

## SECTION 1

## Personal Past History and Mortality in the Japan Collaborative Cohort Study for Evaluation of Cancer (JACC)

Shogo Kikuchi

### Abstract

To determine the influence of personal medical history on mortality from cancer and other chronic diseases, participants in the JACC study were questioned and followed up. Consistent across the sexes, risk of deaths of all causes was increased with hypertension, diabetes mellitus, apoplexy, liver diseases, surgical operations, and blood transfusions. All cancers were similarly related to a history of diabetes and liver diseases, surgery and transfusions. In addition, risk of liver cancer was elevated with diabetes, liver disease, cholecystectomy, renal disease, surgical operations and blood transfusions. Apoplexy was related to a past history of blood transfusion and diabetes, the latter also predisposing to ischemic heart disease. Links with infectious disease were also elucidated. Clearly, a past medical history can exert a strong influence on chronic disease development.

**Keywords:** Personal past medical history - risk - cancer - circulatory disease

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### Introduction

Associations between personal past histories and deaths due to malignancies and circulatory diseases are discussed in this section. Because of the prospective study design, little influence of death of diseases analyzed as endpoints was expected on the information regarding past history of tuberculosis, apoplexy, hypertension, heart disease, diabetes mellitus and malignant diseases (cancer), collected at baseline.

### Materials and Methods

In the questionnaire at the baseline, the subjects were asked for their personal medical histories of hypertension, apoplexy, myocardial infarction, renal and liver diseases, cholelithiasis/cholecystitis, diabetes mellitus, peptic ulcer, surgical operation, operation of stomach, cholecystectomy, operation of uterus, appendectomy, blood transfusion, tuberculosis, dysentery, typhoid, pertussis, Japanese encephalitis, polio, measles and

**Table 1. Observed Person-years for Family Histories**

Family history	Males		Females	
	No	Yes	No	Yes
Apoplexy	495,660	8,729	704,858	5,918
Hypertension	414,635	102,999	570,620	164,271
Myocardial infarction	492,159	13,411	695,499	18,041
Renal disease	430,588	80,941	606,302	115,595
Liver disease	417,491	96,417	606,537	117,748
Gallbladder disease	458,966	52,854	643,663	80,760
Diabetes mellitus	474,740	32,070	687,531	26,685
Peptic ulcer	393,701	123,289	630,728	89,485
Tuberculosis	445,276	66,853	695,671	75,760
Surgical operation	318,487	143,504	393,775	278,719
Gastric surgery	360,567	17,842	539,903	8,523
Cholecystectomy	372,597	5,786	536,787	11,609
Uterine surgery			475,816	72,602
Appendectomy	292,850	85,473	404,137	144,235
Blood transfusion	431,757	43,548	601,545	70,881
Tuberculosis	445,276	66,853	645,671	75,670
Dysentery	448,565	10,290	643,410	9,573
Typhoid	452,654	6,256	645,964	7,095
Pertussis	441,011	17,885	614,868	38,174
Japanese encephalitis	458,287	650	652,243	819
Polio	457,448	1,489	651,280	1,773
Measles	173,649	270,825	204,180	429,359
Mumps	346,648	97,945	459,316	174,250

Dept of Public Health, Aichi Medical University School of Medicine, 21 Karimata, Yazako, Nagakute-cho, Aichi-gun, Aichi 480-1195, Japan, Fax: +81-561-62-5270, E-mail: kikuchis@aichi-med-u.ac.jp

**Table 2. Associations between Past History and Risk of Mortality from Cancer and Circulatory Disease**

Family history Cancer site/ disease	Male			Female		
	N for No	N for Yes	Hazard ratio <sup>#</sup> (95% CI)	N for No	N for Yes	Hazard ratio <sup>#</sup> (95% CI)
<b>Hypertension</b>						
All causes	5823	2887	1.32 (1.27, 1.39)**	3869	2361	1.28 (1.21, 1.35)**
All cancers	2446	900	1.03 (0.95, 1.12)	1438	604	0.98 (0.89, 1.09)
Esophagus	98	38	1.23 (0.84, 1.82)	14	7	0.97 (0.38, 2.45)
Stomach	485	187	1.07 (0.90, 1.27)	244	101	0.91 (0.72, 1.16)
Colon	143	53	1.09 (0.79, 1.51)	133	59	1.01 (0.74, 1.39)
Rectum	110	38	1.13 (0.77, 1.65)	51	30	1.54 (0.96, 2.46) <sup>+</sup>
Liver	270	123	1.35 (1.08, 1.68)**	134	58	0.98 (0.71, 1.35)
Gallbladder	43	19	1.14 (0.65, 1.98)	52	30	1.31 (0.82, 2.09)
Pancreas	145	42	0.81 (0.57, 1.15)	129	71	1.28 (0.95, 1.73)
Lung	569	201	0.95 (0.81, 1.12)	169	65	0.88 (0.65, 1.18)
Breast				75	17	0.77 (0.45, 1.34)
Cervix uteri				25	8	0.88 (0.38, 2.00)
Prostate	103	42	0.96 (0.67, 1.39)			
Kidney	25	14	1.78 (0.91, 3.49) <sup>+</sup>	9	7	1.93 (0.70, 5.37)
Urinary tract	53	22	0.98 (0.59, 1.63)	28	9	0.67 (0.31, 1.44)
Non-Hodgkin's lymphoma	60	18	0.91 (0.53, 1.57)	35	20	1.52 (0.85, 2.72)
Multiple myeloma	36	7	0.60 (0.27, 1.37)	33	12	0.83 (0.42, 1.65)
Myeloid leukaemia	31	11	1.25 (0.61, 2.55)	18	11	1.32 (0.60, 2.91)
Ischaemic heart diseases	336	230	1.81 (1.53, 2.16)**	198	204	1.96 (1.60, 2.40)**
Cerebrovascular diseases	667	505	1.94 (1.72, 2.18)**	508	499	1.96 (1.73, 2.23)**
<b>Diabetes mellitus</b>						
All causes	7442	926	1.49 (1.39, 1.60)**	5318	603	1.95 (1.79, 2.12)**
All cancers	2951	298	1.21 (1.07, 1.37)**	1825	137	1.40 (1.17, 1.66)**
Esophagus	124	5	0.51 (0.21, 1.25)	19	2	1.88 (0.43, 8.16)
Stomach	611	50	1.01 (0.75, 1.35)	311	16	0.92 (0.55, 1.52)
Colon	173	16	1.09 (0.65, 1.84)	170	17	1.82 (1.10, 3.02)*
Rectum	137	9	0.86 (0.44, 1.71)	69	4	1.28 (0.47, 3.54)
Liver	310	73	2.58 (1.98, 3.35)**	160	23	2.62 (1.67, 4.09)**
Gallbladder	55	5	1.10 (0.44, 2.78)	71	8	2.00 (0.95, 4.21) <sup>+</sup>
Pancreas	163	21	1.66 (1.05, 2.64)*	176	14	1.45 (0.84, 2.52)
Lung	698	47	0.80 (0.59, 1.07)	215	16	1.31 (0.78, 2.19)
Breast				85	3	0.94 (0.29, 2.99)
Cervix uteri				31	2	1.25 (0.29, 5.33)
Prostate	121	15	1.45 (0.84, 2.51)			
Kidney	34	6	1.88 (0.78, 4.57)	14	2	2.66 (0.59, 11.90)
Urinary tract	63	4	0.73 (0.26, 2.01)	34	0	NA
Non-Hodgkin's lymphoma	70	7	1.23 (0.56, 2.71)	48	5	1.92 (0.74, 4.94)
Multiple myeloma	36	6	2.15 (0.89, 5.17) <sup>+</sup>	44	0	NA
Myeloid leukaemia	40	?	0.32 (0.04, 2.35)	25	2	1.37 (0.32, 5.90)
Ischaemic heart diseases	463	69	1.78 (1.3, 2.30)**	311	61	3.26 (2.46, 4.30)**
Cerebrovascular diseases	997	108	1.31 (1.07, 1.61)**	835	96	1.89 (1.53, 2.34)**
<b>Apoplexy</b>						
All causes	7784	462	1.96 (1.78, 2.15)**	5604	210	2.51 (2.18, 2.88)**
All cancers	3118	88	1.00 (0.81, 1.24)	1904	22	0.88 (0.58, 1.35)
Esophagus	124	4	1.27 (0.47, 3.48)	19	1	3.35 (0.44, 25.35)
Stomach	632	22	1.19 (0.78, 1.83)	318	6	1.32 (0.59, 2.96)
Colon	181	8	1.64 (0.80, 3.34)	179	2	0.81 (0.20, 3.29)
Rectum	141	3	0.90 (0.29, 2.84)	73	2	2.31 (0.56, 9.51)
Liver	359	10	1.07 (0.57, 2.01)	173	4	1.70 (0.63, 4.60)
Gallbladder	58	1	0.54 (0.08, 3.95)	73	1	1.04 (0.14, 7.54)
Pancreas	176	3	0.61 (0.20, 1.92)	190	0	NA
Lung	724	15	0.70 (0.42, 1.18)	227	2	0.65 (0.16, 2.64)
Breast				87	0	NA
Cervix uteri				33	0	NA
Prostate	132	4	0.87 (0.32, 2.37)			
Kidney	38	1	1.06 (0.14, 7.80)	15	0	NA
Urinary tract	64	2	0.97 (0.24, 4.00)	34	0	NA
Non-Hodgkin's lymphoma	73	3	1.65 (0.52, 5.30)	48	1	1.86 (0.25, 13.67)
Multiple myeloma	41	0	N.A	41	1	1.80 (0.25, 13.21)
Myeloid leukaemia	40	1	1.14 (0.16, 8.47)	27	0	N.A
Ischaemic heart diseases	495	26	1.75 (1.17, 2.60)**	344	13	2.39 (1.37, 4.18)**
Cerebrovascular diseases	980	125	3.95 (3.27, 4.78)**	845	66	4.81 (3.74, 6.20)**

**Table 2. Continued. Associations between Past History and Risk of Mortality**

<b>Myocardial infarction</b>								
All causes	7759	535	1.50	(1.37, 1.64)**	5540	328	1.46	(1.30, 1.64)**
All cancers	3095	121	0.89	(0.74, 1.07)	1874	71	0.97	(0.76, 1.23)
Esophagus	123	6	1.41	(0.61, 3.28)	21	0	NA	
Stomach	631	22	0.80	(0.52, 1.23)	313	13	1.06	(0.60, 1.89)
Colon	179	7	0.90	(0.41, 1.94)	178	8	1.11	(0.53, 2.31)
Rectum	143	3	0.58	(0.18, 1.83)	71	4	1.83	(0.64, 5.23)
Liver	357	12	0.73	(0.41, 1.32)	169	10	1.28	(0.66, 2.50)
Gallbladder	54	5	1.98	(0.77, 5.12)	72	3	1.06	(0.32, 3.54)
Pancreas	176	6	0.76	(0.33, 1.73)	188	2	0.27	(0.07, 1.11) <sup>+</sup>
Lung	714	27	0.82	(0.55, 1.21)	220	8	0.82	(0.40, 1.71)
Breast					88	1	0.45	(0.06, 3.33)
Cervix uteri					33	0	NA	
Prostate	131	5	0.72	(0.29, 1.78)				
Kidney	37	1	0.65	(0.09, 4.83)	15	0	NA	
Urinary tract	64	4	1.32	(0.47, 3.70)	33	2	1.55	(0.35, 6.76)
Non-Hodgkin's lymphoma	73	5	1.72	(0.67, 4.36)	46	4	1.97	(0.66, 5.92)
Multiple myeloma	39	2	1.45	(0.34, 6.21)	42	1	0.59	(0.08, 4.49)
Myeloid leukaemia	41	0	N.A		26	1	0.77	(0.10, 6.05)
Ischaemic heart diseases	459	82	4.02	(3.14, 5.15)**	336	30	2.11	(1.43, 3.13)**
Cerebrovascular diseases	1029	69	1.40	(1.09, 1.79)**	857	68	1.97	(1.52, 2.55)**
<b>Renal disease</b>								
All causes	6767	1672	1.32	(1.20, 1.46)**	4689	1287	1.31	(1.17, 1.46)**
All cancers	2621	656	1.22	(1.03, 1.44)*	1582	388	1.03	(0.83, 1.27)
Esophagus	109	23	0.82	(0.30, 2.23)	19	2	0.91	(0.12, 6.85)
Stomach	539	129	1.25	(0.87, 1.80)	274	63	0.84	(0.48, 1.47)
Colon	150	39	1.72	(0.95, 3.12) <sup>+</sup>	158	25	0.69	(0.31, 1.57)
Rectum	118	28	0.78	(0.29, 2.12)	57	17	0.72	(0.18, 2.95)
Liver	248	136	2.25	(1.52, 3.32)**	125	61	2.24	(1.34, 3.74)**
Gallbladder	46	15	1.75	(0.62, 4.95)	68	8	NA	
Pancreas	152	33	1.49	(0.78, 2.85)	162	31	1.72	(1.01, 2.93)*
Lung	638	111	0.76	(0.50, 1.16)	183	49	1.00	(0.54, 1.85)
Breast					70	17	0.29	(0.04, 2.07)
Cervix uteri					26	7	1.31	(0.31, 5.57)
Prostate	111	29	1.02	(0.42, 2.53)				
Kidney	29	10	2.17	(0.65, 7.20)	15	0	NA	
Urinary tract	52	17	2.25	(0.89, 5.69) <sup>+</sup>	24	12	1.66	(0.39, 7.10)
Non-Hodgkin's lymphoma	60	17	1.95	(0.78, 4.92)	41	11	2.02	(0.79, 5.20)
Multiple myeloma	32	12	2.17	(0.66, 7.20)	38	6	NA	
Myeloid leukaemia	37	4	N.A		22	5	0.74	(0.10, 5.54)
Ischaemic heart diseases	442	93	1.07	(0.70, 1.65)	288	84	1.34	(0.86, 2.07)
Cerebrovascular diseases	930	176	1.07	(0.79, 1.46)	768	160	1.23	(0.93, 1.63)

<sup>+</sup>Adjusted for age, area of study. \*\* p<0.01, \* p<0.05, + p<0.10 NA: not applicable

mumps. Associations between the past histories and the deaths of the malignant and circulatory diseases were then analyzed.

## Results

The observed person-years are shown in Table 1 and the associations for particular medical histories are detailed in Table 2.

### History of hypertension

A history of hypertension increased deaths of ischemic heart disease and apoplexy, whereby hazard ratios (HR) were 1.81 and 1.94 in men and 1.96 and 1.96 in women, respectively. It was also positively associated with risk of liver cancer in men, where the HR was 1.35. It showed a weak association with deaths of renal cancer in men and of rectal cancer in women. In both genders, a positive association was observed between a history of hypertension and deaths of all causes.

### History of diabetes mellitus

A history of diabetes mellitus increased deaths of ischemic heart disease and apoplexy, with HRs of 1.78 and 1.31 in men, respectively, and 3.26 and 1.89 in women respectively. It was positively associated with deaths of colon and liver cancers in women (HR=1.82 and 2.62, respectively), and of liver and pancreatic cancers in men (HR=2.58 and 1.66, respectively). It also showed positive associations with deaths of all causes and all cancers in both genders, and weak positive ones with deaths of gall bladder cancer in women and of multiple myeloma in males.

### Histories of apoplexy and myocardial infarction

A history of apoplexy was positively associated with deaths of ischemic heart disease (HR=1.75 in men and =2.39 in women) and a history of myocardial infarction with deaths of apoplexy (HR=1.40 in men and =1.97 in women). Histories of the both showed positive associations with deaths of all causes. Nevertheless, they

**Table 2. Continued. Associations between Past Histories and Mortality,**

Family history Cancer site/ disease	Male			Female		
	N for No	N for Yes	Hazard ratio <sup>#</sup> (95% CI)	N for No	N for Yes	Hazard ratio <sup>#</sup> (95% CI)
<b>Liver disease</b>						
All causes	6423	2143	1.72 (1.60, 1.85)**	4634	1400	1.74 (1.58, 1.92)**
All cancers	2436	898	1.91 (1.71, 2.13)**	1523	476	1.97 (1.68, 2.31)**
Esophagus	102	32	1.59 (0.88, 2.87)	19	2	0.94 (0.12, 7.28)
Stomach	523	142	1.04 (0.76, 1.42)	264	71	1.36 (0.86, 2.14)
Colon	151	44	1.28 (0.76, 2.14)	161	28	0.97 (0.49, 1.93)
Rectum	115	33	0.97 (0.49, 1.93)	57	18	1.00 (0.31, 3.23)
Liver	142	270	12.71 (10.0, 16.1)**	74	130	19.0 (13.7, 26.4)**
Gallbladder	42	19	2.29 (1.05, 5.00)*	65	13	1.16 (0.46, 2.96)
Pancreas	153	34	0.88 (0.47, 1.64)	166	25	0.96 (0.49, 1.90)
Lung	608	155	1.28 (0.99, 1.66) <sup>+</sup>	187	48	0.74 (0.39, 1.42)
Breast				67	21	1.45 (0.57, 3.69)
Cervix uteri				26	6	0.59 (0.08, 4.52)
Prostate	110	30	0.73 (0.32, 1.68)			
Kidney	30	10	1.07 (0.32, 3.60)	14	1	1.82 (0.24, 13.9)
Urinary tract	56	17	1.09 (0.43, 2.77)	26	10	NA
Non-Hodgkin's lymphoma	60	16	0.87 (0.31, 2.42)	41	11	1.70 (0.65, 4.48)
Multiple myeloma	29	14	2.42 (0.92, 6.40) <sup>+</sup>	35	7	0.46 (0.06, 3.41)
Myeloid leukaemia	35	7	1.01 (0.30, 3.39)	23	5	0.54 (0.07, 4.15)
Ischaemic heart diseases	439	104	0.92 (0.64, 1.31)	286	82	1.25 (0.78, 1.98)
Cerebrovascular diseases	893	231	1.49 (1.21, 1.84)**	782	155	1.12 (0.83, 1.52)
<b>Cholelithiasis/ cholecystitis</b>						
All causes	7378	1070	1.09 (1.01, 1.18)*	5153	862	1.11 (1.03, 1.21)*
All cancers	2871	396	0.99 (0.87, 1.12)	1703	283	1.18 (1.02, 1.36)*
Esophagus	117	16	1.29 (0.71, 2.36)	21	0	NA
Stomach	588	72	0.78 (0.58, 1.05)	287	50	1.19 (0.84, 1.68)
Colon	180	13	0.56 (0.30, 1.03) <sup>+</sup>	166	20	1.02 (0.61, 1.70)
Rectum	129	17	0.99 (0.55, 1.80)	61	17	2.25 (1.21, 4.20)*
Liver	310	68	1.04 (0.77, 1.42)	147	40	1.59 (1.07, 2.36)*
Gallbladder	50	10	1.60 (0.71, 3.60)	64	12	1.54 (0.76, 3.10)
Pancreas	164	20	1.02 (0.58, 1.77)	163	29	1.73 (1.12, 2.68)*
Lung	669	82	1.00 (0.76, 1.32)	201	32	1.01 (0.66, 1.54)
Breast				79	10	0.84 (0.39, 1.79)
Cervix uteri				31	3	0.69 (0.19, 2.45)
Prostate	124	16	0.74 (0.39, 1.39)			
Kidney	33	6	1.40 (0.51, 3.82)	14	2	2.20 (0.50, 9.77)
Urinary tract	57	11	1.37 (0.62, 3.01)	32	4	0.55 (0.18, 1.69)
Non-Hodgkin's lymphoma	61	16	2.30 (1.16, 4.57)*	47	5	0.84 (0.31, 2.28)
Multiple myeloma	35	8	1.73 (0.68, 4.39)	40	4	0.71 (0.24, 2.16)
Myeloid leukaemia	36	6	1.70 (0.59, 4.90)	25	2	0.52 (0.11, 2.38)
Ischaemic heart diseases	473	73	1.22 (0.90, 1.64)	311	54	1.03 (0.74, 1.44)
Cerebrovascular diseases	995	120	1.00 (0.80, 1.25)	827	109	1.02 (0.82, 1.27)

showed no association with risks of particular malignant diseases except that a history of myocardial infarction exhibited a weak negative association with pancreatic cancer in women.

#### History of renal diseases

A history of renal disease was positively associated with deaths of liver cancer in both genders (HR=2.25 in men and =2.24 in women), of pancreatic cancer in women (HR=1.72), of all causes in both genders and of all cancers in men. It further showed weak positive associations with deaths of colon and urinary tract cancers in men.

#### History of liver diseases

A history of liver diseases was strongly associated with deaths of liver cancer, with HR values of 12.7 in men and 19.0 in women. In men, it was also positively associated with deaths of gallbladder cancer (HR=2.29) and

cerebrovascular diseases (HR=1.49). Those with a history further showed increased deaths of all causes and all cancers in both genders. Personal experience of liver disease also showed weak associations with lung cancer and multiple myeloma in men.

#### History of cholelithiasis/ cholecystitis

A history of cholelithiasis or cholecystitis showed positive associations with deaths of rectal, liver and pancreatic cancers in women; the HR values were 2.25, 1.59 and 1.73, respectively. In men, it showed a positive link with risk of non-Hodgkin's lymphoma (HR=2.30) and a weak negative association with colon cancer. The history was also positively associated with deaths of all causes in both genders and of all cancers in women.

#### History of peptic ulcers

In men, a history of peptic ulcers was positively

**Table 2. Continued. Associations between Past Histories and Mortality**

<b>Peptic Ulcers</b>								
All causes	6384	2178	1.02	(0.97, 1.07)	5169	803	1.08	(1.00, 1.16) <sup>+</sup>
All cancers	2456	890	1.07	(0.99, 1.16) <sup>+</sup>	1716	271	1.10	(0.96, 1.26)
Esophagus	105	31	0.96	(0.64, 1.43)	17	4	1.89	(0.62, 5.72)
Stomach	518	148	0.82	(0.68, 1.00) <sup>*</sup>	274	59	1.50	(1.12, 2.01) <sup>**</sup>
Colon	143	49	1.05	(0.76, 1.46)	165	21	0.95	(0.60, 1.51)
Rectum	115	37	0.99	(0.68, 1.44)	66	9	1.11	(0.55, 2.23)
Liver	268	135	1.36	(1.10, 1.69) <sup>**</sup>	160	27	1.10	(0.72, 1.66)
Gallbladder	45	13	0.88	(0.47, 1.64)	67	13	1.28	(0.68, 2.41)
Pancreas	129	62	1.46	(1.07, 1.99) <sup>*</sup>	175	17	0.68	(0.41, 1.14)
Lung	559	212	1.11	(0.94, 1.31)	202	32	1.02	(0.69, 1.51)
Breast					83	8	0.71	(0.33, 1.55)
Cervix uteri					28	5	1.30	(0.49, 3.43)
Prostate	106	33	0.92	(0.61, 1.38)				
Kidney	31	7	0.66	(0.29, 1.50)	14	3	1.67	(0.48, 5.86)
Urinary tract	58	16	0.78	(0.44, 1.38)	29	6	1.69	(0.70, 4.12)
Non-Hodgkin's lymphoma	53	28	1.54	(0.95, 2.47) <sup>+</sup>	49	5	0.67	(0.26, 1.70)
Multiple myeloma	29	12	1.29	(0.65, 2.54)	33	10	2.29	(1.11, 4.72) <sup>*</sup>
Myeloid leukaemia	33	1	0.71	(0.31, 1.61)	23	5	1.57	(0.58, 4.23)
Ischaemic heart diseases	423	117	0.79	(0.64, 0.98) <sup>*</sup>	329	45	0.88	(0.64, 1.23)
Cerebrovascular diseases	863	264	0.94	(0.81, 1.08)	817	121	1.07	(0.88, 1.30)
<b>Surgical Operations</b>								
All causes	4932	2910	1.20	(1.15, 1.26) <sup>**</sup>	3317	2250	1.09	(1.03, 1.15) <sup>**</sup>
All cancers	1903	1104	1.18	(1.09, 1.27) <sup>**</sup>	1029	810	1.19	(1.09, 1.31) <sup>**</sup>
Esophagus	80	39	1.01	(0.68, 1.49)	15	8	0.93	(0.38, 2.24)
Stomach	400	205	1.07	(0.90, 1.27)	187	119	1.01	(0.80, 1.28)
Colon	106	70	1.29	(0.95, 1.75)	104	85	1.24	(0.93, 1.67)
Rectum	78	46	1.26	(0.87, 1.83)	37	30	1.16	(0.71, 1.91)
Liver	168	154	1.72	(1.38, 2.16) <sup>**</sup>	74	99	1.84	(1.35, 2.50) <sup>**</sup>
Gallbladder	33	21	1.23	(0.70, 2.16)	49	21	0.65	(0.38, 1.10)
Pancreas	107	70	1.33	(0.98, 1.81) <sup>+</sup>	105	81	1.27	(0.95, 1.71)
Lung	502	217	0.88	(0.75, 1.03)	109	102	1.42	(1.07, 1.87) <sup>*</sup>
Breast					36	43	1.66	(1.06, 2.61) <sup>*</sup>
Cervix uteri					18	8	0.62	(0.26, 1.44)
Prostate	71	53	1.51	(1.05, 2.17) <sup>*</sup>				
Kidney	20	15	1.52	(0.77, 3.00)	6?	9	2.46	(0.86, 7.05) <sup>+</sup>
Urinary tract	36??	36	2.09	(1.30, 3.37) <sup>**</sup>	15	12	1.54	(0.71, 3.34)
Non-Hodgkin's lymphoma	45	25	1.14	(0.69, 1.88)	34	19	0.73	(0.41, 1.29)
Multiple myeloma	23	11	0.96	(0.46, 1.99)	26	10	0.57	(0.27, 1.19)
Myeloid leukaemia	25	4	0.88	(0.42, 1.85)	12	14	1.70	(0.77, 3.77)
Ischaemic heart diseases	320	195	1.22	(1.01, 1.46) <sup>*</sup>	228	120	0.88	(0.70, 1.10)
Cerebrovascular diseases	669	384	1.20	(1.05, 1.36) <sup>**</sup>	577	350	1.02	(0.89, 1.17)
<b>Gastric Surgery</b>								
All causes	5997	626	1.48	(1.37, 1.61) <sup>**</sup>	4425	166	1.34	(1.15, 1.57) <sup>**</sup>
All cancers	2278	220	1.45	(1.26, 1.67) <sup>**</sup>	1445	52	1.52	(1.15, 2.00) <sup>**</sup>
Esophagus	105	9	1.46	(0.73, 2.91)	20	0	NA	
Stomach	455	52	1.72	(1.28, 2.30) <sup>**</sup>	235	20	3.41	(2.15, 5.41) <sup>**</sup>
Colon	133	13	1.61	(0.91, 2.86)	156	2	0.50	(0.12, 2.03)
Rectum	95	8	1.43	(0.69, 2.96)	62	1	0.71	(0.10, 5.17)
Liver	211	34	2.32	(1.60, 3.37) <sup>**</sup>	133	5	1.56	(0.64, 3.83)
Gallbladder	38	4	1.62	(0.57, 4.56)	58	1	0.71	(0.10, 5.13)
Pancreas	133	14	1.54	(0.88, 2.70)	147	2	0.54	(0.13, 2.18)
Lung	550	40	1.12	(0.81, 1.55)	162	8	2.08	(1.02, 4.26) <sup>*</sup>
Breast					65	1	0.93	(0.13, 6.75)
Cervix uteri					22	1	2.32	(0.31, 17.5)
Prostate	96	6	0.81	(0.35, 1.86)				
Kidney	28	4	2.16	(0.75, 6.27)	14	1	2.74	(0.36, 21.2)
Urinary tract	58	3	0.68	(0.21, 2.20)	17	2	3.93	(0.90, 17.3) <sup>+</sup>
Non-Hodgkin's lymphoma	52	5	1.44	(0.57, 3.65)	41	0	NA	
Multiple myeloma	29	0	N.A.		29	1	1.44	(0.19, 10.6)
Myeloid leukaemia	32	10	0.43	(0.06, 3.19)	18	0	NA	
Ischaemic heart diseases	389	35	1.30	(0.91, 1.84)	303	5	0.51	(0.21, 1.23)
Cerebrovascular diseases	819	89	1.50	(1.20, 1.87) <sup>**</sup>	730	33	1.46	(1.03, 2.08) <sup>*</sup>

Adjusted for age, area of study. \*\* p&lt;0.01, \* p&lt;0.05, + p&lt;0.10 NA: not applicable

**Table 2. Continued. Associations between Past Histories and Mortality**

Family history Cancer site/ disease	Male			Female		
	N for No	N for Yes	Hazard ratio <sup>#</sup> (95% CI)	N for No	N for Yes	Hazard ratio <sup>#</sup> (95% CI)
<b>Cholecystectomy</b>						
All causes	6442	181	1.29 (1.11, 1.50)**	4442	149	1.17 (0.99, 1.38) <sup>+</sup>
All cancers	2419	79	1.58 (1.26, 1.98)**	1441	56	1.43 (1.09, 1.87)**
Esophagus	111	3	1.55 (0.49, 4.92)	20	0	NA
Stomach	493	14	1.41 (0.83, 2.41)	251	4	0.58 (0.22, 1.57)
Colon	143	3	1.09 (0.35, 3.43)	150	8	1.88 (0.92, 3.86) <sup>+</sup>
Rectum	101	2	1.09 (0.27, 4.45)	63	0	NA
Liver	233	12	2.18 (1.21, 3.94)**	128	10	2.67 (1.39, 5.13)**
Gallbladder	40	2	2.65 (0.64, 11.0)	56	3	1.87 (0.58, 6.03)
Pancreas	144	3	0.98 (0.31, 3.10)	143	6	1.49 (0.65, 3.39)
Lung	573	17	1.47 (0.91, 2.39)	162	8	1.73 (0.84, 3.54)
Breast				62	4	3.03 (1.09, 8.44)*
Cervix uteri				23	0	NA
Prostate	99	3	1.27 (0.40, 4.04)			
Kidney	32	0	N.A.	13	2	6.38 (1.43, 28.5)*
Urinary tract	58	3	2.17 (0.67, 7.04)	19	0	NA
Non-Hodgkin's lymphoma	56	1	0.89 (0.12, 6.46)	41	0	NA
Multiple myeloma	28	1	1.70 (0.23, 12.7)	30	0	NA
Myeloid leukaemia	31	1	2.84 (0.65, 12.4)	18	0	NA
Ischaemic heart diseases	416	8	0.87 (0.43, 1.76)	297	11	1.20 (0.65, 2.19)
Cerebrovascular diseases	892	16	0.82 (0.50, 1.34)	740	23	1.07 (0.70, 1.62)
<b>Uterine Surgery</b>						
All causes				4031	560	0.97 (0.89, 1.06)
All cancers				1267	230	1.20 (1.04, 1.38)*
Esophagus				16	4	1.84 (0.59, 5.73)
Stomach				224	31	0.96 (0.65, 1.40)
Colon				138	20	0.93 (0.57, 1.51)
Rectum				47	16	2.13 (1.19, 3.82)*
Liver				109	29	1.64 (1.07, 2.50)*
Gallbladder				54	5	0.57 (0.22, 1.47)
Pancreas				125	24	1.29 (0.82, 2.03)
Lung				142	28	1.21 (0.80, 1.85)
Breast				53	13	1.68 (0.91, 3.11) <sup>+</sup>
Cervix uteri				19	4	1.48 (0.49, 4.46)
Kidney				13	2	1.24 (0.28, 5.49)
Urinary tract				17	2	1.09 (0.25, 4.73)
Non-Hodgkin's lymphoma				35	6	1.08 (0.44, 2.61)
Multiple myeloma				27	3	0.86 (0.26, 2.84)
Myeloid leukaemia				14	4	1.93 (0.61, 6.05)
Ischaemic heart diseases				282	26	0.69 (0.46, 1.05) <sup>+</sup>
Cerebrovascular diseases				684	79	0.84 (0.67, 1.07)

associated with deaths of liver and pancreatic cancers, and negatively with stomach cancer and ischemic heart disease (HR=1.36, 1.46, 0.81 and 0.79, respectively). In women, it was positively associated with deaths of stomach cancer and multiple myeloma (HR=1.50 and 2.29, respectively). It also showed weak positive associations with deaths of non-Hodgkin's lymphoma and all cancers in men, and of all causes in women.

#### History of surgical operations

In men, a history of any operation increased risks of mortality from liver, prostate, urinary tract cancers, ischemic heart disease and apoplexy (HR= 1.72, 1.51, 2.09, 1.22 and 1.20, respectively), and in women of liver, lung and breast cancers (HR= 1.84, 1.42 and 1.66, respectively). It showed positive associations with deaths of all causes and all cancers in both genders, and weak positive ones with pancreatic cancer in men and renal cancer in women.

A history of surgical operations on the stomach was positively associated with deaths of stomach cancer (HR=1.72 in men and 3.41 in women), apoplexy (HR=1.50 in men and 1.46 in women), liver cancer in men (HR=2.32), and lung cancer in women (HR=2.08). It showed positive associations with deaths of all causes and all cancers in both genders, and a weak positive one with deaths of urinary tract cancer in women.

A history of cholecystectomy was positively associated with deaths of liver cancer (HR=2.18 in men and 2.67 in women) in both genders, and of breast cancer (HR=3.03) and colon cancer (weak) in women. It also showed positive associations with deaths of all causes and all cancers in both genders.

A history of uterine surgery was positively associated with deaths of rectal (HR=2.13), liver (HR=1.64) and all cancers. It also showed weak associations with deaths of breast cancer and ischemic heart diseases.

A history of appendectomy showed a positive

**Table 2. Continued. Associations between Past Histories and Mortality**

<b>Appendectomy</b>								
All causes	5380	1243	0.90	(0.84, 0.96)**	3664	927	1.02	(0.94, 1.09)
All cancers	2005	493	0.92	(0.83, 1.02) <sup>+</sup>	1145	352	1.07	(0.95, 1.21)
Esophagus	97	17	0.60	(0.35, 1.02) <sup>+</sup>	16	4	0.97	(0.31, 3.08)
Stomach	416	91	0.83	(0.66, 1.05)	210	45	0.80	(0.57, 1.11)
Colon	123	23	0.71	(0.45, 1.12)	116	42	1.32	(0.91, 1.91)
Rectum	78	25	1.23	(0.78, 1.94)	55	8	0.41	(0.19, 0.89)*
Liver	181	64	1.09	(0.80, 1.48)	93	45	1.48	(1.02, 2.14)*
Gallbladder	35	7	0.86	(0.38, 1.94)	50	9	0.61	(0.29, 1.28)
Pancreas	115	32	1.04	(0.70, 1.57)	112	37	1.22	(0.83, 1.80)
Lung	491	99	0.79	(0.63, 0.98)*	116	54	1.61	(1.15, 2.27)**
Breast					49	17	1.00	(0.57, 1.75)
Cervix uteri					21	2	0.30	(0.07, 1.29)
Prostate	80	22	1.17	(0.72, 1.90)				
Kidney	23	9	1.57	(0.71, 3.47)	11	4	1.69	(0.52, 5.42)
Urinary tract	45	16	1.40	(0.77, 2.55)	14	5	1.98	(0.69, 5.62)
Non-Hodgkin's lymphoma	43	14	1.26	(0.68, 2.34)	31	10	1.04	(0.50, 2.19)
Multiple myeloma	23	6	1.02	(0.41, 2.54)	26	4	0.60	(0.21, 1.74)
Myeloid leukaemia	26	7	0.79	(0.32, 1.97)	13	5	1.39	(0.48, 4.04)
Ischaemic heart diseases	344	80	0.95	(0.74, 1.22)	266	42	0.74	(0.53, 1.03) <sup>+</sup>
Cerebrovascular diseases	735	173	0.97	(0.82, 1.15)	630	133	0.91	(0.75, 1.10)
<b>Blood transfusion</b>								
All causes	6475	1372	1.60	(1.51, 1.70)**	4587	867	1.49	(1.39, 1.61)**
All cancers	2578	491	1.49	(1.35, 1.64)**	1510	311	1.64	(1.45, 1.85)**
Esophagus	104	21	1.76	(1.10, 2.83)*	16	4	2.27	(0.75, 6.84)
Stomach	554	72	1.01	(0.79, 1.30)	247	54	1.79	(1.33, 2.41)**
Colon	150	25	1.31	(0.85, 2.01)	154	25	1.30	(0.85, 1.98)
Rectum	118	15	1.08	(0.63, 1.85)	57	10	1.36	(0.69, 2.66)
Liver	241	114	3.63	(2.89, 4.56)**	128	56	3.25	(2.37, 4.47)**
Gallbladder	48	7	1.01	(0.45, 2.25)	59	10	1.41	(0.72, 2.77)
Pancreas	150	24	1.25	(0.81, 1.92)	160	20	1.00	(0.63, 1.60)
Lung	634	83	1.02	(0.81, 1.29)	175	33	1.55	(1.07, 2.25)*
Breast					70	10	1.11	(0.57, 2.17)
Cervix uteri					24	6	1.98	(0.81, 4.87)
Prostate	102	25	1.71	(1.10, 2.66)*				
Kidney	25	7	2.13	(0.91, 4.98) <sup>+</sup>	10	3	2.36	(0.65, 8.61)
Urinary tract	51	18	2.67	(1.55, 4.60)**	23	7	2.31	(0.99, 5.41) <sup>+</sup>
Non-Hodgkin's lymphoma	62	12	1.49	(0.80, 2.79)	46	6	1.03	(0.44, 2.43)
Multiple myeloma	30	4	1.06	(0.37, 3.03)	32	5	1.20	(0.47, 3.09)
Myeloid leukaemia	33	4	1.11	(0.39, 3.17)	18	5	2.11	(0.78, 5.71)
Ischaemic heart diseases	401	85	1.62	(1.28, 2.05)**	296	49	1.32	(0.97, 1.79) <sup>+</sup>
Cerebrovascular diseases	844	177	1.56	(1.33, 1.84)**	757	126	1.32	(1.09, 1.59)**
<b>Tuberculosis</b>								
All causes	7005	1498	1.03	(0.97, 1.10)	5159	816	1.12	(1.03, 1.22)*
All cancers	2749	554	0.97	(0.88, 1.08)	1737	240	0.99	(0.85, 1.16)
Esophagus	110	22	1.26	(0.76, 2.10)	21	0	NA	
Stomach	560	108	0.91	(0.71, 1.15)	285	48	1.24	(0.86, 1.77)
Colon	154	36	1.33	(0.90, 1.99)	172	14	0.67	(0.37, 1.22)
Rectum	119	27	1.25	(0.78, 2.01)	63	11	1.36	(0.64, 2.87)
Liver	298	85	1.03	(0.79, 1.36)	157	33	1.21	(0.79, 1.85)
Gallbladder	51	8	0.67	(0.30, 1.51)	67	11	1.38	(0.66, 2.88)
Pancreas	155	32	1.12	(0.73, 1.72)	170	21	1.22	(0.73, 2.02)
Lung	649	110	0.85	(0.68, 1.06)	206	26	0.78	(0.49, 1.24)
Breast					84	4	0.23	(0.07, 0.78)*
Cervix uteri					30	3	0.74	(0.20, 2.71)
Prostate	118	28	0.98	(0.62, 1.56)				
Kidney	33	7	0.99	(0.41, 2.39)	15	0	NA	
Urinary tract	54	17	1.47	(0.79, 2.72)	33	3	0.40	(0.11, 1.42)
Non-Hodgkin's lymphoma	65	13	0.88	(0.44, 1.77)	48	5	0.81	(0.30, 2.21)
Multiple myeloma	36	7	0.84	(0.34, 2.05)	37	7	1.69	(0.68, 4.24)
Myeloid leukaemia	38	8	0.51	(0.15, 1.78)	24	3	0.93	(0.25, 3.49)
Ischaemic heart diseases	441	101	1.12	(0.88, 1.44)	307	57	1.23	(0.89, 1.71)
Cerebrovascular diseases	949	164	0.86	(0.71, 1.03) <sup>+</sup>	836	94	0.93	(0.73, 1.18)

#Adjusted for age, area of study. \*\* p<0.01, \* p<0.05, + p<0.10 NA: not applicable

**Table 2. Continued. Associations between Past Histories and Mortality**

Family history Cancer site/ disease	Male			Female		
	N for No	N for Yes	Hazard ratio <sup>#</sup> (95%CI)	N for No	N for Yes	Hazard ratio <sup>#</sup> (95%CI)
<b>Dysentery</b>						
All causes	7746	217	0.97 (0.85, 1.11)	5434	72	0.89 (0.71, 1.12)
All cancers	2919	82	1.00 (0.80, 1.24)	1778	25	0.92 (0.62, 1.36)
Esophagus	117	4	1.27 (0.47, 3.45)	19	0	NA
Stomach	583	14	0.89 (0.52, 1.52)	291	5	1.14 (0.47, 2.76)
Colon	177	3	0.55 (0.18, 1.74)	181	0	NA
Rectum	127	3	0.89 (0.28, 2.80)	66	1	1.06 (0.15, 7.66)
Liver	303	10	1.09 (0.58, 2.06)	166	1	0.37 (0.05, 2.62)
Gallbladder	48	2	1.52 (0.37, 6.31)	77	1	0.88 (0.12, 6.36)
Pancreas	169	6	1.29 (0.57, 2.91)	174	4	1.47 (0.54, 3.97)
Lung	699	18	0.93 (0.58, 1.49)	195	5	1.59 (0.65, 3.87)
Breast				76	1	0.88 (0.12, 6.34)
Cervix uteri				28	1	2.42 (0.32, 18.0)
Prostate	128	4	0.95 (0.35, 2.58)			
Kidney	33	3	3.31 (1.00, 11.0)*	18	0	NA
Urinary tract	66	0	N.A	27	1	2.51 (0.34, 18.7)
Non-Hodgkin's lymphoma	69	1	0.49 (0.07, 3.54)	54	0	NA
Multiple myeloma	35	1	1.00 (0.14, 7.32)	39	0	NA
Myeloid leukaemia	35	2	2.12 (0.50, 8.95)	26	0	NA
Ischaemic heart diseases	499	19	1.31 (0.83, 2.08)	346	4	0.74 (0.27, 1.98)
Cerebrovascular diseases	1041	25	0.82 (0.55, 1.22)	921	4	0.30 (0.11, 0.79)*
<b>Typhoid</b>						
All causes	7790	174	0.87 (0.75, 1.01) <sup>+</sup>	5427	81	0.87 (0.70, 1.08)
All cancers	2930	71	0.99 (0.78, 1.26)	1777	26	0.91 (0.61, 1.34)
Esophagus	119	2	0.77 (0.19, 3.15)	19	0	NA
Stomach	587	10	0.76 (0.40, 1.42)	292	4	0.80 (0.30, 2.15)
Colon	177	3	0.64 (0.20, 2.02)	180	1	0.34 (0.05, 2.45)
Rectum	128	2	0.73 (0.18, 2.98)	67	0	NA
Liver	302	11	1.35 (0.73, 2.50)	163	4	1.31 (0.48, 3.58)
Gallbladder	49	1	0.79 (0.11, 5.78)	77	1	0.86 (0.12, 6.26)
Pancreas	168	7	1.74 (0.81, 3.75)	176	2	0.68 (0.17, 2.77)
Lung	701	16	0.94 (0.57, 1.55)	198	2	0.58 (0.14, 2.33)
Breast				76	1	1.16 (0.16, 8.48)
Cervix uteri				29	0	NA
Prostate	130	2	0.46 (0.11, 1.85)			
Kidney	36	0	NA	18	0	NA
Urinary tract	63	3	1.82 (0.56, 5.90)	27	1	1.94 (0.26, 14.5)
Non-Hodgkin's lymphoma	70	0	NA	51	3	3.92 (1.19, 12.9)*
Multiple myeloma	35	1	1.38 (0.19, 10.2)	39	0	NA
Myeloid leukaemia	36	1	1.37 (0.18, 10.3)	26	0	NA
Ischaemic heart diseases	505	13	1.01 (0.58, 1.76)	344	6	0.94 (0.42, 2.11)
Cerebrovascular diseases	1044	22	0.78 (0.51, 1.20)	914	13	0.80 (0.46, 1.39)

association with deaths of liver (HR=1.48) cancer, and negative ones with rectal cancer (HR=0.41) in women and all causes deaths in men. With lung cancer, it was negatively linked in men (HR=0.79), while positively associated in women (HR=1.61). It also showed weak negative associations with deaths of esophageal cancer and all cancers in men, and of ischemic heart diseases in women.

#### History of blood transfusion

In both genders, a history of blood transfusion was positively associated with deaths of liver cancer (HR=3.63 in men and 3.25 in women), apoplexy (HR=1.56 and 1.32, respectively), all causes and all cancers. It was positively associated with deaths of esophageal, prostate and urinary tract cancers, ischemic heart diseases in men, where HRs were 1.76, 1.71, 2.67 and 1.62, respectively, and of stomach, lung and uterine cancers in women, where HRs

were 1.79, 1.55 and 1.98, respectively. It also showed weak positive associations with deaths of renal cancer in men, and of urinary tract cancer and ischemic heart diseases in women.

#### History of infectious diseases

A history of tuberculosis was negatively associated with deaths of breast cancer (HR=0.23), and positively with all causes in women. It further showed a weak negative association with deaths of apoplexy in men but not in women.

A history of dysentery showed a positive association with deaths of renal cancer in men (HR=3.31) and a negative one with apoplexy in women (HR=0.30). A history of typhoid showed a positive association with deaths of non-Hodgkin's lymphoma in women (HR=3.92) and a weak negative one with all causes in men. Pertussis was positively associated with deaths of renal cancer in

**Table 2. Continued. Associations between Past Histories and Mortality**

<b>Pertussis</b>								
All causes	7705	259	0.94	(0.83, 1.07)	5237	268	1.00	(0.88, 1.13)
All cancers	2908	93	0.86	(0.70, 1.06)	1712	91	0.95	(0.77, 1.18)
Esophagus	117	4	0.96	(0.35, 2.61)	19	0	N.A	
Stomach	584	13	0.62	(0.36, 1.08) <sup>+</sup>	277	19	1.27	(0.80, 2.04)
Colon	172	8	1.28	(0.63, 2.62)	169	12	1.33	(0.74, 2.41)
Rectum	129	1	0.21	(0.03, 1.49)	64	3	0.90	(0.28, 2.88)
Liver	302	11	0.82	(0.45, 1.50)	161	6	0.63	(0.28, 1.42)
Gallbladder	48	2	1.32	(0.32, 5.49)	74	4	0.93	(0.34, 2.56)
Pancreas	170	5	0.79	(0.32, 1.92)	171	7	0.75	(0.35, 1.61)
Lung	694	23	0.90	(0.59, 1.36)	193	7	0.61	(0.28, 1.29)
Breast					72	5	1.04	(0.42, 2.60)
Cervix uteri					24	5	3.07	(1.15, 8.17)*
Prostate	129	3	0.70	(0.22, 2.22)				
Kidney	31	5	3.84	(1.47, 10.0)**	17	1	1.21	(0.16, 9.17)
Urinary tract	64	2	0.84	(0.20, 3.45)	28	0	NA	
Non-Hodgkin's lymphoma	69	1	0.39	(0.05, 2.80)	53	1	0.31	(0.04, 2.26)
Multiple myeloma	35	1	0.83	(0.11, 6.10)	38	1	0.46	(0.06, 3.39)
Myeloid leukaemia	37	0	N.A		25	1	0.76	(0.10, 5.68)
Ischaemic heart diseases	494	24	1.33	(0.88, 2.01)	335	14	0.80	(0.47, 1.37)
Cerebrovascular diseases	1035	31	0.89	(0.62, 1.28)	889	37	0.86	(0.62, 1.20)
<b>Japanese encephalitis</b>								
All causes	7946	18	1.82	(1.14, 2.89)*	5502	6	0.62	(0.28, 1.38)
All cancers	2996	5	1.32	(0.55, 3.17)	1802	1	0.36	(0.05, 2.56)
Esophagus	121	0	NA		19	0	NA	
Stomach	596	1	1.34	(0.19, 9.53)	296	0	NA	
Colon	180	0	NA		181	0	NA	
Rectum	130	0			67	0	NA	
Liver	311	2	4.82	(1.20, 19.4)*	167	0	NA	
Gallbladder	50	0	NA		78	0	NA	
Pancreas	175	0	NA		178	0	NA	
Lung	716	1	1.10	(0.16, 7.82)	199	1	3.58	(0.50, 25.6)
Breast					77	0	NA	
Cervix uteri					29	0	NA	
Prostate	132	0	NA					
Kidney	36	0	NA		18	0	NA	
Urinary tract	66	0	NA		28	0	NA	
Non-Hodgkin's lymphoma	70	0	NA		54	0	NA	
Multiple myeloma	36	0	NA		39	0	NA	
Myeloid leukaemia	37	0	NA		26	0	NA	
Ischaemic heart diseases	517	1	1.47	(0.21, 10.4)	348	2	2.62	(0.65, 10.5)
Cerebrovascular diseases	1066	0	N.A		927	0	N.A	
<b>Polio</b>								
All causes	7939	25	1.12	(0.76, 1.66)	5493	15	0.98	(0.59, 1.63)
All cancers	2993	8	0.92	(0.46, 1.85)	1797	6	1.31	(0.59, 2.91)
Esophagus	121	0	NA		19	0	NA	
Stomach	594	3	1.80	(0.58, 5.59)	295	1	1.31	(0.18, 9.30)
Colon	180	0	NA		180	1	2.20	(0.31, 15.7)
Rectum	130	0	NA		67	0	NA	
Liver	312	1	0.94	(0.13, 6.73)	167	0	NA	
Gallbladder	50	0	NA		77	1	4.77	(0.66, 34.3)
Pancreas	174	1	1.97	(0.28, 14.1)	178	0	NA	
Lung	716	1	0.50	(0.07, 3.56)	199	1	2.11	(0.30, 15.0)
Breast					75	2	9.39	(2.30, 38.4)**
Cervix uteri					29	0	NA	
Prostate	132	0	NA					
Kidney	36	0	NA		18	0	NA	
Urinary tract	66	0	NA		28	0	NA	
Non-Hodgkin's lymphoma	69	1	4.93	(0.68, 35.6)	54	0	NA	
Multiple myeloma	36	0	NA		39	0	NA	
Myeloid leukaemia	37	0	NA		26	0	NA	
Ischaemic heart diseases	516	2	1.32	(0.33, 5.28)	346	4	3.45	(1.29, 9.26)*
Cerebrovascular diseases	1065	1	0.36	(0.05, 2.51)	925	1	0.38	(0.05, 2.66)

#Adjusted for age, area of study. \*\* p&lt;0.01, \* p&lt;0.05, + p&lt;0.10 NA: not applicable

**Table 2. Associations between Past Histories and Mortality, Continued**

Family history Cancer site/ disease	Male			Female		
	N for No	N for Yes	Hazard ratio <sup>#</sup> (95% CI)	N for No	N for Yes	Hazard ratio <sup>#</sup> (95% CI)
<b>Measles</b>						
All causes	3681	4001	0.91 (0.87, 0.95)**	2187	3142	0.95 (0.90, 1.00) <sup>+</sup>
All cancers	1376	1538	0.89 (0.83, 0.96)**	670	1089	0.97 (0.87, 1.07)
Esophagus	50	70	0.96 (0.67, 1.39)	7	10	NA
Stomach	280	306	0.88 (0.74, 1.03)	118	172	NA
Colon	81	99	0.95 (0.71, 1.28)	62	117	1.13 (0.82, 1.54)
Rectum	62	66	0.81 (0.57, 1.16)	29	38	0.70 (0.43, 1.14)
Liver	152	147	0.77 (0.61, 0.97)*	68	98	0.88 (0.64, 1.21)
Gallbladder	22	28	1.04 (0.59, 1.83)	23	50	1.34 (0.81, 2.23)
Pancreas	90	78	0.69 (0.51, 0.94)*	68	104	0.91 (0.66, 1.24)
Lung	320	369	0.94 (0.80, 1.09)	65	131	1.19 (0.88, 1.62)
Breast				28	49	0.82 (0.51, 1.31)
Cervix uteri				8	20	1.24 (0.54, 2.85)
Prostate	66	64	0.89 (0.63, 1.26)			
Kidney	18	16	0.68 (0.34, 1.36)	9	8	0.55 (0.21, 1.44)
Urinary tract	35	29	0.70 (0.43, 1.16)	11	17	1.01 (0.47, 2.17)
Non-Hodgkin's lymphoma	32	34	0.83 (0.51, 1.36)	22	30	0.78 (0.44, 1.37)
Multiple myeloma	13	21	1.16 (0.58, 2.35)	15	20	0.81 (0.40, 1.62)
Myeloid leukaemia	13	23	1.14 (0.57, 2.28)	10	16	0.93 (0.42, 2.09)
Ischaemic heart diseases	225	269	1.02 (0.85, 1.22)	152	188	0.94 (0.76, 1.18)
Cerebrovascular diseases	509	524	0.88 (0.78, 1.00) <sup>+</sup>	390	506	0.91 (0.79, 1.04)
<b>Mumps</b>						
All causes	6664	1019	0.89 (0.83, 0.95)**	4386	945	0.93 (0.86, 1.00)*
All cancers	2501	413	0.87 (0.78, 0.97)*	1393	365	0.97 (0.86, 1.09)
Esophagus	98	22	1.11 (0.69, 1.79)	16	1	0.30 (0.04, 2.33)
Stomach	500	86	0.93 (0.74, 1.18)	229	61	1.04 (0.78, 1.39)
Colon	152	28	0.97 (0.65, 1.47)	136	43	1.27 (0.89, 1.81)
Rectum	114	14	0.56 (0.32, 0.99)*	56	11	0.74 (0.38, 1.43)
Liver	263	36	0.61 (0.43, 0.87)**	133	33	0.91 (0.62, 1.35)
Gallbladder	44	6	0.82 (0.35, 1.96)	57	16	1.01 (0.57, 1.80)
Pancreas	146	22	0.82 (0.52, 1.29)	145	27	0.71 (0.47, 1.08)
Lung	593	95	0.86 (0.69, 1.08)	155	41	0.89 (0.63, 1.28)
Breast				55	22	1.07 (0.64, 1.79)
Cervix uteri				18	10	1.50 (0.67, 3.38)
Prostate	113	17	1.05 (0.62, 1.76)			
Kidney	27	7	1.30 (0.55, 3.06)	15	2	0.56 (0.13, 2.49)
Urinary tract	57	7	0.71 (0.32, 1.58)	25	3	0.52 (0.15, 1.74)
Non-Hodgkin's lymphoma	58	8	0.73 (0.34, 1.55)	40	12	0.93 (0.48, 1.82)
Multiple myeloma	29	5	0.84 (0.32, 2.20)	28	7	0.97 (0.41, 2.29)
Myeloid leukaemia	30	6	0.75 (0.30, 1.85)	21	5	0.96 (0.35, 2.63)
Ischaemic heart diseases	428	66	0.91 (0.70, 1.18)	281	58	1.02 (0.76, 1.36)
Cerebrovascular diseases	917	116	0.81 (0.67, 0.99)*	758	141	0.87 (0.72, 1.04)

<sup>#</sup>Adjusted for age, area of study. \*\* p<0.01, \* p<0.05, + p<0.10 NA: HR not calculated because of stratifying option in the SAS

men (HR=3.84) and of uterine cancer in women (HR=3.07). It showed a weak negative association with deaths of stomach cancer.

A history of Japanese encephalitis was positively associated with deaths of liver cancer (HR=4.82) and all causes in men. A history of polio was positively associated with deaths of breast cancer (HR=9.39) and ischemic heart disease (HR=3.45) in women. A history of measles showed negative associations with deaths of liver (HR=0.77), pancreatic (HR=0.69), all cancers and all causes in men, and weak negative ones with deaths of apoplexy in men and all causes in women. Furthermore, history of mumps was negatively associated with deaths of rectal (HR=0.56), liver cancers (HR=0.61), apoplexy (0.81) and all cancers in men and of all causes in both genders.

## Discussion

As studies to date, history of hypertension elevated risks of circulatory diseases and deaths of all causes, but not ones of all cancers. Its positive association with liver cancer was observed only in men, where alcohol consumption might be a confounder. The relationship with rectal cancer in women has already been reported (Watanabe et al., 2005).

History of diabetes mellitus elevated risks of circulatory disease, which is consistent with the studies to date. The history was associated with risks of liver, pancreatic and colon cancers. The association with liver cancer may be because damaged liver function, which is precancerous status of liver cancer, provokes glucose intolerance. The association with pancreatic cancer has

already been reported (Lin et al., 2002). The history also elevated risks of deaths of both all causes and all cancers.

Histories of apoplexy and myocardial infarction seem to be related with risks of only circulatory diseases, but not of cancers.

History of renal diseases elevated risk of liver cancer, which was consistent in both genders, but few studies to date have reported the association, and the mechanism is unclear. The relationship between the history and deaths of pancreatic cancer was observed in women, but few studies to date have referred to.

History of liver diseases strongly increased risk of liver cancer (Shibata et al., 2003), which is an established fact.

History of cholelithiasis or cholecystitis showed associations with risks of several cancers, but directions of the associations were different by gender. The history was not associated with risk of gallbladder cancer in this study (Yagyu et al, 2004; Yagyu et al, 2007).

History of peptic ulcer was positively related with liver cancer in men and the point estimate was larger than 1.0 in women. Through blood transfusion for bleeding or in surgical operation, history of peptic ulcer may elevate the risk of liver cancer. The history contained both gastric and duodenal ulcers, which may be one of the causes of the different direction of the association with stomach cancer by gender. Those with history of gastric ulcer have high risk and those with that of duodenal ulcer have low risk of stomach cancer (Take et al., 2005). The directions of associations with pancreatic cancer were different by gender and the observed associations do not seem consistent. Although the point estimates were toward the same directions, the positive association with multiple myeloma and the negative associations with ischemic heart diseases were not mentioned in the studies to date.

History of any surgical operations was positively associated with liver cancer in both genders, which may be through blood transfusion. History of stomach operation was positively associated with deaths of stomach cancer. More than 20 years ago, the patients were not told their real diagnosis in Japan, if the diseases were malignant ones. History of cholecystectomy showed a weak positive association with colon cancer in women, which may be because of the change in bile acid metabolism provoked by operation.

History of surgical operation on uterus and appendix showed associations with several diseases, but they did not seem to be consistent ones.

History of blood transfusion was positively associated with deaths of liver cancer and apoplexy in both genders. The association with liver cancer is because of hepatitis virus infection through transfusion. The association with apoplexy has already been reported using partial data of this study (Pham et al., 2007). History of blood transfusion also elevated risk of deaths of all causes and all cancers. A lot of studies to date have reported elevated risk of breast cancer among those with history of tuberculosis (John et al., 2007), but negative association was observed in the current study. History of polio markedly elevated risk of breast cancer, which was also reported in Denmark (Nielsen et al., 2003). History of dysentery and pertussis showed positive associations with urinary cancers

including renal cancer, and history of typhoid did positive one with non-Hodgkin's lymphoma, but few studies have referred to the associations so far. Histories of measles and mumps showed negative associations with mortality of several diseases. Measles were sometimes lethal when subjects were in their childhood, which may have exerted some selection effect on the subjects. Consequently, risks of liver and pancreatic cancers were lowered. Mumps is a disease with frequent inapparent infection, and those with apparent infection showed lower risks of several diseases including rectal, liver cancers and apoplexy.

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