.08
US	1.31	1.24	1.37	1.14	1.03	1.25	1.41	1.32	1.50	0.97	0.93	1.02
Vietnam	1.39	1.26	1.53	1.28	0.89	1.83	1.51	1.34	1.70	1.17	0.86	1.58
<b>Total</b>	<b>1.34</b>	<b>1.27</b>	<b>1.41</b>	<b>1.13</b>	<b>1.06</b>	<b>1.20</b>	<b>1.49</b>	<b>1.40</b>	<b>1.58</b>	<b>1.02</b>	<b>1.00</b>	<b>1.05</b>

**Table S5.** Pooled relative risk ischemic and hemorrhagic stroke deaths comparing the 1<sup>st</sup> percentile (extreme cold) and 99<sup>th</sup> percentile (extreme heat) to the minimum mortality temperature (MMT) stratified by groups of countries with high and low gross domestic product (GDP) per capita.

GDP per Capita	<b>High (75<sup>th</sup> percentile and above)</b>		<b>Low (25<sup>th</sup> percentile and below)</b>	
Stroke Type	<b>ISCHEMIC</b>	<b>HEMORRHAGIC</b>	<b>ISCHEMIC</b>	<b>HEMORRHAGIC</b>
	<i>RR (95% CI)</i>		<i>RR (95% CI)</i>	
<b>Extreme Heat (99<sup>th</sup> vs. MMT)</b>	1.105 (1.046, 1.168)	1.000 (0.986, 1.014)	1.166 (1.053, 1.291)	1.081 (1.015, 1.151)
<b>Extreme Cold (1<sup>st</sup> vs. MMT)</b>	1.309 (1.251, 1.370)	1.434 (1.367, 1.504)	1.398 (1.282, 1.523)	1.611 (1.440, 1.803)