Lifetime risk of suicide among survivors of the atomic bombings of Japan

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Supplementary Material

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Table S1: Distribution of type of shielding and the occurrence of acute radiation and thermal injuries by proximity to the hypocenter[a], Life Span Study, 1950–2009.

	0–<1.8 km n=26,448	1.8–<3.4 km n=47,416	3.4–<5 km n=12,936	5–10 km n=6,865
Shielding, n (%)				
Inside	21,200 (80.2)	32,970 (69.5)	8,242 (63.7)	3,919 (57.1)
Outside	5,198 (19.7)	13,186 (27.8)	3,912 (30.2)	2,459 (35.8)
Unknown	50 (0.2)	1,260 (2.7)	782 (6.0)	487 (7.1)
Acute radiation injuries[b]				
Epilation, n (%)				
No	21,354 (80.7)	44,351 (93.5)	12,398 (95.8)	6,640 (96.7)
Yes	4,590 (17.4)	1,503 (3.2)	84 (0.6)	30 (0.4)
Unknown	504 (1.9)	1,562 (3.3)	454 (3.5)	195 (2.8)
Oropharyngeal lesions, n (%)				
No	23,153 (87.5)	44,722 (94.3)	12,362 (95.6)	6,637 (96.7)
Yes	2,784 (10.5)	1,115 (2.4)	113 (0.9)	33 (0.5)
Unknown	511 (1.9)	1,579 (3.3)	461 (3.6)	195 (2.8)
Flash burns, n (%)				
No	21,264 (80.4)	40,634 (85.7)	12,129 (93.8)	6,568 (95.7)
Yes	4,631 (17.5)	4,824 (10.2)	141 (1.1)	14 (0.2)
Unknown	553 (2.1)	1958 (4.1)	666 (5.1)	283 (4.1)

[a] Categorized based on maps produced by the U.S. Strategic Bombing Survey that indicated the extent of fire and blast damage.

[b] Cramér's V—a measure of association between two nominal variables that ranges from 0 (no association) to 1—for measuring associations among acute radiation injuries:

    Epilation and oropharyngeal lesions: 0.40

    Epilation and flash burns: 0.19

    Oropharyngeal lesions and flash burns: 0.11

Table S2: Unadjusted rates and adjusted hazard ratios for death due to other external causes, by demographic characteristics, Life Span Study, 1950–2009.

	Participants[a]	Person-years	Deaths	Rate[b]	HR (95% CI)[c]
City					
Hiroshima	82,149	3,275,340	1,851	56.5	Reference
Nagasaki	38,082	1,601,630	698	43.6	0.84 (0.77, 0.92)
Cohort					
Atomic bomb survivor	93,665	3,790,901	1,990	52.5	Reference
Not-in-city resident	26,566	1,086,068	559	51.5	0.88 (0.79, 0.97)
Sex					
Female	70,092	2,970,475	1,140	38.4	Reference
Male	50,139	1,906,494	1,409	73.9	2.66 (2.44, 2.90)
Age at bombing, years[d]					
<15	35,148	1,932,782	619	32.0	Reference
15–<25	22,206	1,141,914	398	34.9	1.01 (0.88, 1.15)
25–<40	24,713	1,009,533	629	62.3	1.16 (1.01, 1.33)
≥40	38,164	792,742	903	114.0	1.36 (1.18, 1.56)
Education level[e]					
Less than high school	—	682,766	583	85.4	Reference
High school	—	757,143	311	41.1	0.71 (0.61, 0.81)
More than high school	—	207,303	75	36.2	0.50 (0.39, 0.64)
Marital status[e]					
Single	—	92,672	58	62.6	2.21 (1.69, 2.90)
Married	—	1,447,603	716	49.5	Reference
Separated or divorced	—	63,624	42	66.0	1.49 (1.09, 2.03)
Widowed	—	270,932	302	112.0	1.17 (1.01, 1.36)
All	120,231	4,876,970	2,549	52.3	

CI, confidence interval; HR, hazard ratio.

[a] Number of participants is not provided for time-dependent variables.

[b] Per 100,000 person-years.

[c] Adjusted for all other variables listed.

[d] Age at bombing is equivalent to birth year because all survivors were exposed in 1945.
[e] Numbers do not sum to total because results for unknown categories are not included.

Table S3: Unadjusted rates and adjusted hazard ratios for death due to other external causes, by measures of exposure severity, Life Span Study, 1950–2009.

	Participants	Person-years	Deaths	Rate[a]	HR (95% CI)[b]
Proximity to hypocenter, km					
5–10	6,865	279,330	162	58.0	Reference
3.4–<5	12,936	513,986	295	57.4	0.95 (0.78, 1.15)
1.8–<3.4	47,416	1,939,182	971	50.1	0.86 (0.73, 1.02)
<1.8	26,448	1,058,403	562	53.1	0.90 (0.75, 1.07)
Proximity to hypocenter, per km					0.97 (0.94, 1.00)
Shielding					
Inside	66,331	2,706,756	1,369	50.6	Reference
Outside	24,755	977,972	569	58.2	0.99 (0.90, 1.10)
Acute radiation injuries					
Epilation					
No	84,743	3,500,252	1,788	51.1	Reference
Yes	6,207	251,103	123	49.0	1.08 (0.90, 1.30)
Oropharyngeal lesions					
No	86,874	3,591,128	1,829	50.9	Reference
Yes	4,045	159,212	81	50.9	1.05 (0.84, 1.32)
Flash burns					
No	80,595	3,330,662	1,661	49.9	Reference
Yes	9,610	388,120	227	58.5	1.07 (0.92, 1.24)
Entry time, days					
>30	21,955	913,404	450	49.3	Reference
≤30	4,611	172,664	109	63.1	0.99 (0.80, 1.22)

CI, confidence interval; HR, hazard ratio.

[a] Per 100,000 person-years.

[b] Adjusted for city, cohort, sex, age at bombing (cubic spline), education level, and marital status. Models for acute radiation injuries are also adjusted for proximity to hypocenter and shielding.

Table S4: Adjusted hazard ratios for death due to other external causes, by measures of exposure severity and stratified by sex, Life Span Study, 1950–2009.

	Women (n=70,092)		Men (n=50,139)	
	Deaths	HR (95% CI)[a]	Deaths	HR (95% CI)[a]
Proximity to hypocenter, km				
5–10	68	Reference	94	Reference
3.4–<5	115	0.87 (0.65, 1.18)	180	1.01 (0.79, 1.30)
1.8–<3.4	409	0.82 (0.63, 1.06)	562	0.90 (0.72, 1.12)
<1.8	277	1.04 (0.80, 1.37)	285	0.79 (0.62, 1.00)
Proximity to hypocenter, per km				
All	869	1.01 (0.96, 1.06)	1,121	0.94 (0.91, 0.98)
Age at bombing, years[b]				
<15	99	1.04 (0.97, 1.11)	404	0.96 (0.92, 1.00)
15–<25	145	1.02 (0.97, 1.08)	168	0.94 (0.90, 0.98)
25–<40	269	1.00 (0.95, 1.06)	197	0.95 (0.90, 0.99)
≥40	356	1.00 (0.95, 1.05)	352	0.93 (0.89, 0.97)
Shielding				
Inside	651	Reference	718	Reference
Outside	200	0.92 (0.79, 1.08)	369	1.03 (0.91, 1.17)
Acute radiation injuries				
Epilation				
No	789	Reference	999	Reference
Yes	58	1.12 (0.85, 1.47)	65	1.03 (0.80, 1.33)
Oropharyngeal lesions				
No	813	Reference	1,016	Reference
Yes	34	1.00 (0.70, 1.41)	47	1.07 (0.80, 1.45)
Flash burns				
No	757	Reference	904	Reference
Yes	81	1.09 (0.85, 1.40)	146	1.06 (0.87, 1.28)
Entry time, days				
>30	215	Reference	235	Reference
≤30	56	1.16 (0.87, 1.56)	53	0.85 (0.63, 1.15)

CI, confidence interval; HR, hazard ratio.

[a] Adjusted for city, cohort, age at bombing (cubic spline), education level, and marital status. Models for acute radiation injuries are also adjusted for proximity to hypocenter and shielding.

[b] Likelihood ratio P value for evaluating the null hypothesis of equality in hazard ratios across age groups (3 degrees of freedom): women, P=0.42; men, P=0.40.

Figure S1: Unadjusted rates of suicide death, by calendar year and stratified by sex, Life Span Study, 1950–2009.
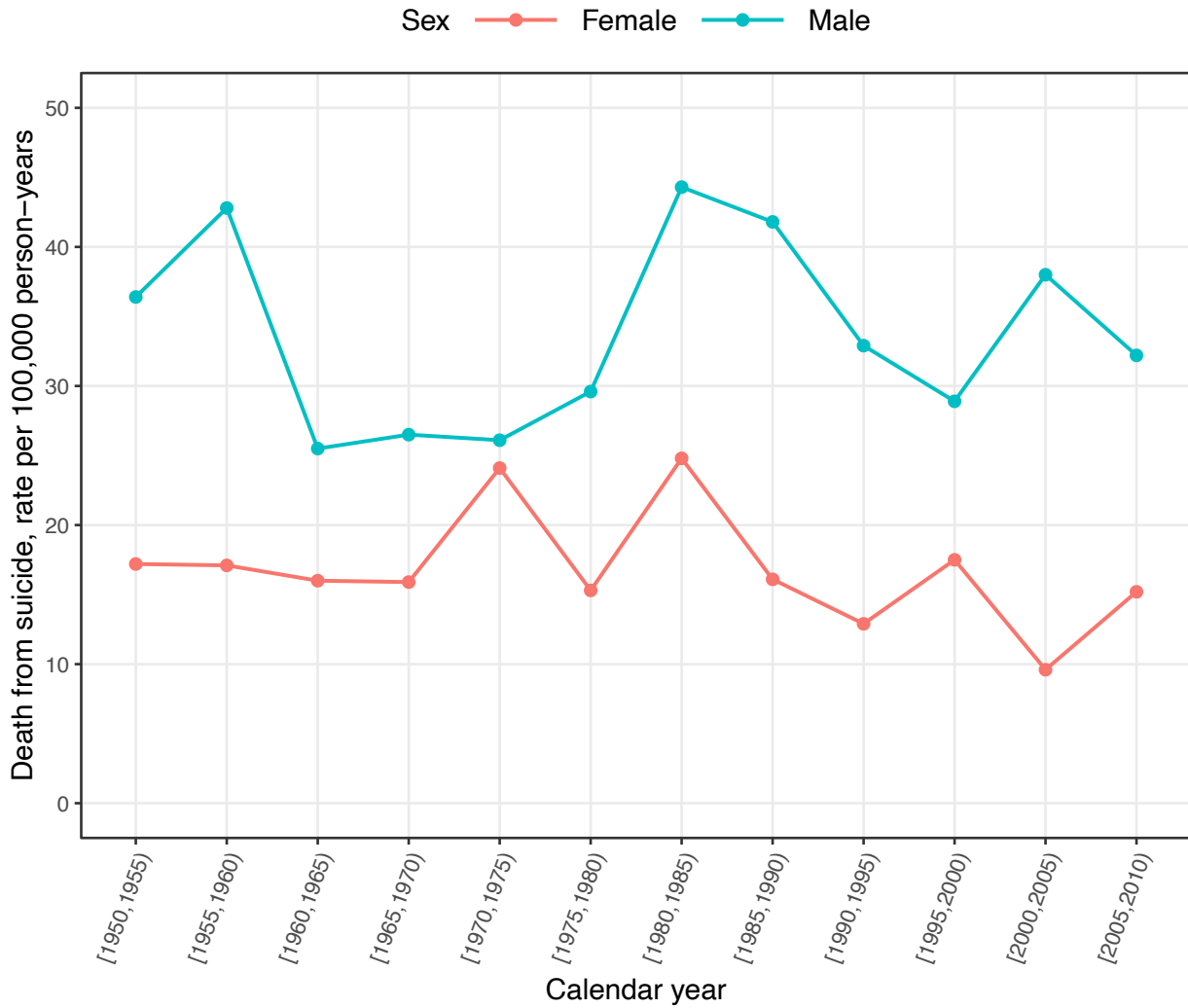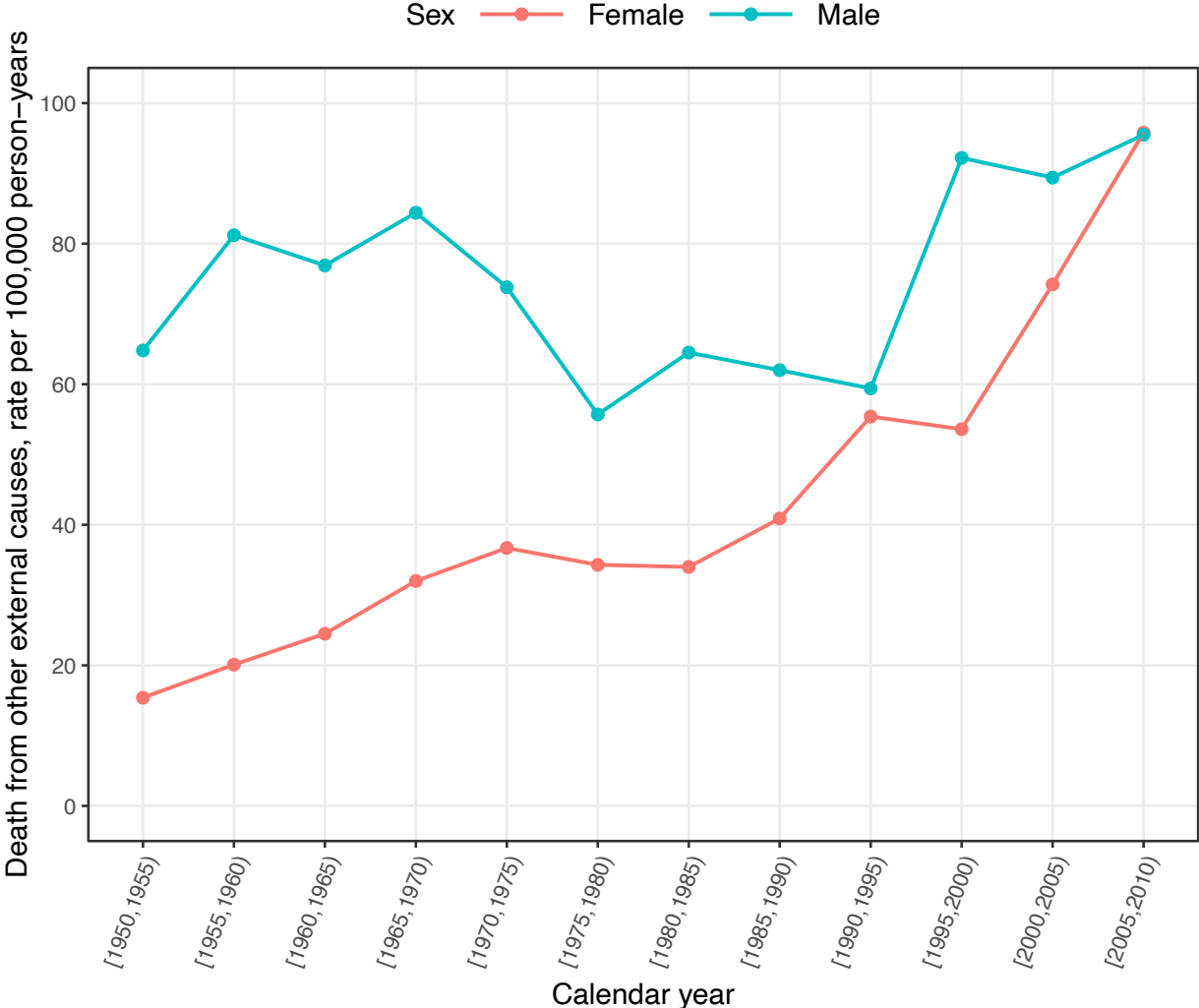

Note: Because the Life Span Study cohort is a fixed cohort, incidence rates by calendar year might not correspond to population-level incidence rates.

Figure S2: Unadjusted rates of suicide death, by calendar year and stratified by sex and birth year, Life Span Study, 1950–2009.
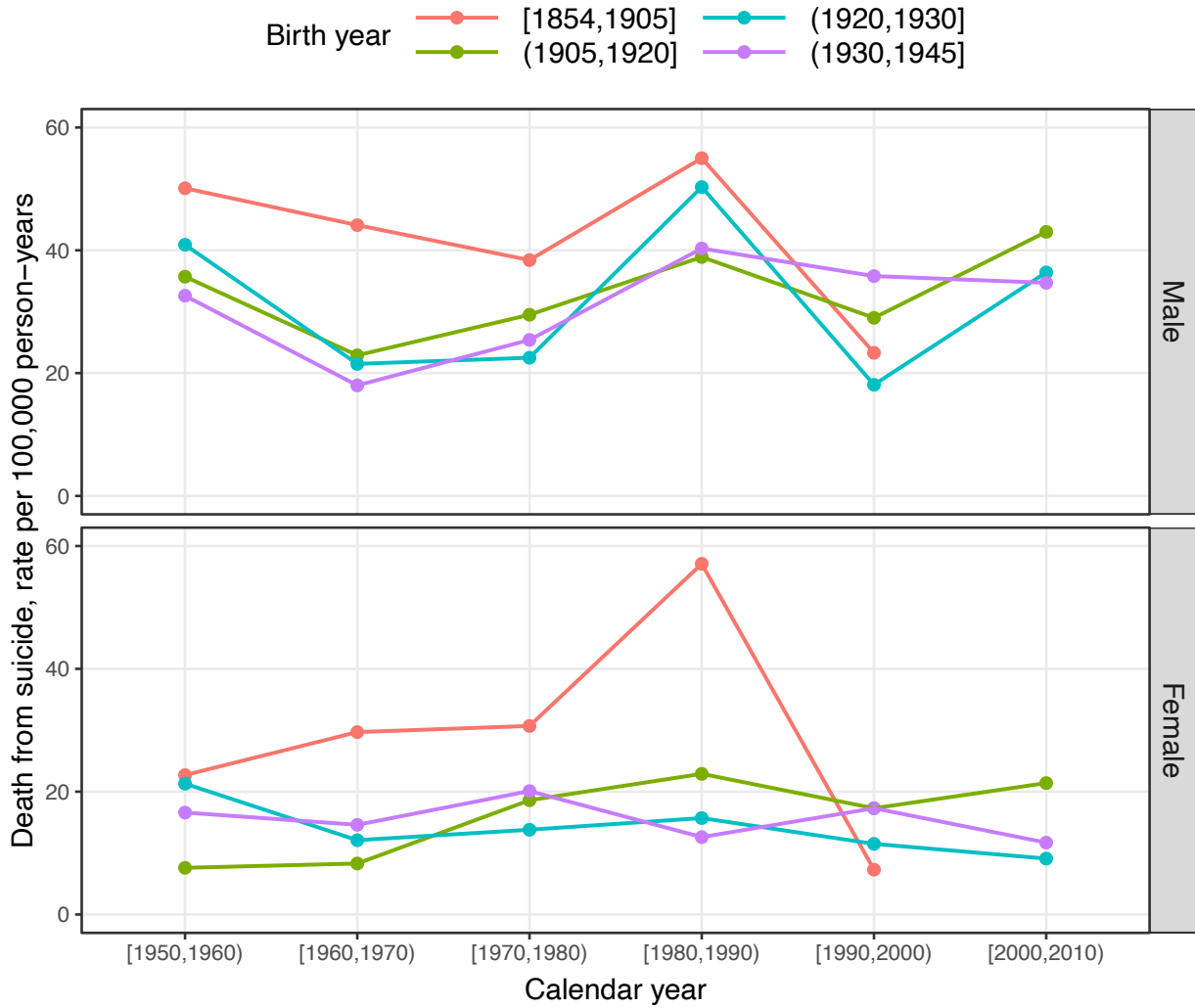
Note: Because the Life Span Study cohort is a fixed cohort, incidence rates by calendar year might not correspond to population-level incidence rates.

Figure S3: Unadjusted rates of death due to other external causes, by calendar year and stratified by sex, Life Span Study, 1950–2009.

Note: Because the Life Span Study cohort is a fixed cohort, incidence rates by calendar year might not correspond to population-level incidence rates.

Figure S4: Unadjusted rates of death due to other external causes, by proximity to the hypocenter (among atomic bomb survivors) and entry time (among not-in-city residents) and stratified by sex, Life Span Study, 1950–2009.