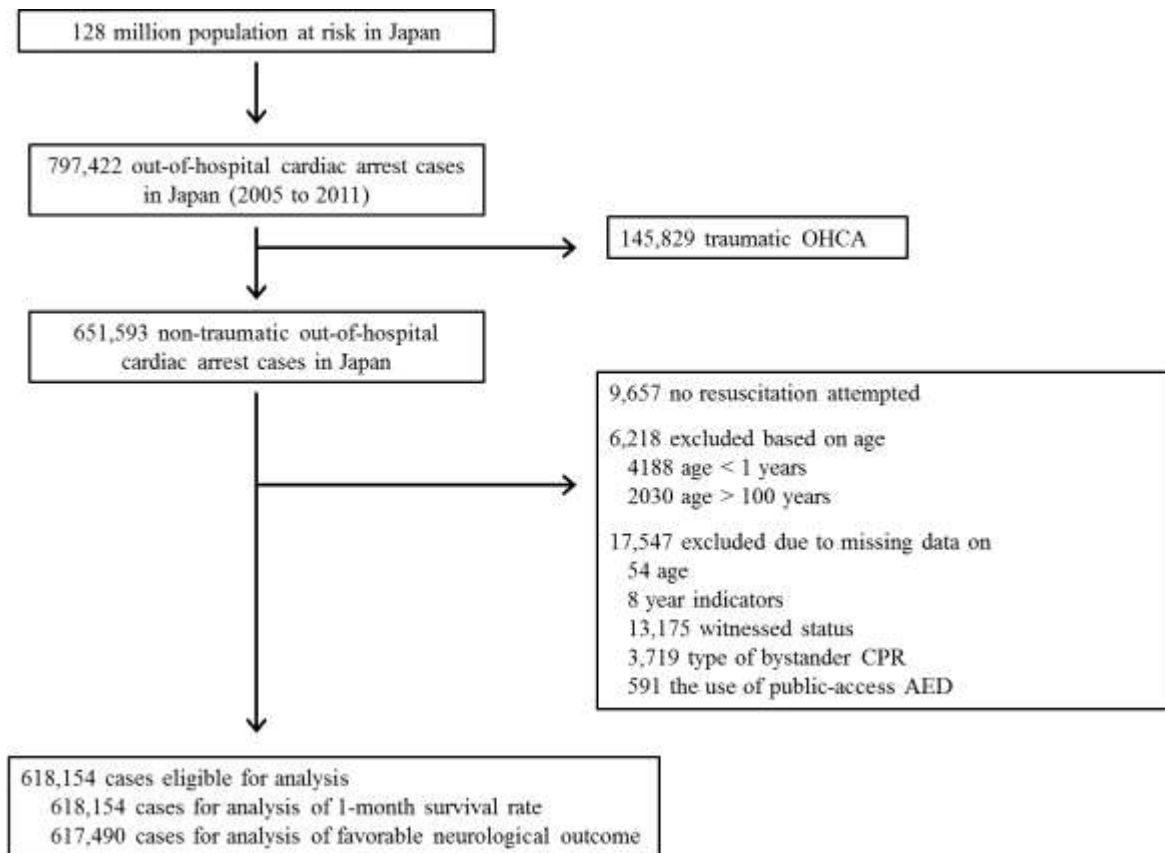


Appendix 1. Population size, land area and population density by prefecture in Japan

	Population in 2010 (thousand persons)	Land area (km²)	Population density (person/km²)
Japan	128,057	377,972	338.8
Hokkaido	5,506	83,424	66.0
Aomori	1,373	9,645	142.3
Iwate	1,330	15,275	87.1
Miyagi	2,348	7,282	322.4
Akita	1,086	11,638	93.3
Yamagata	1,169	9,323	125.4
Fukushima	2,029	13,784	147.2
Ibaraki	2,970	6,097	487.1
Tochigi	2,008	6,408	313.4
Gumma	2,008	6,362	315.6
Saitama	7,195	3,798	1894.5
Chiba	6,216	5,158	1205.2
Tokyo	13,159	2,191	6006.2
Kanagawa	9,048	2,416	3745.3
Niigata	2,374	12,584	188.7
Toyama	1,093	4,248	257.3
Ishikawa	1,170	4,186	279.5
Fukui	806	4,190	192.3
Yamanashi	863	4,465	193.3
Nagano	2,152	13,562	158.7
Gifu	2,081	10,621	195.9
Shizuoka	3,765	7,779	484.0
Aichi	7,411	5,172	1432.8
Mie	1,855	5,774	321.2
Shiga	1,411	4,017	351.2
Kyoto-fu	2,636	4,612	571.5
Osaka-fu	8,865	1,905	4653.6
Hyogo	5,588	8,401	665.2
Nara	1,401	3,691	379.6
Wakayama	1,002	4,725	212.1
Tottori	589	3,507	167.9
Shimane	717	6,708	106.9
Okayama	1,945	7,115	273.4
Hiroshima	2,861	8,479	337.4
Yamaguchi	1,451	6,112	237.4

Tokushima	785	4,147	189.3
Kagawa	996	1,877	530.7
Ehime	1,431	5,676	252.1
Kochi	764	7,104	107.5
Fukuoka	5,072	4,986	1017.2
Saga	850	2,441	348.3
Nagasaki	1,427	4,132	345.3
Kumamoto	1,817	7,409	245.2
Oita	1,197	6,341	188.8
Miyazaki	1,135	7,735	146.7
Kagoshima	1,706	9,188	185.7
Okinawa	1,393	2,281	610.7

Appendix 2. Study participants selection.



Appendix 3. Health outcomes after out-of-hospital cardiac arrest and per capita total health expenditure by prefecture

Prefecture	Survival rate at 1 month (95%CI)		Neurologically favorable outcome (95%CI)		Annual health expenditure per capita		
	Unadjusted	Adjusted	Unadjusted	Adjusted	JPY	USD	Tertile
Kochi	5.9% (5.1% - 6.7%)	6.4% (5.6% - 7.2%)	2.5% (2.0% - 3.0%)	3.0% (2.4% - 3.5%)	287,925	2,504	High
Tokushima	3.8% (3.2% - 4.5%)	3.4% (2.9% - 4.0%)	2.2% (1.7% - 2.6%)	1.9% (1.5% - 2.3%)	264,169	2,297	
Kagoshima	4.7% (4.2% - 5.2%)	4.8% (4.4% - 5.3%)	2.3% (1.9% - 2.6%)	2.4% (2.0% - 2.7%)	264,055	2,296	
Oita	5.3% (4.7% - 5.9%)	5.1% (4.5% - 5.6%)	2.2% (1.7% - 2.6%)	2.0% (1.7% - 2.4%)	259,836	2,259	
Nagasaki	4.2% (3.7% - 4.7%)	4.1% (3.6% - 4.6%)	2.2% (1.8% - 2.5%)	2.2% (1.8% - 2.5%)	259,250	2,254	
Kumamoto	5.3% (4.8% - 5.7%)	5.3% (4.9% - 5.8%)	2.5% (2.2% - 2.9%)	2.6% (2.2% - 2.9%)	257,367	2,238	
Hokkaido	6.2% (5.9% - 6.5%)	6.0% (5.7% - 6.2%)	3.0% (2.8% - 3.2%)	2.8% (2.6% - 3.0%)	253,361	2,203	
Fukuoka	7.7% (7.3% - 8.0%)	7.4% (7.1% - 7.7%)	3.8% (3.5% - 4.0%)	3.7% (3.4% - 3.9%)	252,144	2,193	
Yamaguchi	4.5% (4.0% - 5.0%)	4.4% (4.0% - 4.9%)	2.2% (1.9% - 2.6%)	2.2% (1.9% - 2.5%)	248,632	2,162	
Wakayama	5.2% (4.6% - 5.8%)	5.5% (4.9% - 6.1%)	2.5% (2.1% - 2.9%)	2.8% (2.3% - 3.2%)	247,759	2,154	
Ehime	4.4% (3.9% - 4.9%)	4.7% (4.2% - 5.1%)	2.0% (1.7% - 2.4%)	2.2% (1.9% - 2.5%)	247,342	2,151	
Okayama	4.8% (4.4% - 5.2%)	5.0% (4.6% - 5.4%)	2.2% (1.9% - 2.5%)	2.4% (2.1% - 2.7%)	243,946	2,121	
Kagawa	3.9% (3.3% - 4.5%)	4.2% (3.6% - 4.8%)	2.0% (1.6% - 2.4%)	2.1% (1.7% - 2.6%)	243,645	2,119	
Ishikawa	6.7% (6.0% - 7.4%)	6.3% (5.7% - 7.0%)	3.6% (3.1% - 4.1%)	3.3% (2.9% - 3.8%)	239,565	2,083	
Hiroshima	5.1% (4.7% - 5.5%)	4.8% (4.4% - 5.2%)	2.5% (2.2% - 2.8%)	2.4% (2.1% - 2.6%)	238,875	2,077	
Tottori	5.3% (4.5% - 6.1%)	5.4% (4.7% - 6.2%)	2.6% (2.0% - 3.1%)	2.6% (2.1% - 3.2%)	236,214	2,054	Medium
Shimane	5.8% (5.1% - 6.5%)	6.2% (5.5% - 6.9%)	3.1% (2.6% - 3.7%)	3.5% (3.0% - 4.0%)	235,968	2,052	
Miyazaki	4.6% (4.0% - 5.2%)	4.7% (4.1% - 5.2%)	2.3% (1.9% - 2.7%)	2.4% (2.0% - 2.8%)	235,709	2,050	
Saga	4.7% (4.0% - 5.4%)	4.6% (4.0% - 5.3%)	2.8% (2.3% - 3.3%)	2.8% (2.3% - 3.3%)	233,157	2,027	
Fukui	3.5% (2.9% - 4.1%)	3.9% (3.3% - 4.6%)	1.7% (1.2% - 2.1%)	2.0% (1.5% - 2.4%)	232,293	2,020	
Osaka	7.1% (6.9% - 7.4%)	6.6% (6.4% - 6.9%)	3.9% (3.7% - 4.1%)	3.5% (3.3% - 3.7%)	226,081	1,966	
Toyama	8.3% (7.6% - 9.0%)	8.4% (7.7% - 9.1%)	2.8% (2.3% - 3.2%)	2.8% (2.4% - 3.2%)	224,596	1,953	
Kyoto	6.0% (5.6% - 6.4%)	5.8% (5.4% - 6.1%)	2.8% (2.5% - 3.1%)	2.6% (2.3% - 2.9%)	223,388	1,943	
Akita	4.2% (3.8% - 4.7%)	4.7% (4.2% - 5.2%)	2.5% (2.1% - 2.8%)	2.8% (2.5% - 3.2%)	219,345	1,907	
Aomori	4.2% (3.8% - 4.7%)	4.3% (3.9% - 4.7%)	1.9% (1.6% - 2.2%)	1.9% (1.6% - 2.2%)	213,084	1,853	
Yamagata	3.3% (2.9% - 3.7%)	3.8% (3.3% - 4.2%)	1.7% (1.4% - 2.0%)	2.0% (1.7% - 2.4%)	211,407	1,838	
Gumma	4.4% (4.0% - 4.8%)	4.5% (4.1% - 4.9%)	2.1% (1.9% - 2.4%)	2.2% (1.9% - 2.5%)	208,711	1,815	
Nara	4.0% (3.5% - 4.5%)	4.0% (3.5% - 4.4%)	2.2% (1.8% - 2.5%)	2.1% (1.8% - 2.4%)	207,181	1,802	
Okinawa	9.1% (8.3% - 9.8%)	8.1% (7.4% - 8.7%)	3.4% (2.9% - 3.9%)	2.8% (2.5% - 3.2%)	206,845	1,799	
Fukushima	3.5% (3.2% - 3.8%)	3.5% (3.2% - 3.8%)	1.8% (1.6% - 2.0%)	1.8% (1.5% - 2.0%)	204,142	1,775	
Hyogo	6.2% (5.9% - 6.5%)	5.8% (5.6% - 6.1%)	2.8% (2.6% - 3.1%)	2.6% (2.4% - 2.8%)	202,829	1,764	
Iwate	2.9% (2.6% - 3.3%)	3.3% (2.9% - 3.7%)	1.4% (1.2% - 1.7%)	1.6% (1.4% - 1.9%)	200,099	1,740	Low
Tochigi	3.4% (3.1% - 3.8%)	3.4% (3.1% - 3.7%)	1.8% (1.6% - 2.1%)	1.8% (1.6% - 2.0%)	196,225	1,706	
Nagano	3.8% (3.4% - 4.1%)	4.2% (3.9% - 4.6%)	1.7% (1.5% - 1.9%)	2.0% (1.8% - 2.3%)	194,999	1,696	

Tokyo	3.2% (3.1% - 3.3%)	3.4% (3.3% - 3.5%)	1.8% (1.7% - 1.9%)	2.0% (1.9% - 2.1%)	194,947	1,695
Mie	4.0% (3.7% - 4.4%)	4.1% (3.8% - 4.5%)	1.8% (1.5% - 2.0%)	1.8% (1.6% - 2.1%)	194,425	1,691
Nigata	4.0% (3.7% - 4.3%)	4.2% (3.9% - 4.5%)	2.3% (2.1% - 2.6%)	2.5% (2.2% - 2.8%)	192,820	1,677
Yamanashi	4.3% (3.7% - 4.9%)	4.6% (4.0% - 5.2%)	2.1% (1.7% - 2.5%)	2.3% (1.9% - 2.7%)	191,488	1,665
Miyagi	4.3% (3.9% - 4.6%)	4.3% (4.0% - 4.7%)	2.2% (1.9% - 2.4%)	2.2% (2.0% - 2.5%)	191,412	1,664
Gifu	5.1% (4.7% - 5.5%)	5.5% (5.1% - 5.9%)	2.3% (2.0% - 2.6%)	2.4% (2.2% - 2.7%)	191,359	1,664
Aichi	6.9% (6.6% - 7.2%)	6.8% (6.5% - 7.0%)	3.1% (2.9% - 3.3%)	3.0% (2.8% - 3.2%)	185,712	1,615
Shizuoka	3.7% (3.5% - 4.0%)	3.8% (3.5% - 4.0%)	1.9% (1.7% - 2.0%)	1.9% (1.8% - 2.1%)	185,693	1,615
Shiga	5.8% (5.3% - 6.5%)	6.1% (5.5% - 6.6%)	2.5% (2.1% - 2.9%)	2.6% (2.2% - 3.0%)	179,995	1,565
Ibaraki	4.1% (3.8% - 4.4%)	4.0% (3.8% - 4.3%)	1.8% (1.6% - 2.0%)	1.7% (1.5% - 1.9%)	171,339	1,490
Kanagawa	4.8% (4.6% - 5.0%)	4.8% (4.6% - 5.0%)	2.2% (2.0% - 2.3%)	2.2% (2.1% - 2.3%)	160,195	1,393
Chiba	4.2% (4.0% - 4.5%)	4.1% (3.9% - 4.3%)	2.0% (1.9% - 2.2%)	1.9% (1.8% - 2.1%)	158,745	1,380
Saitama	5.1% (4.8% - 5.3%)	4.6% (4.4% - 4.8%)	2.6% (2.4% - 2.8%)	2.3% (2.2% - 2.4%)	151,272	1,315

* An exchange rate of 115 yen per US dollar was used for calculating per capita health expenditure

Appendix 4. Adjusted association between tertile of per capita health expenditure at prefecture-level and patients' health outcomes after out-of-hospital cardiac arrest, additional adjustment for per capita income at prefecture-level*

1-month survival	Overall		Age 1 to 59		Age 60 to 79		Age 80 to 100	
	Adjusted OR (95% CI)	P-value	Adjusted OR (95% CI)	P-value	Adjusted OR (95% CI)	P-value	Adjusted OR (95% CI)	P-value
Sample size	618,154		91,108		250,705		276,341	
Tertile of prefecture-level health expenditure per capita								
Q1 (Lowest)	Ref		Ref		Ref		Ref	
Q2	1.24 (0.97 to 1.59)	0.08	1.19 (0.95 to 1.51)	0.14	1.26 (0.96 to 1.65)	0.10	1.27 (1.001 to 1.62)	0.049
Q3 (Highest)	1.24 (0.99 to 1.55)	0.06	1.24 (1.00 to 1.54)	0.055	1.21 (0.95 to 1.53)	0.13	1.30 (1.03 to 1.65)	0.03
Favorable neurological outcome at 1 month	Adjusted OR (95% CI)	P-value	Adjusted OR (95% CI)	P-value	Adjusted OR (95% CI)	P-value	Adjusted OR (95% CI)	P-value
Sample size	617,490		90,996		250,403		276,091	
Tertile of prefecture-level health expenditure per capita								
Q1 (Lowest)	Ref		Ref		Ref		Ref	
Q2	1.29 (1.002 to 1.67)	0.049	1.20 (0.91 to 1.57)	0.19	1.32 (1.004 to 1.73)	0.047	1.44 (1.13 to 1.83)	<0.01
Q3 (Highest)	1.29 (1.05 to 1.58)	0.02	1.23 (1.01 to 1.50)	0.04	1.25 (1.004 to 1.55)	0.046	1.52 (1.17 to 1.99)	<0.01

*Adjusted for age, sex, the interaction between age and sex, year indicators, etiology of arrest (cardiac vs. non-cardiac), initial cardiac rhythm (VF or pulseless VT), witness status, CPR by bystander, use of public-access AED by bystander, and per capita income at prefecture-level.

Appendix 5. Adjusted association between quintile of per capita health expenditure at prefecture-level and patients' health outcomes after out-of-hospital cardiac arrest

1-month survival rate		Unadjusted (N=635,710)		Adjusted* (N=618,154)	
		OR (95% CI)	P-value	Adjusted OR (95% CI)	P-value
Quintile of prefecture-level health expenditure per capita	Q1 (Lowest)	Reference		Reference	
	Q2	0.80 (0.60-1.08)	0.14	0.82 (0.61-1.09)	0.19
	Q3	1.15 (0.87-1.52)	0.33	1.17 (0.90-1.54)	0.25
	Q4	1.01 (0.85-1.19)	0.94	1.05 (0.87-1.28)	0.60
	Q5 (Highest)	1.20 (0.96-1.51)	0.10	1.22 (0.95-1.57)	0.13
Favorable neurological outcome at 1 month		Unadjusted (N=618,081)		Adjusted* (N=617,490)	
		OR (95% CI)	P-value	Adjusted OR (95% CI)	P-value
Quintile of prefecture-level health expenditure per capita	Q1 (Lowest)	Reference		Reference	
	Q2	0.87 (0.70-1.07)	0.19	0.91 (0.75-1.10)	0.33
	Q3	1.24 (0.90-1.69)	0.18	1.28 (0.96-1.70)	0.09
	Q4	1.07 (0.89-1.28)	0.47	1.14 (0.95-1.38)	0.15
	Q5 (Highest)	1.22 (0.98-1.53)	0.07	1.26 (0.99-1.60)	0.06

*Adjusted for age, sex, the interaction between age and sex, year indicators, etiology of arrest (cardiac vs. non-cardiac), initial cardiac rhythm (VF or pulseless VT), witness status, CPR by bystander, use of public-access AED by bystander, and per capita income at prefecture-level.

Appendix 6. Adjusted association between tertile of per capita health expenditure at prefecture-level and patients' return of spontaneous circulation after out-of-hospital cardiac arrest

Return of spontaneous circulation		Unadjusted (N=618,748)		Adjusted* (N=618,157)	
		Adjusted OR (95% CI)	P-value	Adjusted OR (95% CI)	P-value
Tertile of prefecture-level health expenditure per capita	Low	Reference		Reference	
	Medium	1.06 (0.86-1.30)	0.60	1.03 (0.85-1.26)	0.74
	High	0.95 (0.80-1.14)	0.62	0.92 (0.76-1.10)	0.36

*Adjusted for age, sex, the interaction between age and sex, year indicators, etiology of arrest (cardiac vs. non-cardiac), initial cardiac rhythm (VF or pulseless VT), witness status, CPR by bystander, use of public-access AED by bystander, and per capita income at prefecture-level.