

# *Try Bayesian Survival Analysis using the JACC study data (traditional Cox-proportional hazard model presentations)*

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## *Data preparation*

Before exclusion, we have 110585 participants (46395 men and 64190 women) aged between 40-79 at baseline in the JACC data set:

```
## # A tibble: 2 x 3
##   tr_sex      n rel.freq
##   <chr> <int> <chr>
## 1 1      46395 41.95%
## 2 2      64190 58.05%
```

## *Excluding participants with conditions*

1. With stroke history: n = 1496 (915 men and 581 wmen);
2. With cancer history: n = 1461 (411 men and 1050 women);
3. With myocardial infarction history: n = 2994 (1310 men and 1684 women);
4. With ischemic heart diseases history: n = 186 (91 men, 95 women);
5. With other heart diseases history (ICD9 codes: 420-429): n = 518 (204 men and 314 women);
6. Did not answer the question about milk intake frequency: n = 9545 (3593 men and 5952 women);
7. Finally, n = 94385 (39386 men and 54999 women) are left in the data:

```
## # A tibble: 6 x 4
## # Groups:   tr_sex [2]
##   tr_sex Tot_Stroke      n rel.freq
##   <chr> <chr>      <int> <chr>
## 1 1      Alive/Censor 27401 69.57%
## 2 1      I60_9         1352  3.43%
## 3 1      other_death  10633 27%
## 4 2      Alive/Censor 45672 83.04%
## 5 2      I60_9         1323  2.41%
## 6 2      other_death   8004 14.55%
```

- N of total stroke mortality (I60-I69) confirmed: 2675 (1352 men and 1323 women)

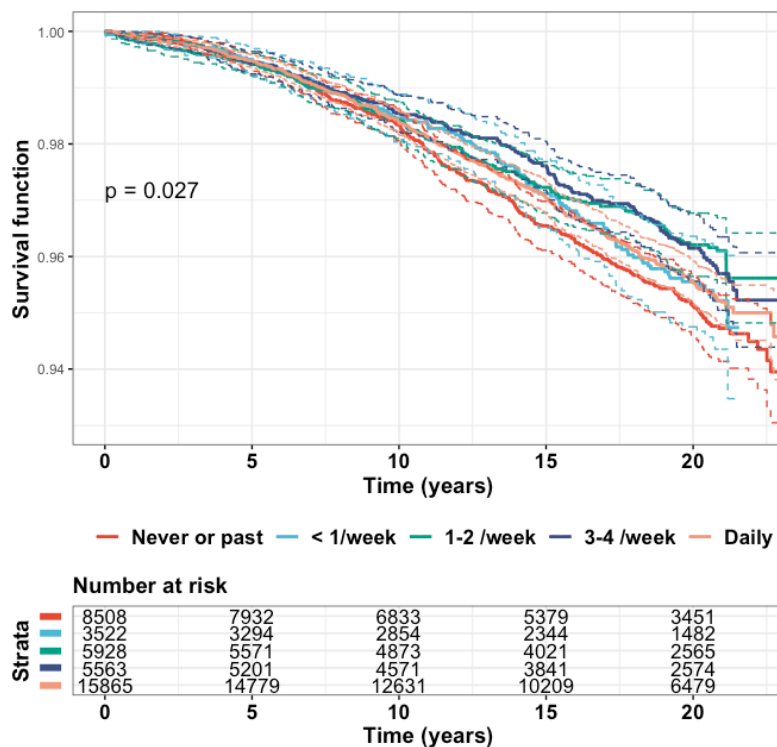
- Subtypes of stroke and CHD, heart failure:
  - Ischemic stroke: 957 (520 men and 437 women);
  - Hemorrhagic stroke: 952 (432 men and 520 women);
  - CHD: 1320 (749 men and 571 women);
  - Heart failure: 1097 (498 men and 599 women).

- Follow-up years summary in total sample:

```
## obs. mean median s.d. min. max.
## 94385 16.476 19.34 5.689 0.005 23.001
```

- Follow-up years summary by total stroke mortality events:

```
## # A tibble: 6 x 6
## # Groups:   tr_sex [2]
##   tr_sex Tot_Stroke      n MeanFolYear MedianFolYear MaxFolYear
##   <chr>   <chr>      <int>      <dbl>         <dbl>         <dbl>
## 1 1     Alive/Censor 27401      18.1          20.3          23.0
## 2 1     I60_9        1352      11.2          11.1          22.9
## 3 1     other_death 10633      11.6          11.8          23.0
## 4 2     Alive/Censor 45672      17.7          20.1          23.0
## 5 2     I60_9        1323      11.8          11.9          22.9
## 6 2     other_death  8004      12.4          13.1          23.0
```



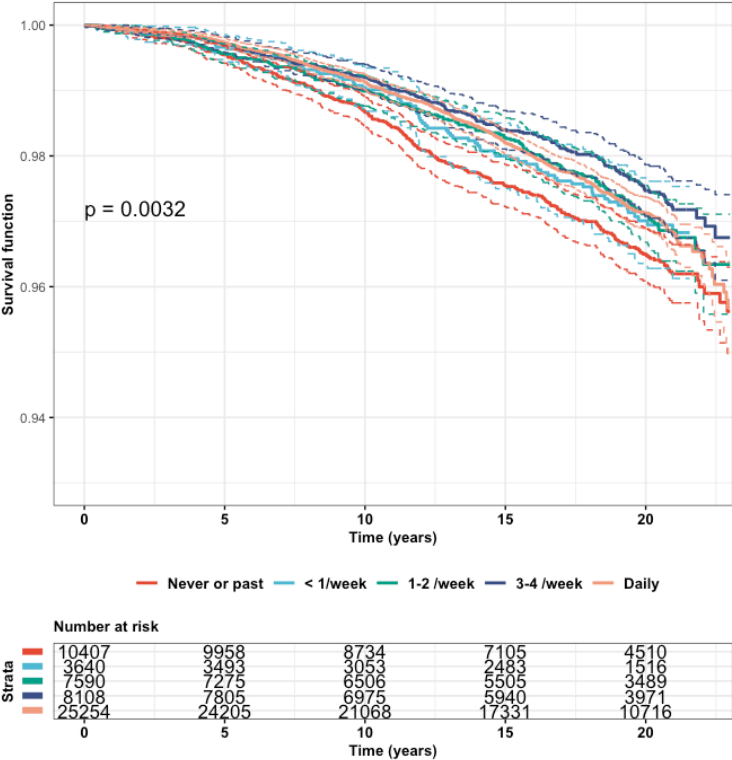


Figure 2: Kaplan-Meier survival curves for total stroke mortality by milk drinking frequency (P value was obtained from log-rank tests) in women.

Table 1. Baseline characteristics of subjects in the JACC study by milk intake level in Men (n = 39,386).

Characteristic	Never	Drinker	Milk drinkers				P value
			1-2 t/Mon	1-2 t/Week	3-4 t/Week	Daily	
n	8508	30878	3522	5928	5563	15865	
Age (mean (SD))	56.80 (9.97)	56.78 (10.15)	55.18 (10.14)	55.42 (10.10)	55.43 (9.95)	58.12 (10.07)	<0.001
Smoking (%)							<0.001
Never	1384 (16.3)	6479 (21.0)	652 (18.5)	1091 (18.4)	1141 (20.5)	3595 (22.7)	
Past	1836 (21.6)	7729 (25.0)	730 (20.7)	1298 (21.9)	1335 (24.0)	4366 (27.5)	
Current	4996 (58.7)	15386 (49.8)	2020 (57.4)	3313 (55.9)	2845 (51.1)	7208 (45.4)	
Alc_Fre (%)							<0.001
< 1/week	355 ( 4.2)	1469 ( 4.8)	130 ( 3.7)	273 ( 4.6)	301 ( 5.4)	765 ( 4.8)	
1-4 /week	1105 (13.0)	5316 (17.2)	597 (17.0)	1056 (17.8)	1033 (18.6)	2630 (16.6)	
Daily	4416 (51.9)	14746 (47.8)	1793 (50.9)	2871 (48.4)	2706 (48.6)	7376 (46.5)	
Never or past	2028 (23.8)	7060 (22.9)	727 (20.6)	1257 (21.2)	1120 (20.1)	3956 (24.9)	
BMI (mean (SD))	22.58 (3.41)	22.71 (3.41)	22.76 (2.75)	22.76 (2.82)	22.91 (5.44)	22.61 (2.75)	<0.001
BMIgrp (%)							<0.001
18.5-24.9	6099 (71.7)	22591 (73.2)	2562 (72.7)	4313 (72.8)	4042 (72.7)	11674 (73.6)	
< 18.5	505 ( 5.9)	1446 ( 4.7)	152 ( 4.3)	266 ( 4.5)	213 ( 3.8)	815 ( 5.1)	
25-29.9	1404 (16.5)	5246 (17.0)	612 (17.4)	1082 (18.3)	988 (17.8)	2564 (16.2)	
> 30	90 ( 1.1)	296 ( 1.0)	38 ( 1.1)	54 ( 0.9)	63 ( 1.1)	141 ( 0.9)	
Exercise (%)							<0.001
Almost0	5009 (58.9)	17232 (55.8)	2274 (64.6)	3316 (55.9)	2954 (53.1)	8688 (54.8)	
> 1h/w	1618 (19.0)	8509 (27.6)	934 (26.5)	1482 (25.0)	1418 (25.5)	4675 (29.5)	
Slepgrp (%)							<0.001
< 6.9	1502 (17.7)	5274 (17.1)	582 (16.5)	1036 (17.5)	948 (17.0)	2708 (17.1)	
7-7.9	2559 (30.1)	9953 (32.2)	1182 (33.6)	1891 (31.9)	1802 (32.4)	5078 (32.0)	
8-8.9	3026 (35.6)	11074 (35.9)	1217 (34.6)	2143 (36.2)	1953 (35.1)	5761 (36.3)	
> 9	1113 (13.1)	3102 (10.0)	374 (10.6)	581 ( 9.8)	553 ( 9.9)	1594 (10.0)	
Veg (%)							<0.001
Less1tm	1002 (11.8)	2556 ( 8.3)	556 (15.8)	508 ( 8.6)	362 ( 6.5)	1130 ( 7.1)	
One2tw	2198 (25.8)	7915 (25.6)	1118 (31.7)	1828 (30.8)	1280 (23.0)	3689 (23.3)	
Thre4tw	1787 (21.0)	7791 (25.2)	871 (24.7)	1333 (22.5)	1582 (28.4)	4005 (25.2)	
daily	1810 (21.3)	7844 (25.4)	709 (20.1)	1209 (20.4)	1158 (20.8)	4768 (30.1)	
Fruit (%)							<0.001
Less1tm	1888 (22.2)	4007 (13.0)	786 (22.3)	810 (13.7)	618 (11.1)	1793 (11.3)	
One2tw	1877 (22.1)	6691 (21.7)	999 (28.4)	1581 (26.7)	1099 (19.8)	3012 (19.0)	
Thre4tw	1376 (16.2)	6120 (19.8)	695 (19.7)	1122 (18.9)	1271 (22.8)	3032 (19.1)	
daily	1260 (14.8)	6924 (22.4)	542 (15.4)	968 (16.3)	961 (17.3)	4453 (28.1)	
Greentea (%)							<0.001
daily	6508 (76.5)	24444 (79.2)	2814 (79.9)	4641 (78.3)	4332 (77.9)	12657 (79.8)	
Thre3tw	737 ( 8.7)	2926 ( 9.5)	378 (10.7)	588 ( 9.9)	562 (10.1)	1398 ( 8.8)	
Never	659 ( 7.7)	1748 ( 5.7)	184 ( 5.2)	327 ( 5.5)	299 ( 5.4)	938 ( 5.9)	
Coffe (%)							<0.001
daily	3727 (43.8)	15662 (50.7)	1780 (50.5)	2845 (48.0)	2642 (47.5)	8395 (52.9)	
Thre3tw	2267 (26.6)	8511 (27.6)	998 (28.3)	1822 (30.7)	1774 (31.9)	3917 (24.7)	
Never	2299 (27.0)	6006 (19.5)	700 (19.9)	1123 (18.9)	983 (17.7)	3200 (20.2)	
Educgrp (%)							<0.001
>= 18 y.o	2168 (25.5)	10701 (34.7)	1190 (33.8)	1973 (33.3)	1726 (31.0)	5812 (36.6)	
DM_hist (%)							<0.001
TRUE	423 ( 5.0)	1942 ( 6.3)	160 ( 4.5)	250 ( 4.2)	304 ( 5.5)	1228 ( 7.7)	
HT_hist (%)							0.039
TRUE	1568 (18.4)	5526 (17.9)	616 (17.5)	1013 (17.1)	937 (16.8)	2960 (18.7)	
KID_hist (%)							<0.001
TRUE	257 ( 3.0)	1038 ( 3.4)	135 ( 3.8)	178 ( 3.0)	168 ( 3.0)	557 ( 3.5)	
LIV_hist (%)							<0.001
TRUE	495 ( 5.8)	2016 ( 6.5)	223 ( 6.3)	356 ( 6.0)	300 ( 5.4)	1137 ( 7.2)	

Note:

Abbreviations: n, number; SD, standard deviation; Alc\_Fre, alcohol intake; BMI, Body Mass Index; Slepgrp, sleep duration groups; Veg, vegetable intake; Coffe, coffee intake; DM/HT/KID/LIV\_hist, diabetes, hypertension, kidney disease, liver disease history.

Table 2. Baseline characteristics of subjects in the JACC study by  
milk intake level in Women (n = 54,999).

Characteristic	Never	Drinker	Milk drinkers				P value
			1-2 t/Mon	1-2 t/Week	3-4 t/Week	Daily	
n	10407	44592	3640	7590	8108	25254	
Age (mean (SD))	58.03 (10.17)	56.97 (9.99)	56.52 (10.19)	55.60 (10.08)	55.58 (9.89)	57.90 (9.86)	<0.001
Smoking (%)							<0.001
Never	8318 (79.9)	36978 (82.9)	2974 (81.7)	6219 (81.9)	6763 (83.4)	21022 (83.2)	
Past	169 ( 1.6)	607 ( 1.4)	49 ( 1.3)	113 ( 1.5)	98 ( 1.2)	347 ( 1.4)	
Current	723 ( 6.9)	1860 ( 4.2)	222 ( 6.1)	420 ( 5.5)	346 ( 4.3)	872 ( 3.5)	
Alc_Fre (%)							<0.001
< 1/week	697 ( 6.7)	3084 ( 6.9)	191 ( 5.2)	567 ( 7.5)	673 ( 8.3)	1653 ( 6.5)	
1-4 /week	837 ( 8.0)	4611 (10.3)	357 ( 9.8)	828 (10.9)	918 (11.3)	2508 ( 9.9)	
Daily	450 ( 4.3)	2021 ( 4.5)	200 ( 5.5)	325 ( 4.3)	338 ( 4.2)	1158 ( 4.6)	
Never or past	7449 (71.6)	30670 (68.8)	2562 (70.4)	5196 (68.5)	5416 (66.8)	17496 (69.3)	
BMI (mean (SD))	23.01 (3.38)	22.91 (3.69)	23.02 (3.80)	23.07 (4.41)	23.07 (3.08)	22.80 (3.62)	<0.001
BMIgrp (%)							<0.001
18.5-24.9	6589 (63.3)	30588 (68.6)	2438 (67.0)	5121 (67.5)	5496 (67.8)	17533 (69.4)	
< 18.5	703 ( 6.8)	2465 ( 5.5)	188 ( 5.2)	380 ( 5.0)	398 ( 4.9)	1499 ( 5.9)	
25-29.9	2173 (20.9)	8545 (19.2)	756 (20.8)	1505 (19.8)	1678 (20.7)	4606 (18.2)	
> 30	280 ( 2.7)	769 ( 1.7)	76 ( 2.1)	175 ( 2.3)	158 ( 1.9)	360 ( 1.4)	
Exercise (%)							<0.001
Almost0	6618 (63.6)	27513 (61.7)	2624 (72.1)	4816 (63.5)	4790 (59.1)	15283 (60.5)	
> 1h/w	1417 (13.6)	9265 (20.8)	624 (17.1)	1401 (18.5)	1522 (18.8)	5718 (22.6)	
Slepgrp (%)							<0.001
< 6.9	2805 (27.0)	11968 (26.8)	1019 (28.0)	2047 (27.0)	2103 (25.9)	6799 (26.9)	
7-7.9	3336 (32.1)	16071 (36.0)	1245 (34.2)	2721 (35.8)	2944 (36.3)	9161 (36.3)	
8-8.9	2886 (27.7)	11432 (25.6)	914 (25.1)	1965 (25.9)	2056 (25.4)	6497 (25.7)	
> 9	887 ( 8.5)	2543 ( 5.7)	254 ( 7.0)	439 ( 5.8)	435 ( 5.4)	1415 ( 5.6)	
Veg (%)							<0.001
Less1tm	917 ( 8.8)	2356 ( 5.3)	399 (11.0)	445 ( 5.9)	337 ( 4.2)	1175 ( 4.7)	
One2tw	2514 (24.2)	10127 (22.7)	1029 (28.3)	2195 (28.9)	1642 (20.3)	5261 (20.8)	
Thre4tw	2331 (22.4)	11845 (26.6)	1001 (27.5)	1876 (24.7)	2452 (30.2)	6516 (25.8)	
daily	2567 (24.7)	13537 (30.4)	909 (25.0)	1866 (24.6)	1963 (24.2)	8799 (34.8)	
Fruit (%)							<0.001
Less1tm	1397 (13.4)	3270 ( 7.3)	523 (14.4)	594 ( 7.8)	514 ( 6.3)	1639 ( 6.5)	
One2tw	1913 (18.4)	6761 (15.2)	801 (22.0)	1515 (20.0)	1122 (13.8)	3323 (13.2)	
Thre4tw	1926 (18.5)	9018 (20.2)	845 (23.2)	1591 (21.0)	1922 (23.7)	4660 (18.5)	
daily	2601 (25.0)	15939 (35.7)	967 (26.6)	2216 (29.2)	2369 (29.2)	10387 (41.1)	
Greentea (%)							<0.001
daily	7680 (73.8)	34264 (76.8)	2804 (77.0)	5800 (76.4)	6146 (75.8)	19514 (77.3)	
Thre3tw	946 ( 9.1)	4615 (10.3)	394 (10.8)	848 (11.2)	921 (11.4)	2452 ( 9.7)	
Never	944 ( 9.1)	2928 ( 6.6)	230 ( 6.3)	467 ( 6.2)	466 ( 5.7)	1765 ( 7.0)	
Coffe (%)							<0.001
daily	4121 (39.6)	21483 (48.2)	1682 (46.2)	3519 (46.4)	3597 (44.4)	12685 (50.2)	
Thre3tw	2648 (25.4)	12514 (28.1)	1069 (29.4)	2279 (30.0)	2698 (33.3)	6468 (25.6)	
Never	3387 (32.5)	9670 (21.7)	835 (22.9)	1611 (21.2)	1620 (20.0)	5604 (22.2)	
Educgrp (%)							<0.001
>= 18 y.o	2073 (19.9)	14092 (31.6)	1016 (27.9)	2263 (29.8)	2225 (27.4)	8588 (34.0)	
DM_hist (%)							<0.001
TRUE	269 ( 2.6)	1642 ( 3.7)	115 ( 3.2)	206 ( 2.7)	219 ( 2.7)	1102 ( 4.4)	
HT_hist (%)							<0.001
TRUE	2236 (21.5)	8782 (19.7)	745 (20.5)	1446 (19.1)	1533 (18.9)	5058 (20.0)	
KID_hist (%)							<0.001
TRUE	371 ( 3.6)	1830 ( 4.1)	142 ( 3.9)	280 ( 3.7)	298 ( 3.7)	1110 ( 4.4)	
LIV_hist (%)							<0.001
TRUE	365 ( 3.5)	2047 ( 4.6)	178 ( 4.9)	295 ( 3.9)	320 ( 3.9)	1254 ( 5.0)	
Menopause (%)							<0.001
TRUE	8213 (78.9)	34021 (76.3)	2684 (73.7)	5408 (71.3)	5791 (71.4)	20138 (79.7)	

*Note:*

Abbreviations: n, number; SD, standard deviation; Alc\_Fre, alcohol intake; BMI, Body Mass Index; Slepgrp, sleep duration groups; Veg, vegetable intake; Coffe, coffee intake; DM/HT/KID/LIV\_hist, diabetes, hypertension, kidney disease, liver disease history.

Table 3. Sex-specific hazard ratio (95% CI) of mortality from stroke according to milk intake frequency.

	Never	1-2 t/Mon	1-2 t/Week	3-4 t/Week	Daily
<b>Men</b>					
N	8508	3522	5928	5563	15865
Person year	135704	56551	97098	92153	252364
<b>Total Stroke</b>					
n	326	122	181	177	546
Crude model	1	0.89 (0.73, 1.11)	0.77 (0.64, 0.92)	0.79 (0.66, 0.95)	0.90 (0.79, 1.04)
Age-adjusted	1	0.99 (0.80, 1.22)	0.84 (0.70, 1.01)	0.86 (0.72, 1.03)	0.76 (0.66, 0.87)
Multivariable-adjusted	1	1.03 (0.83, 1.27)	0.91 (0.75, 1.09)	0.96 (0.79, 1.16)	0.87 (0.76, 1.01)
<b>Hemorrhagic stroke</b>					
n	100	42	58	56	176
Crude model	1	1.00 (0.70, 1.44)	0.81 (0.58, 1.11)	0.82 (0.59, 1.14)	0.94 (0.74, 1.21)
Age-adjusted	1	1.07 (0.75, 1.55)	0.86 (0.62, 1.19)	0.87 (0.63, 1.21)	0.85 (0.66, 1.08)
Multivariable-adjusted	1	1.11 (0.77, 1.60)	0.94 (0.68, 1.31)	1.01 (0.72, 1.40)	0.98 (0.76, 1.27)
<b>Ischemic stroke</b>					
n	151	41	64	66	198
Crude model	1	0.65 (0.46, 0.92)	0.59 (0.44, 0.79)	0.63 (0.48, 0.85)	0.71 (0.57, 0.88)
Age-adjusted	1	0.73 (0.52, 1.03)	0.65 (0.49, 0.87)	0.70 (0.53, 0.94)	0.58 (0.47, 0.72)
Multivariable-adjusted	1	0.73 (0.51, 1.04)	0.67 (0.49, 0.90)	0.74 (0.55, 0.99)	0.63 (0.50, 0.79)
<b>Women</b>					
N	10407	3640	7590	8108	25254
Person year	173222	59904	129233	139919	418925
<b>Total Stroke</b>					
n	300	84	182	172	585
Crude model	1	0.83 (0.65, 1.05)	0.81 (0.67, 0.97)	0.69 (0.58, 0.84)	0.81 (0.71, 0.93)
Age-adjusted	1	1.01 (0.79, 1.28)	1.07 (0.89, 1.28)	0.94 (0.78, 1.13)	0.88 (0.77, 1.01)
Multivariable-adjusted	1	1.05 (0.82, 1.34)	1.12 (0.93, 1.35)	1.01 (0.83, 1.22)	0.99 (0.86, 1.15)
<b>Hemorrhagic stroke</b>					
n	108	27	78	76	231
Crude model	1	0.73 (0.48, 1.12)	0.96 (0.72, 1.29)	0.86 (0.64, 1.16)	0.89 (0.71, 1.12)
Age-adjusted	1	0.83 (0.54, 1.26)	1.16 (0.86, 1.55)	1.04 (0.77, 1.39)	0.92 (0.73, 1.15)
Multivariable-adjusted	1	0.85 (0.56, 1.30)	1.21 (0.90, 1.62)	1.13 (0.84, 1.52)	1.03 (0.81, 1.29)
<b>Ischemic stroke</b>					
n	102	35	63	50	187
Crude model	1	1.01 (0.69, 1.48)	0.82 (0.60, 1.13)	0.59 (0.43, 0.84)	0.76 (0.59, 0.97)
Age-adjusted	1	1.29 (0.88, 1.89)	1.15 (0.84, 1.58)	0.86 (0.61, 1.20)	0.86 (0.67, 1.09)
Multivariable-adjusted	1	1.30 (0.88, 1.92)	1.18 (0.86, 1.63)	0.87 (0.62, 1.23)	0.93 (0.72, 1.19)