SECTION 10

Marital Status and Having Children and Mortality in the Japan Collaborative Cohort Study for Evaluation of Cancer (JACC)

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Abstract

Marital status has been identified as an important social factor associated with mortality. Interesting results were obtained in the present analyses of the Japan Collaborative Cohort Study. Death of spouse was positively associated with risks of male death from all causes, all cancers, and ischemic heart diseases, compared with married status. Divorce or separation was positively associated with risks from all causes among men and women, all cancers among women, and single status was also positively associated with risks from all causes among men and women, and ischemic heart diseases among men. Having large numbers of children was also found to be a risk factor.

Keywords: Marital status - children - cohort study - mortality - cancer - circulatory disease

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Introduction

Male and female participants were surveyed about marital status and having children in the JACC Study in order to determine the influence on mortality from cancer and circulatory diseases.

Materials and Methods

Each participant was asked about his or her marital status, i.e., married, death of spouse, divorce or separate, single, age at first marriage, and health condition of spouse. Each participant was also asked about number of boys, girls, total children, and dead children. The sex-specific hazard ratios (HRs) adjusted for age and area of study and 95% confidence intervals (95%CIs) of major causes of death were calculated.

Results

Marital status, age at first marriage, and current health condition of spouse (Table1)

Death of spouse was positively associated with risks of male death from all causes (HR=1.28), all cancers (HR=1.20), and ischemic heart diseases (HR=1.59) compared with a married status. Divorce or separation were positively associated with risks from all causes (HR=1.39 for men, HR=1.23 for women, respectively), and all cancers for women (HR=1.33). A single status was also positively associated with risks from all causes (HR=1.81 for men, HR=1.53 for women), non-Hodgkin's and other lymphoma (HR=4.88 for men), and ischemic heart diseases (HR=2.16 for men).

Men who married at an age of between 25-28 years had reduced risks of death from all causes (HR=0.93), all cancers (HR=0.91), and ischemic heart diseases (HR=0.77) compared with those who married at an age of less than 25 years old. Women who married at an age of between 22-24 years had reduced risks of death from all causes (HR=0.92) compared with those who married at an age of less than 22 years old.

A poor health condition of the spouse was positively associated with risk of myeloid leukemia for men (HR=4.81), and of esophageal cancer, and breast cancer for women (HR=5.05 and HR=2.87, respectively) compared with good health of the spouse.

Number of having children (Table 2)

Having ≥3 boys was positively associated with risk of death from all causes for men (HR=1.12), and having no boy was positively associated with risk from all causes for women (HR=1.10) compared with having 1-2 boys. Having ≥3 girls was positively associated with risk of death from cerebrovascular disease for men (HR=1.26), and having no girl was positively associated with risk of death from all causes for women (HR=1.16). Moreover having ≥4 total children was positively associated with risks of death from all causes and cerebrovascular diseases for men (HR=1.16 and HR=1.32, respectively), and it was also associated with such risks for women as well (HR=1.08 and HR=1.19, respectively) compared with having 1-3 total children, in addition for women risks of

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Table 1. Hazard ratios (HRs)[#] and 95% Confidence Intervals (95% CI) with Selected Causes of Death for Marital Status

		Marital Status							
Observed		married		spouse dead		divorced /separated		single	
person- /Male		468,460		14,229		6,889		8,230	
years / Female		585,865		88,813		15,270		11,212	
	Mortality	No	HR	No	HR (95%CI)	No	HR (95%CI)	No	HR (95%CI)
Male									
All causes	10,230	7,369	1.00	575	1.28(1.17, 1.39)**	120	1.39 (1.16, 1.67)**	101	1.81 (1.48, 2.20)**
All cancers C00-97	3,894	2,933	1.00	192	1.20 (1.04, 1.40)*	38	1.10 (0.80, 1.52)	24	0.94 (0.63, 1.41)
Esophagus C15	153	121	1.00	8	1.49 (0.72, 3.09)	1	0.70 (0.10, 4.99)	1	0.72 (0.10, 5.19)
Stomach C16	777	595	1.00	38	1.17 (0.84, 1.63)	9	1.29 (0.67, 2.49)	5	0.93 (0.39, 2.25)
Colon C18	219	169	1.00	10	1.14 (0.60, 2.19)	1	0.48 (0.07, 3.44)	2	1.32 (0.33, 5.38)
Rectum C19-20	164	127	1.00	14	2.47 (1.40, 4.37)**	2	1.32 (0.33, 5.34)	1	0.75 (0.11, 5.43)
Liver C22	463	358	1.00	15	0.87 (0.52, 1.47)	5	1.07 (0.44, 2.60)	2	0.52 (0.13, 2.08)
Gall bladder C23	72	52	1.00	4	1.23 (0.44, 3.44)	3	5.07 (1.57, 16.4)**	0	NA
Pancreas C25	224	163	1.00	12	1.31 (0.72, 2.37)	3	1.62 (0.51, 5.07)	2	1.47 (0.36, 5.97)
Lung C33-34	904	660	1.00	40	1.05 (0.76, 1.45)	7	0.96 (0.45, 2.01)	7	1.34 (0.64, 2.83)
Prostate C61	169	120	1.00	11	1.18 (0.63, 2.22)	3	2.17 (0.69, 6.85)	0	NA
Kidney C64	46	34	1.00	2	1.05 (0.25, 4.47)	0	NA	0	NA
Urothelial tract C65-67	94	67	1.00	7	1.48 (0.67, 3.29)	1	1.22 (0.17, 8.83)	0	NA
Non-Hodgkin's lymphoma C82-C85	93	68	1.00	6	1.82 (0.78, 4.26)	1	1.19 (0.17, 8.60)	3	4.88 (1.50, 15.9)**
Multiple myeloma C90	49	33	1.00	3	1.89 (0.57, 6.34)	0	NA	0	NA
Myeloid leukemia C92	44	35	1.00	2	1.50 (0.35, 6.39)	0	NA	0	NA
Ischemic heart disease I20-I25	666	469	1.00	46	1.59 (1.17, 2.17)**	8	1.43 (0.71, 2.88)	8	2.16 (1.07, 4.36)*
Cerebrovascular disease I60-I69	1,322	935	1.00	79	1.20 (0.95, 1.52)	9	0.84 (0.43, 1.61)	10	1.65 (0.88, 3.08)
Female									
All causes	7,174	3,824	1.00	1,537	1.04 (0.98, 1.11)	134	1.23 (1.03, 1.46) *	121	1 .53 (1.28, 1.84)**
All cancers C00-97	2,325	1,379	1.00	407	1.00 (0.89, 1.12)	51	1.33 (1.01, 1.76) *	37	1.32 (0.95, 1.83)$^{+}$
Esophagus C15	27	17	1.00	6	0.76 (0.29, 2.04)	0	NA	1	3.07 (0.41, 23.3)
Stomach C16	386	225	1.00	66	0.86 (0.64, 1.16)	8	1.27 (0.63, 2.58)	6	1.31 (0.58, 2.95)
Colon C18	220	121	1.00	43	1.10 (0.76, 1.59)	6	1.86 (0.82, 4.24)	2	0.88 (0.22, 3.57)
Rectum C19-20	89	51	1.00	15	1.18 (0.63, 2.19)	4	2.87 (1.03, 8.01)*	2	1.88 (0.45, 7.76)
Liver C22	227	134	1.00	50	1.19 (0.84, 1.69)	7	1.84 (0.86, 3.95)	1	0.33 (0.05, 2.38)
Gall bladder C23	95	49	1.00	19	1.47 (0.82, 2.61)	1	0.80 (0.11, 5.82)	1	1.13 (0.16, 8.24)
Pancreas C25	217	150	1.00	27	0.56 (0.36, 0.86)**	6	1.47 (0.65, 3.33)	1	0.33 (0.05, 2.36)
Lung C33-34	268	153	1.00	51	1.10 (0.78, 1.55)	4	0.90 (0.33, 2.43)	7	2.25 (1.05, 4.82) *
Breast C50	103	66	1.00	16	1.75 (0.97, 3.17)$^{+}$	3	1.61 (0.50, 5.15)	3	2.04 (0.64, 6.53)
Cervix uteri C53	36	26	1.00	3	0.52 (0.15, 1.82)	0	NA	2	3.53 (0.83, 15.0)$^{+}$
Kidney C64	19	8	1.00	3	1.28 (0.32, 5.21)	1	4.61 (0.58, 36.8)	0	NA
Urothelial tract C65-67	41	21	1.00	8	1.01 (0.42, 2.41)	2	3.68 (0.85, 16.0)$^{+}$	0	NA
Non-Hodgkin's lymphoma C82-85	65	46	1.00	7	0.61 (0.27, 1.42)	0	NA	1	1.22 (0.17, 8.86)
Multiple myeloma C90	49	29	1.00	8	0.94 (0.40, 2.17)	0	NA	0	NA
Myeloid leukemia C92	33	20	1.00	6	1.19 (0.44, 3.19)	0	NA	0	NA
Ischemic heart disease I20-I25	458	225	1.00	113	0.99 (0.77, 1.25)	9	1.31 (0.67, 2.57)	7	1.43 (0.67,3.05)
Cerebrovascular disease I60-I69	1,151	566	1.00	281	1.14 (0.98, 1.33)$^{+}$	21	1.32 (0.85, 2.05)	11	0.96 (0.53,1.74)

[#]Adjusted for age, area of study. Significance level: ** p<0.01, * p<0.05, $^{+}$ p<0.1 NA: not applicable

death from uterine cervical cancer and non-Hodgkin's and other lymphomas were positively associated with having ≥4 total children (HR=2.77 and HR=2.24, respectively). While having no children significantly increased the risk of death from all causes for both sexes (HR=1.25 and HR=1.31 for men and women, respectively), it was also positively associated with risks of death from ischemic heart diseases and cerebrovascular diseases in women (HR=1.61 and HR=1.40, respectively).

Discussion

Marital status has been identified as an important social factor associated with mortality. It was previously reported that marriage is associated with physical health, psychological well-being, and low mortality , i.e., the married people have better overall well-being compared to those who are divorced, separated, widowed, or single (Ross et al., 1990). Our results in the present study also

Table 2. Hazard ratios (HRs)[#] and 95% Confidence Intervals (95% CI) of Selected Causes of Death with Age at First Marriage and Health Condition of the Spouse

		Age at first marriage (male/female)						Health condition of spouse					
		≤25/22		25-28/22-24		≥29/25		good		poor		no spouse	
Disease ICD10		No	HR	No	HR (95% CI)	No	HR (95% CI)	No	HR	No	HR (95% CI)	No	HR (95% CI)
Male/Observed Person-years		121,457		279,573		128,758		414,470		26,669		28,203	
All causes		1,957	1.00	4,788	0.93 (0.88, 0.99)*	2,329	0.95 (0.89, 1.01)	6,473	1.00	722	1.07 (0.99, 1.15)	784	1.29 (1.20, 1.40)**
All cancers	C00-97	800	1.00	1,852	0.91 (0.84, 0.99)*	878	0.93 (0.84, 1.02)	2,569	1.00	243	0.96 (0.84, 1.10)	235	1.05 (0.92, 1.20)
Esophagus	C15	35	1.00	80	0.95 (0.63, 1.42)	28	0.73 (0.44, 1.22)	107	1.00	7	0.74 (0.34, 1.61)	12	1.40 (0.77, 2.55)
Stomach	C16	136	1.00	380	1.18 (0.96, 1.44)	189	1.23 (0.97, 1.55)+	527	1.00	43	0.86 (0.63, 1.18)	42	0.90 (0.66, 1.24)
Colon	C18	31	1.00	110	1.29 (0.86, 1.93)	55	1.35 (0.85, 2.12)	149	1.00	12	0.80 (0.44, 1.45)	13	1.03 (0.58, 1.82)
Rectum	C19-20	30	1.00	89	1.18 (0.77, 1.81)	35	1.01 (0.61, 1.68)	104	1.00	10	1.14 (0.59, 2.20)	14	1.72 (0.98, 3.03)+
Liver	C22	98	1.00	198	0.81 (0.63, 1.05)	116	1.06 (0.80, 1.40)	265	1.00	28	1.06 (0.71, 1.58)	22	1.00 (0.64, 1.54)
Gall bladder	C23	14	1.00	37	0.98 (0.52, 1.83)	13	0.71 (0.33, 1.56)	43	1.00	6	1.25 (0.52, 2.97)	4	0.97 (0.35, 2.73)
Pancreas	C25	52	1.00	97	0.71 (0.50, 1.01)+	52	0.80 (0.54, 1.20)	142	1.00	20	1.44 (0.89, 2.31)	16	1.30 (0.77, 2.19)
Lung	C33-34	208	1.00	421	0.80 (0.67, 0.94)**	186	0.77 (0.62, 0.94)*	618	1.00	57	0.92 (0.70, 1.21)	56	1.01 (0.77, 1.33)
Prostate	C61	37	1.00	74	0.69 (0.46, 1.05)+	43	0.79 (0.50, 1.26)	116	1.00	8	0.55 (0.27, 1.14)	10	0.76 (0.39, 1.45)
Kidney	C64	10	1.00	20	0.71 (0.33, 1.53)	14	1.08 (0.47, 2.49)	30	1.00	3	0.96 (0.29, 3.21)	2	0.79 (0.19, 3.34)
Urothelial tract	C65-67	15	1.00	50	1.32 (0.72, 2.40)	20	1.15 (0.57, 2.31)	63	1.00	5	0.70 (0.28, 1.75)	7	1.08 (0.49, 2.38)
Non-Hodgkin lymphoma	C82-85	20	1.00	42	0.85 (0.48, 1.48)	21	0.90 (0.47, 1.73)	55	1.00	8	1.56 (0.73, 3.32)	9	2.06 (1.01, 4.19)*
Multiple myeloma	C90	11	1.00	22	0.69 (0.33, 1.43)	12	0.72 (0.31, 1.69)	32	1.00	3	1.07 (0.32, 3.55)	2	0.80 (0.19, 3.38)
Myeloid leukaemia	C92	13	1.00	22	0.66 (0.32, 1.35)	7	0.45 (0.17, 1.17)	26	1.00	9	4.81 (2.18, 10.6)**	2	1.10 (0.26, 4.65)
Ischaemic heart diseases	I20-25	141	1.00	283	0.77 (0.62, 0.95)*	171	0.96 (0.76, 1.22)	415	1.00	48	1.10 (0.81, 1.49)	69	1.78 (1.37, 2.30)**
Cerebrovascular diseases	I60-69	261	1.00	603	0.87 (0.74, 1.01)+	300	0.89 (0.74, 1.05)	847	1.00	100	1.06 (0.86, 1.31)	104	1.19 (0.97, 1.47)+
Female/Observed Person-years		205,935		330,358		225,400		495,504		42,698		127,428	
All causes		1,978	1.00	2,319	0.92 (0.86, 0.98)**	1,966	0.98 (0.92, 1.05)	2,956	1.00	433	1.03 (0.93, 1.14)	2,080	1.08 (1.01, 1.15)*
All cancers	C00-97	633	1.00	801	0.90 (0.81, 1.01)+	655	0.97 (0.86, 1.09)	1,097	1.00	149	1.09 (0.92, 1.30)	560	1.04 (0.93, 1.16)
Esophagus	C15	7	1.00	12	1.38 (0.52, 3.62)	6	0.96 (0.30, 3.07)	9	1.00	6	5.05 (1.74, 14.6)**	7	1.40 (0.48, 4.08)
Stomach	C16	110	1.00	134	0.90 (0.69, 1.18)	96	0.83 (0.61, 1.12)	183	1.00	24	0.97 (0.63, 1.49)	89	0.83 (0.63, 1.09)
Colon	C18	55	1.00	74	1.06 (0.74, 1.52)	70	1.32 (0.90, 1.95)	96	1.00	17	1.37 (0.81, 2.31)	70	1.40 (1.00, 1.96)+
Rectum	C19-20	31	1.00	29	0.63 (0.37, 1.07)+	19	0.54 (0.29, 1.01)+	44	1.00	3	0.57 (0.18, 1.85)	19	0.95 (0.53, 1.71)
Liver	C22	55	1.00	84	1.10 (0.77, 1.56)	62	1.11 (0.75, 1.64)	101	1.00	12	0.88 (0.48, 1.61)	52	0.95 (0.66, 1.36)
Gall bladder	C23	26	1.00	32	0.84 (0.49, 1.45)	25	0.84 (0.46, 1.53)	42	1.00	7	1.41 (0.63, 3.18)	27	1.40 (0.82, 2.39)
Pancreas	C25	55	1.00	72	0.90 (0.62, 1.29)	70	1.07 (0.73, 1.58)	131	1.00	13	0.77 (0.44, 1.38)	43	0.60 (0.41, 0.86)**
Lung	C33-34	82	1.00	87	0.79 (0.58, 1.08)	78	0.97 (0.70, 1.36)	117	1.00	16	1.07 (0.63, 1.82)	64	1.15 (0.82, 1.61)
Breast	C50	21	1.00	34	0.97 (0.55, 1.71)	35	1.53 (0.86, 2.74)	46	1.00	10	2.87 (1.42, 5.82)**	22	2.17 (1.25, 3.77)**
Cervix uteri	C53	12	1.00	10	0.49 (0.21, 1.16)	11	0.75 (0.31, 1.80)	17	1.00	3	2.03 (0.58, 7.13)	9	2.04 (0.84, 4.98)
Kidney	C64	3	1.00	6	1.62 (0.39, 6.83)	7	2.42 (0.55, 10.6)	6	1.00	2	3.05 (0.60, 15.5)	7	2.62 (0.79, 8.66)
Urothelial tract	C65-67	11	1.00	11	0.68 (0.29, 1.60)	15	1.10 (0.47, 2.58)	18	1.00	2	0.93 (0.21, 4.07)	8	0.75 (0.31, 1.83)
Non-Hodgkin lymphoma	C82-85	22	1.00	27	0.87 (0.49, 1.55)	12	0.57 (0.27, 1.21)	33	1.00	7	1.72 (0.74, 3.98)	10	0.73 (0.34, 1.56)
Multiple myeloma	C90	11	1.00	15	0.92 (0.41, 2.06)	18	1.45 (0.64, 3.27)	27	1.00	3	0.87 (0.26, 2.91)	12	0.84 (0.40, 1.77)
Myeloid leukaemia	C92	6	1.00	17	1.72 (0.66, 4.51)	9	1.06 (0.35, 3.20)	20	1.00	2	0.82 (0.19, 3.58)	5	0.52 (0.18, 1.47)
Ischaemic heart diseases	I20-25	134	1.00	141	0.94 (0.73, 1.20)	125	1.07 (0.82, 1.41)	170	1.00	28	1.01 (0.67, 1.50)	154	0.99 (0.78, 1.25)
Cerebrovascular diseases	I60-69	316	1.00	359	0.90 (0.77, 1.06)	329	0.97 (0.82, 1.15)	453	1.00	60	0.90 (0.69, 1.18)	398	1.16 (1.01, 1.35)*

[#] Adjusted for age and area of study. Significance level: ** p<0.01, * p<0.05, + p<0.1

Table 3. Hazard ratios (HRs)[#] and 95% Confidence Intervals (95% CI) for Selected Causes of Death for Number of Children

		Number of boys						Number of girls					
		none		1-2		≥3		none		1-2		≥3	
Disease ICD10		No	HR (95% CI)	No	HR	N	HR (95% CI)	No	HR (95% CI)	No	HR	No	HR (95% CI)
Male/Observed Person-years			62,541		393,946		52,879		72,607		388,350		44,316
All causes		1,025	1.08 (1.00, 1.16)+	6,354	1.00	1,628	1.12 (1.04, 1.20)**	1,167	1.06 (0.99, 1.14)+	6,546	1.00	1,229	1.03 (0.96, 1.11)
All cancers	C00-97	370	0.99 (0.88, 1.11)	2,518	1.00	561	1.13 (1.00, 1.28)*	446	1.01 (0.90, 1.13)	2,566	1.00	406	0.93 (0.81, 1.06)
Esophagus	C15	10	0.53 (0.27, 1.05)+	111	1.00	16	0.82 (0.44, 1.52)	16	0.75 (0.42, 1.33)	105	1.00	14	0.68 (0.33, 1.39)
Stomach	C16	87	1.26 (0.97, 1.62)+	476	1.00	109	1.21 (0.92, 1.59)	88	1.01 (0.78, 1.30)	511	1.00	90	1.11 (0.84, 1.47)
Colon	C18	22	1.14 (0.69, 1.87)	140	1.00	27	1.12 (0.67, 1.86)	23	1.08 (0.66, 1.76)	145	1.00	21	0.79 (0.44, 1.41)
Rectum	C19-20	18	1.07 (0.61, 1.86)	106	1.00	30	1.63 (0.96, 2.77)+	17	0.77 (0.44, 1.35)	117	1.00	16	0.84 (0.45, 1.59)
Liver	C22	44	1.02 (0.71, 1.45)	306	1.00	55	1.02 (0.68, 1.52)	54	1.08 (0.77, 1.51)	317	1.00	32	0.92 (0.60, 1.42)
Gall bladder	C23	4	0.71 (0.23, 2.14)	46	1.00	14	1.58 (0.69, 3.62)	9	1.04 (0.47, 2.33)	48	1.00	9	0.91 (0.39, 2.14)
Pancreas	C25	18	0.99 (0.57, 1.70)	144	1.00	31	1.12 (0.66, 1.89)	14	0.51 (0.29, 0.92)*	153	1.00	22	0.71 (0.41, 1.26)
Lung	C33-34	89	1.00 (0.78, 1.28)	590	1.00	131	1.04 (0.81, 1.34)	111	1.13 (0.90, 1.42)	576	1.00	94	0.89 (0.68, 1.18)
Prostate	C61	13	0.82 (0.44, 1.55)	102	1.00	38	1.52 (0.91, 2.56)	18	1.25 (0.70, 2.22)	113	1.00	27	1.33 (0.76, 2.32)
Kidney	C64	3	0.41 (0.12, 1.40)	37	1.00	5	0.72 (0.26, 2.04)	4	0.43 (0.15, 1.29)	36	1.00	3	0.20 (0.03, 1.47)
Urothelial tract	C65-67	16	1.75 (0.92, 3.35)+	51	1.00	20	1.25 (0.60, 2.60)	13	0.94 (0.48, 1.83)	62	1.00	8	0.38 (0.13, 1.09)+
Non-Hodgkin lymphoma	C82-85	8	0.84 (0.38, 1.87)	64	1.00	11	1.29 (0.60, 2.79)	9	0.89 (0.41, 1.95)	63	1.00	6	0.31 (0.07, 1.32)
Multiple myeloma	C90	0	N.A	34	1.00	10	1.46 (0.59, 3.59)	9	1.15 (0.50, 2.63)	30	1.00	6	0.84 (0.28, 2.51)
Myeloid leukaemia	C92	3	0.56 (0.16, 1.98)	27	1.00	6	1.17 (0.33, 4.15)	5	0.68 (0.25, 1.88)	29	1.00	5	1.06 (0.35, 3.19)
Ischaemic heart diseases	I20-I25	73	1.13 (0.85, 1.49)	402	1.00	113	1.04 (0.77, 1.39)	78	0.99 (0.76, 1.30)	430	1.00	77	0.88 (0.65, 1.20)
Cerebrovascular diseases	I60-69	131	1.10 (0.90, 1.35)	797	1.00	233	1.14 (0.93, 1.39)	132	1.04 (0.84, 1.28)	840	1.00	197	1.26 (1.03, 1.54)*
Female/Observed Person-years			85,677		549,734		94,688		99,085		548,385		75,989
All causes		738	1.10 (1.01, 1.21) *	4,131	1.00	1,464	1.04 (0.95, 1.13)	876	1.16 (1.07, 1.27)**	4,310	1.00	1,131	1.03 (0.94, 1.13)
All cancers	C00-97	228	1.02 (0.87, 1.19)	1,428	1.00	409	1.09 (0.94, 1.27)	264	1.02 (0.88, 1.18)	1,436	1.00	327	1.08 (0.92, 1.26)
Esophagus	C15	3	1.35 (0.34, 5.45)	11	1.00	10	2.66 (0.87, 8.11)+	2	0.60 (0.13, 2.88)	18	1.00	4	1.34 (0.39, 4.62)
Stomach	C16	41	0.88 (0.61, 1.28)	240	1.00	64	0.84 (0.57, 1.22)	43	0.87 (0.60, 1.25)	228	1.00	64	1.37 (0.96, 1.95)+
Colon	C18	24	1.20 (0.73, 1.96)	128	1.00	37	0.86 (0.51, 1.45)	30	1.32 (0.83, 2.10)	131	1.00	33	1.02 (0.61, 1.71)
Rectum	C19-20	6	0.56 (0.23, 1.40)	57	1.00	18	1.50 (0.75, 3.03)	8	0.56 (0.25, 1.27)	61	1.00	10	0.47 (0.16, 1.35)
Liver	C22	24	1.22 (0.73, 2.01)	138	1.00	47	1.25 (0.77, 2.01)	27	1.06 (0.66, 1.70)	146	1.00	28	0.75 (0.43, 1.30)
Gall bladder	C23	8	0.71 (0.32, 1.58)	57	1.00	16	0.95 (0.47, 1.94)	12	1.65 (0.78, 3.51)	63	1.00	12	1.37 (0.59, 3.20)
Pancreas	C25	25	1.40 (0.85, 2.29)	134	1.00	36	0.97 (0.57, 1.65)	29	1.45 (0.91, 2.32)	126	1.00	37	1.48 (0.92, 2.38)
Lung	C33-34	25	0.92 (0.58, 1.47)	169	1.00	48	1.20 (0.78, 1.85)	31	0.98 (0.63, 1.50)	163	1.00	39	1.08 (0.69, 1.71)
Breast	C50	12	1.27 (0.64, 2.53)	65	1.00	11	1.07 (0.47, 2.42)	13	1.12 (0.57, 2.17)	66	1.00	9	1.11 (0.48, 2.56)
Cervix uteri	C53	4	0.80 (0.26, 2.50)	26	1.00	5	0.95 (0.29, 3.11)	4	1.31 (0.39, 4.48)	19	1.00	8	2.28 (0.72, 7.24)
Kidney	C64	1	0.42 (0.05, 3.52)	13	1.00	2	0.40 (0.05, 3.40)	1	0.34 (0.04, 2.86)	13	1.00	1	NA
Urothelial tract	C65-67	3	0.95 (0.23, 3.89)	25	1.00	11	1.75 (0.58, 5.28)	4	0.83 (0.24, 2.81)	28	1.00	6	0.96 (0.29, 3.16)
Non-Hodgkin lymphoma	C82-85	6	1.22 (0.46, 3.20)	43	1.00	6	0.46 (0.13, 1.68)	7	1.20 (0.48, 2.95)	42	1.00	10	1.18 (0.46, 3.02)
Multiple myeloma	C90	2	0.35 (0.08, 1.59)	33	1.00	8	1.31 (0.50, 3.42)	5	0.89 (0.30, 2.70)	30	1.00	5	0.84 (0.23, 3.10)
Myeloid leukaemia	C92	2	0.61 (0.13, 2.89)	20	1.00	7	1.96 (0.64, 5.99)	2	0.73 (0.15, 3.54)	22	1.00	4	1.45 (0.42, 5.03)
Ischaemic heart diseases	I20-25	51	1.06 (0.75, 1.50)	250	1.00	102	0.77 (0.54, 1.08)	63	1.39 (1.00, 1.94)+	274	1.00	70	0.91 (0.64, 1.30)
Cerebrovascular diseases	I60-69	117	1.22 (0.97, 1.53)+	626	1.00	273	1.07 (0.87, 1.32)	136	1.18 (0.95, 1.46)	656	1.00	217	0.94 (0.75, 1.17)

[#] Adjusted for age and area of study. Significance level: ** p<0.01, * p<0.05, + p<0.1 NA: not applicable

Table 4. Hazard ratios (HRs)[#] and 95% Confidence Intervals (95% CI) for Causes of Death with Reference to Numbers of Children

	Total number of children						Dead children			
Observed	none		1-3		≤4		none		≤1	
person- /Male	16,770		320,060		56,187		238,973		37,867	
years / Female	25,205		423,533		112,473		309,920		90,125	
	No	HR (95%CI)	No	HR	No	HR (95%CI)	No	HR	No	HR (95%CI)
Male										
All causes	379	1.25 (1.12, 1.39)**	4,410	1.00	2,125	1.16 (1.10, 1.23)**	3,719	1.00	1,160	1.08 (1.01, 1.16)*
All cancers C00-97	110	0.95 (0.78, 1.16)	1,828	1.00	642	0.99 (0.90, 1.10)	1,432	1.00	394	1.09 (0.97, 1.23)
Esophagus C15	3	0.58 (0.18, 1.86)	89	1.00	17	0.66 (0.38, 1.16)	59	1.00	18	1.25 (0.71, 2.19)
Stomach C16	22	0.98 (0.63, 1.53)	355	1.00	131	1.01 (0.81, 1.26)	277	1.00	64	0.96 (0.72, 1.27)
Colon C18	6	0.99 (0.43, 2.29)	103	1.00	30	0.83 (0.53, 1.29)	77	1.00	25	1.39 (0.86, 2.24)
RectumC19-20	4	0.73 (0.26, 2.02)	85	1.00	31	1.31 (0.83, 2.06)	62	1.00	13	1.11 (0.60, 2.07)
Liver C22	17	1.20 (0.72, 2.01)	199	1.00	40	0.74 (0.51, 1.07)	128	1.00	34	1.19 (0.80, 1.79)
Gall bladder C23	1	0.36 (0.05, 2.68)	35	1.00	15	0.93 (0.48, 1.81)	23	1.00	13	1.69 (0.81, 3.56)
Pancreas C25	2	0.30 (0.07, 1.22)[+]	102	1.00	35	0.85 (0.56, 1.31)	70	1.00	26	1.46 (0.91, 2.36)
Lung C33-34	31	1.22 (0.84, 1.77)	427	1.00	157	0.97 (0.79, 1.19)	371	1.00	96	0.97 (0.77, 1.24)
Prostate C61	6	1.20 (0.51, 2.83)	62	1.00	47	1.39 (0.91, 2.12)	62	1.00	20	0.90 (0.52, 1.54)
Kidney C64	0	NA	30	1.00	7	0.77 (0.32, 1.89)	16	1.00	9	2.67 (1.08, 6.59)*
Urothelial tract C65-67	6	1.59 (0.65, 3.87)	45	1.00	17	0.77 (0.42, 1.42)	36	1.00	10	0.97 (0.46, 2.03)
Non-Hodgkin's lymphoma C82-85	2	0.68 (0.16, 2.86)	46	1.00	16	1.00 (0.54, 1.88)	37	1.00	9	0.89 (0.41, 1.93)
Multiple myeloma C90	0	NA	27	1.00	10	1.15 (0.51, 2.57)	20	1.00	4	1.06 (0.35, 3.24)
Myeloid leukemia C92	0	NA	23	1.00	7	1.63 (0.64, 4.16)	22	1.00	3	0.56 (0.15, 2.05)
Ischemic heart disease I20-25	29	1.38 (0.93, 2.04)	298	1.00	128	1.02 (0.81, 1.29)	238	1.00	73	1.09 (0.82, 1.44)
Cerebrovascular disease I60-69	49	1.32 (0.98, 1.79)[+]	529	1.00	334	1.32 (1.14, 1.54)**	478	1.00	162	1.05 (0.87, 1.27)
Female										
All causes	370	1.31 (1.17, 1.47)**	2,504	1.00	2,038	1.08 (1.01, 1.15)*	2,316	1.00	1,256	0.93 (0.87, 1.01)[+]
All cancers C00-97	87	1.03 (0.82, 1.29)	934	1.00	549	1.09 (0.97, 1.23)	777	1.00	376	1.01 (0.88, 1.16)
Esophagus C15	1	1.20 (0.15, 9.52)	11	1.00	8	0.96 (0.34, 2.65)	13	1.00	6	0.93 (0.33, 2.60)
Stomach C16	15	0.86 (0.49, 1.50)	157	1.00	98	1.01 (0.76, 1.35)	136	1.00	60	0.86 (0.61, 1.19)
Colon C18	13	1.70 (0.92, 3.13)[+]	88	1.00	53	0.96 (0.65, 1.40)	77	1.00	44	1.09 (0.72, 1.64)
RectumC19-20	1	0.20 (0.03, 1.50)	42	1.00	20	0.89 (0.49, 1.63)	25	1.00	19	1.59 (0.81, 3.10)
Liver C22	11	1.21 (0.62, 2.36)	87	1.00	44	0.85 (0.57, 1.27)	57	1.00	34	1.19 (0.74, 1.91)
Gall bladder C23	4	1.45 (0.50, 4.19)	37	1.00	26	1.35 (0.76, 2.41)	33	1.00	21	1.45 (0.79, 2.66)
Pancreas C25	11	1.40 (0.73, 2.67)	87	1.00	57	1.06 (0.73, 1.55)	85	1.00	33	0.78 (0.50, 1.20)
Lung C33-34	10	1.06 (0.54, 2.08)	108	1.00	68	1.29 (0.91, 1.82)	93	1.00	41	0.92 (0.61, 1.39)
Breast C50	1	0.38 (0.05, 2.76)	51	1.00	7	0.63 (0.27, 1.48)	34	1.00	9	1.04 (0.47, 2.33)
Cervix uteri C53	2	2.46 (0.53, 11.5)	13	1.00	11	2.77 (1.08, 7.10)*	16	1.00	5	0.70 (0.22, 2.21)
Kidney C64	0	NA	11	1.00	3	0.43 (0.11, 1.76)	7	1.00	3	0.88 (0.21, 3.74)
Urothelial tract C65-67	2	1.89 (0.38, 9.43)	9	1.00	14	2.23 (0.85, 5.83)	11	1.00	7	1.32 (0.48, 3.60)
Non-Hodgkin's lymphoma C82-85	3	1.93 (0.56, 6.71)	25	1.00	19	2.24 (1.12, 4.45)*	24	1.00	10	1.18 (0.53, 2.65)
Multiple myeloma C90	1	0.58 (0.07, 4.56)	18	1.00	12	1.36 (0.59, 3.15)	17	1.00	5	0.51 (0.17, 1.48)
Myeloid leukemia C92	0	NA	13	1.00	9	1.31 (0.49, 3.50)	8	1.00	11	3.11 (1.11, 8.66)*
Ischemic heart disease I20-25	31	1.61 (1.07, 2.44)*	142	1.00	143	1.01 (0.78, 1.31)	148	1.00	76	0.72 (0.53, 0.97)*
Cerebrovascular disease I60-69	58	1.40 (1.05, 1.88) *	360	1.00	397	1.19 (1.01, 1.39) *	371	1.00	238	0.97 (0.81, 1.16)

[#]Adjusted for age, area of study. Significance level: ** p<0.01, * p<0.05, [+] p<0.1 NA: not applicable

showed very interesting findings on the relationship between marital status and mortality, and those results were concordant with an earlier report (Ikeda et al., 2007). They obtained very similar findings to ours by using data collected until the end of 1999 in the JACC Study, for example single status was positively associated with risk from all causes. Single status may constitute potentially unhealthy effects such as not having social ties. Age at first marriage showed some correlations with mortality. It may be preferable that both men and women marry in appropriate ages (between 25-28 years for men, and 22-24 years for women, respectively). Number of children also appeared an important factor for mortality; having ≥4 children was positively associated with the risk of death from all causes for men and women, especially the risk of death from uterine cervical cancer among women. A relationship between the number of full-term pregnancies and risk of uterine cervical cancer has recently reported (International Collaboration of Epidemiological Studies of Cervical Cancer, 2006), thus increasing number of

children may also associate with the risk of death from uterine cervical cancer . Not having children significantly increased the risk of death from all causes in both sexes. This fact suggests that marriage and having one or two children has an effect on mortality including cancer for both men and women. In fact, social scientists find that people have strong beliefs about the positive effects of having and rearing children (Ross et al., 1990).

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