
SECTION 3

Health Conditions and Mortality in the Japan Collaborative Cohort Study for Evaluation of Cancer (JACC)

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Abstract

General health conditions were examined for their influence on mortality in the Japan Collaborative Cohort. Constipation was found to be associated with total death and cerebrovascular disease (CVD). Increased risk was also the case for excessive sleeping and napping and elevated susceptibility to colds and expectoration. Eczema increased the risk of liver cancer. In contrast, exercise proved protective against all causes of death, some cancers, ischemic heart disease (IHD) and CVD. Spending a long time watching TV, as expected, had the opposite effect. A positive attitude towards screening was also linked with lower risk of most chronic diseases.

Key words: General health conditions - sleep - infection - exercise - screening - cancer - circulatory disease

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Introduction

General health conditions were surveyed in Japan Collaborative Cohort Study for Evaluation of Cancer Risk (JACC Study) for assessment of their influence on mortality.

Materials and Methods

The baseline survey included a questionnaire on health conditions within one year prior to entry concerning bowel movement, laxative use, sleep duration, daytime nap, susceptibility to colds, diarrhea, eczema and urticaria, expectoration, sports participation, and time of walking and watching TV. Additionally, participating and interest in health screening were also surveyed. Age- and study area-adjusted hazard ratios and 95% confidence intervals of major cause of death were calculated by sex to assess influence on mortality from different causes.

Results

Bowel movement (Table 1)

1) *Bowel movement*

There was no significant association between bowel movement (BM) and the risk of death from cancer of colon and rectum in both genders. An observed association between infrequent BM and gall bladder cancer can be explained by the role of secondary bile acids induced by infrequent BM. The subjects who had a BM less than once per 2-3 days had an increased risk of total death (HR = 1.28 for men and HR = 1.10 for women) compared with those who had a BM more than once per day. In men,

moreover, those who had less than once per 2-3 days had a increased risk of ischemic heart disease (IHD) (HR = 1.62) and cerebrovascular disease (CVD) (HR = 1.48) and had a decreased risk of cancer of all sites (HR = 0.87) and lung (HR = 0.69) compared with those who had a BM more than once per day.

2) *Diarrhea*

A tendency toward diarrhea was associated with increased risk of total death (HR = 1.13) and CVD (HR = 1.21) in men. In women, a low risk of death from cancer of all sites (HR = 0.77) was observed in those who had tendency toward diarrhea. The women who reported that tendency toward diarrhea was intermediate had a higher risk of all death (HR = 1.09), death from cancer of the esophagus (HR = 3.27), urothelial tract (HR = 3.03), and non-Hodgkin lymphoma (HR = 2.22).

3) *Laxative use*

The subjects who used laxatives for constipation had a higher risk of total death (HR = 1.47 for men and HR = 1.40 for women) and death from CVD (HR = 1.46 and HR = 1.63, respectively). In men, a higher risk of death from IHD (HR = 2.03) and prostate cancer (HR = 1.72) and a lower risk of death from esophageal cancer (HR = 0.24) were observed in those who used laxatives compared with in those who did not. In women, a higher risk of death from all cancers (HR = 1.21) was observed in those who used laxatives.

Sleep (Table 2)

1) *Sleep duration*

A sleep duration of 9 hours or more was associated with an increased risk of total death (HR = 1.32 for men and HR = 1.42 for women) and CVD (HR = 1.49 and HR

= 1.37, respectively) (Table 2). In men, sleep duration of 9 hours or more was associated with an increased risk of death from cancer of esophagus (HR = 1.83) and pancreas (HR = 1.46) and with a decreased risk of prostate cancer (HR = 0.54) compared with those who slept 7-8 hours. Those who slept less than 7 hours had a decreased risk of stomach cancer (HR = 0.80). In women, a sleep duration of 9 hours or more was associated with an increased risk of death from cancer of urothelial tract (HR = 2.38), non-Hodgkin lymphoma (HR = 2.13) and IHD (HR = 1.37) compared with those who slept 7-8 hours. Those who slept less than 7 hours had an increased risk of death from esophageal cancer (HR = 3.09) and also had decreased risks of lung cancer (HR = 0.71) and CVD (HR = 0.86).

2) Napping

The subjects who took a nap had an increased risk of total death (HR = 1.21 for men and HR = 1.34 for women) compared with those who did not. Increased risk of death from IHD (HR = 1.23 and HR = 1.42, respectively) and CVD (HR = 1.28 and HR = 1.50, respectively) were observed in those who took a nap. Additionally, in women, those who took a nap had an elevated risk of death from liver cancer (HR = 1.62).

Susceptibility to colds, eczema and urticaria, and expectoration (Table 3)

1) Susceptibility to colds

An increased total death (HR = 1.17 for men and HR = 1.16 for women) was observed in the subjects with susceptibility to colds compared with those without in both genders (Table 3). In women, there was also an increased risk of death from rectum cancer (HR = 1.95). The subjects who reported 'neither' in susceptibility to colds had a decreased risk of death from liver cancer in men (HR = 0.64) and from CVD in women (HR = 0.83).

2) Expectoration

Men who cough out phlegm almost every day had an increased risk of total death (HR = 1.53) and death from cancer of all sites (HR = 1.39), esophagus (HR = 2.16), pancreas (HR = 1.62), and lung (HR = 2.23), IHD (HR = 1.42), and CVD (HR = 1.21). In women, those who cough out phlegm almost every day also had an increased risk of total death (HR = 1.37) and death from esophageal cancer (HR = 5.16).

3) Susceptibility to eczema and urticaria

An increased risk of total death (HR = 1.11) was observed in men who often had outbreak of eczema or urticaria. The subjects who often had outbreak of eczema or urticaria had an increased risk of liver cancer (HR = 1.57 for men and HR = 1.69 for women). In women, a decreased risk of lung cancer (HR = 0.24) was also observed.

Sports and walking (Table 4)

1) Sports

Compared with men and women who reported 3 hours or more a week of sports or physical exercise, those who reported less than 1 hour a week had an increased risk of death from all causes (HR = 1.27 for men and HR = 1.23 for women) and from IHD (HR = 1.31 and HR = 1.63, respectively) and CVD (HR = 1.31 for men and HR =

1.33 for women). In men, those who reported less than 1 hour of sports or physical exercise had an increased risk of death from stomach cancer (HR = 1.26) and a decreased risk of death from colon cancer (HR = 0.67). Those who reported 1-2 hours a week of sports or physical exercise had an increased risk of gall bladder cancer (HR = 2.70).

2) Walking

In men, those who reported less than 1 hour a week had an increased risk of death from all causes (HR = 1.34) and death from liver cancer (HR = 1.43), multiple myeloma (HR = 2.29), IHD (HR = 1.43), and CVD (HR = 1.48) compared with men who reported 1 hour or more a day of walking. In women, those who reported less than 1 hour a day of walking had an increased risk of all deaths (HR = 1.39) and from cancer of all sites (HR = 1.22), liver (HR = 1.84) and breast (HR = 2.47), as well as CVD (HR = 1.43).

3) Sports in the schooltime

Women who played any sports for a short time in the school days had a decreased risk of total death (HR = 0.86) and death from CVD (HR = 0.77), compared with those who did not play. Those who played any sports in the schooltime had an increased risk of death of multiple myeloma (HR = 2.58).

Watching TV (Table 5)

Compared with men who spent less than 2 hours per day of watching TV, those who spent 4 hours or more a day of watching TV had an increased risk of death from all causes (HR = 1.27) and death from cancer of all sites (HR = 1.26) and liver (HR = 1.55), lung (HR = 1.27), IHD (HR = 1.51) and CVD (HR = 1.21). In women, those who spent 4 hours or more of watching TV had an increased risk of death of liver cancer (HR = 2.38) and non-Hodgkin lymphoma (HR = 3.17) compared to those who spent less than 2 hours of watching TV. Those who spent 2-4 hours of watching TV had a decreased risk of total death (HR = 0.92) and death from kidney cancer (HR = 0.14).

Health screening (Table 6)

1) Participating in health screening

The subjects who participated in screening for circulatory disease or adult diseases had a decreased risk of total death (HR = 0.89 for men and 0.83 for women) and death from cancer of all sites (HR = 0.89 and 0.83) and stomach (HR = 0.89 and 0.83) in both genders. Men who participated in screening for circulatory disease or adult diseases had a decreased risk of death from lung cancer (HR = 0.83) and had an increased risk of pancreas cancer (HR = 1.37). Women who participated in screening for circulatory disease or adult diseases had a decreased risk of death from IHD (HR = 0.80) and CVD (HR = 0.84). Decreased risk of all death (HR = 0.78 for men and HR = 0.67 for women) and death from CVD (HR = 0.64 and 0.55) were observed in the subjects who participated in medical examination in both genders. Men who participated in medical examination had a decreased risk of stomach cancer (HR = 0.64) and women had a decreased risk of cancer of all sites (HR = 0.71). Subjects who participated in chest X-ray examination had a decreased risk of total death (HR = 0.91 and 0.81) and from CVD (HR = 0.85

Table 1. Age-adjusted Hazard Ratios (HRs)[#] and 95% Confidence Intervals(95% CI) for Selected Causes of Death for Bowel Movement Frequency and Laxative Use

Disease ICD10	Stool frequency						Tendency toward diarrhea						Use of laxatives											
	More than once/d			Less than once/ 2-3 days			No			Intermediate			Yes			No			Yes					
	No	HR	95% CI	No	HR	95% CI	No	HR	95% CI	No	HR	95% CI	No	HR	95% CI	No	HR	95% CI	No	HR	95% CI			
Male/Observed Person-years	403,560						291,474						87,540						363,471					
All causes	6,563	1.00	1.28 (1.20, 1.36)**	1,179	1.00	1.178	1.00 (0.94, 1.07)	1,252	1.13 (1.06, 1.20)**	5,553	1.00	867	1.47 (1.36, 1.58)**											
All cancers	2,635	1.00	0.87 (0.77, 0.98)*	309	1.00	440	0.93 (0.84, 1.03)	468	1.01 (0.91, 1.12)	2,262	1.00	231	1.05 (0.91, 1.20)											
Esophagus	100	1.00	1.43 (0.87, 2.37)	18	1.00	18	0.91 (0.54, 1.52)	24	1.26 (0.79, 2.00)	101	1.00	2	0.24 (0.06, 0.99)*											
Stomach	509	1.00	0.88 (0.67, 1.15)	60	1.00	103	1.12 (0.90, 1.39)	78	0.88 (0.69, 1.12)	449	1.00	33	0.75 (0.53, 1.08)											
Colon	148	1.00	0.83 (0.50, 1.40)	16	1.00	25	0.87 (0.56, 1.34)	28	0.96 (0.63, 1.46)	135	1.00	17	1.39 (0.83, 2.32)											
Rectum	109	1.00	1.19 (0.70, 2.02)	16	1.00	16	0.78 (0.46, 1.34)	27	1.30 (0.84, 2.02)	98	1.00	8	0.97 (0.46, 2.00)											
Liver	276	1.00	0.79 (0.54, 1.16)	29	1.00	43	0.84 (0.60, 1.17)	46	0.80 (0.58, 1.10)	239	1.00	33	1.45 (1.00, 2.11)*											
Gall bladder	44	1.00	0.97 (0.41, 2.29)	6	1.00	6	0.69 (0.29, 1.64)	9	1.14 (0.55, 2.37)	39	1.00	3	0.75 (0.23, 2.46)											
Pancreas	152	1.00	1.00 (0.63, 1.59)	21	1.00	29	1.12 (0.74, 1.70)	24	0.93 (0.60, 1.46)	119	1.00	19	1.62 (0.99, 2.66)*											
Lung	654	1.00	0.69 (0.53, 0.90)**	63	1.00	94	0.86 (0.68, 1.07)	127	1.20 (0.99, 1.47)*	539	1.00	47	0.88 (0.65, 1.19)											
Prostate	107	1.00	1.24 (0.77, 2.01)	20	1.00	17	0.88 (0.52, 1.48)	16	0.91 (0.53, 1.55)	95	1.00	21	1.72 (1.06, 2.79)*											
Kidney	34	1.00	0.79 (0.28, 2.24)	4	1.00	7	1.13 (0.49, 2.65)	3	0.51 (0.15, 1.71)	28	1.00	2	0.60 (0.14, 2.55)											
Urothelial tract	69	1.00	0.58 (0.25, 1.33)	6	1.00	10	1.07 (0.53, 2.14)	14	1.61 (0.87, 2.97)	50	1.00	9	1.56 (0.76, 3.24)											
Non-Hodgkin lymphoma	62	1.00	1.10 (0.54, 2.22)	9	1.00	11	0.91 (0.47, 1.76)	7	0.64 (0.29, 1.42)	48	1.00	5	1.11 (0.44, 2.84)											
Multiple myeloma	32	1.00	0.48 (0.11, 2.01)	2	1.00	5	0.76 (0.29, 1.99)	6	0.97 (0.40, 2.38)	26	1.00	1	0.42 (0.06, 3.14)											
Myeloid leukaemia	33	1.00	0.49 (0.12, 2.03)	2	1.00	3	0.37 (0.11, 1.22)	6	0.76 (0.31, 1.86)	30	1.00	1	0.41 (0.06, 3.06)											
Ischaemic heart diseases	409	1.00	1.62 (1.29, 2.03)**	94	1.00	88	1.18 (0.93, 1.49)	75	1.04 (0.81, 1.34)	348	1.00	77	2.03 (1.58, 2.62)**											
Cerebrovascular diseases	857	1.00	1.48 (1.26, 1.74)**	182	1.00	136	0.90 (0.75, 1.08)	166	1.21 (1.02, 1.43)*	739	1.00	127	1.46 (1.20, 1.77)**											
Female/Observed Person-years	451,805						518,989						56,966						485,667					
All causes	3,750	1.00	1.10 (1.04, 1.16)**	1,622	1.00	599	1.09 (1.00, 1.19)*	426	0.99 (0.89, 1.09)	3,571	1.00	986	1.40 (1.31, 1.51)**											
All cancers	1,239	1.00	1.01 (0.91, 1.12)	497	1.00	215	1.15 (1.00, 1.33)*	115	0.77 (0.64, 0.93)**	1,210	1.00	269	1.21 (1.06, 1.39)**											
Esophagus	20	1.00	0.36 (0.11, 1.21)*	3	1.00	6	3.27 (1.23, 8.59)*	2	1.37 (0.31, 6.01)	16	1.00	5	1.72 (0.62, 4.76)											
Stomach	201	1.00	0.90 (0.63, 1.26)	90	1.00	23	0.70 (0.45, 1.07)*	17	0.65 (0.40, 1.07)*	201	1.00	38	1.00 (0.71, 1.42)											
Colon	120	1.00	1.13 (0.81, 1.56)	53	1.00	17	0.84 (0.51, 1.39)	9	0.58 (0.30, 1.14)	120	1.00	28	1.26 (0.83, 1.91)											
Rectum	51	1.00	0.77 (0.43, 1.38)	15	1.00	8	1.31 (0.62, 2.78)	7	1.46 (0.66, 3.23)	47	1.00	12	1.57 (0.83, 2.97)											
Liver	105	1.00	1.22 (0.87, 1.70)	51	1.00	11	0.62 (0.33, 1.14)	8	0.51 (0.25, 1.05)*	110	1.00	29	1.42 (0.93, 2.14)											
Gall bladder	51	1.00	1.19 (0.74, 1.93)	25	1.00	10	1.23 (0.63, 2.41)	4	0.62 (0.23, 1.71)	45	1.00	13	1.60 (0.85, 2.99)											
Pancreas	126	1.00	0.89 (0.63, 1.26)	44	1.00	26	1.46 (0.96, 2.22)*	12	0.83 (0.46, 1.50)	126	1.00	23	0.96 (0.62, 1.51)											
Lung	139	1.00	1.06 (0.78, 1.44)	60	1.00	20	0.86 (0.54, 1.37)	11	0.59 (0.32, 1.09)	143	1.00	31	1.18 (0.80, 1.75)											
Breast	59	1.00	0.64 (0.37, 1.12)	16	1.00	10	1.21 (0.62, 2.38)	4	0.60 (0.22, 1.64)	57	1.00	9	0.94 (0.46, 1.90)											
Cervix uteri	15	1.00	1.69 (0.77, 3.70)	11	1.00	5	1.75 (0.65, 4.71)	1	0.45 (0.06, 3.38)	19	1.00	4	1.20 (0.40, 3.55)											
Kidney	11	1.00	1.18 (0.41, 3.42)	5	1.00	2	1.24 (0.28, 5.55)	1	0.91 (0.12, 6.97)	7	1.00	4	3.24 (0.94, 11.2)											
Urothelial tract	21	1.00	0.49 (0.17, 1.44)	4	1.00	5	3.03 (1.07, 8.53)*	4	3.04 (1.00, 9.26)*	18	1.00	2	0.54 (0.13, 2.36)											
Non-Hodgkin lymphoma	31	1.00	1.52 (0.86, 2.67)	20	1.00	12	2.22 (1.15, 4.26)*	4	0.93 (0.33, 2.62)	38	1.00	9	1.36 (0.65, 2.85)											
Multiple myeloma	30	1.00	0.51 (0.21, 1.23)	6	1.00	5	1.41 (0.54, 3.69)	3	1.08 (0.33, 3.55)	24	1.00	6	1.34 (0.54, 3.31)											
Myeloid leukaemia	17	1.00	0.75 (0.28, 2.04)	5	1.00	5	2.04 (0.75, 5.54)	2	0.97 (0.23, 4.20)	18	1.00	4	1.10 (0.37, 3.30)											
Ischaemic heart diseases	238	1.00	1.18 (0.94, 1.47)	117	1.00	36	1.08 (0.76, 1.54)	27	1.01 (0.68, 1.49)	234	1.00	67	1.31 (0.99, 1.72)*											
Cerebrovascular diseases	622	1.00	1.13 (0.98, 1.30)*	275	1.00	92	1.01 (0.81, 1.26)	73	1.03 (0.81, 1.31)	567	1.00	190	1.63 (1.38, 1.93)*											

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

Table 2. Age-adjusted Hazard Ratios (HRs)[#] and 95% Confidence Intervals(95% CI) for Selected Causes of Death with Sleeping Duration and Napping

Disease	ICD10	Sleep duration						Taking a nap					
		Less than 7 hours		7-8 hours		More than 9 hours		No		Yes		HR (95% CI)	
		No	HR (95% CI)	No	HR	No	HR	No	HR	No	HR		
Male/Observed Person-years			103,674	388,581	61,681	295,551	165,456						
All causes		1,673	1.03 (0.97, 1.09)	6,001	1.00	1,967	1.32 (1.26, 1.40)**	4,091	1.00	3,890	1.00	1.21 (1.15, 1.26)**	
All cancers	C00-C97	641	0.96 (0.88, 1.05)	2,439	1.00	611	1.09 (1.00, 1.19) ⁺	1,700	1.00	1,339	1.00	1.05 (0.97, 1.13)	
Esophagus	C15	24	1.05 (0.66, 1.67)	88	1.00	32	1.83 (1.21, 2.76)**	72	1.00	54	1.00	0.92 (0.63, 1.34)	
Stomach	C16	108	0.80 (0.65, 0.99)*	505	1.00	130	1.09 (0.90, 1.33)	351	1.00	260	1.00	1.01 (0.85, 1.20)	
Colon	C18	34	0.86 (0.58, 1.26)	143	1.00	33	1.08 (0.73, 1.59)	104	1.00	75	1.00	0.96 (0.70, 1.31)	
Rectum	C19-C20	26	0.95 (0.61, 1.47)	104	1.00	24	1.12 (0.71, 1.76)	76	1.00	52	1.00	0.89 (0.61, 1.30)	
Liver	C22	87	1.04 (0.81, 1.32)	284	1.00	61	1.05 (0.79, 1.39)	177	1.00	145	1.00	1.23 (0.97, 1.55) ⁺	
Gall bladder	C23	13	0.98 (0.51, 1.86)	44	1.00	11	0.93 (0.48, 1.82)	29	1.00	26	1.00	1.03 (0.58, 1.81)	
Pancreas	C25	42	1.21 (0.85, 1.73)	125	1.00	43	1.46 (1.02, 2.08)*	93	1.00	77	1.00	1.11 (0.81, 1.53)	
Lung	C33-C34	156	1.01 (0.84, 1.21)	560	1.00	151	1.13 (0.94, 1.36)	400	1.00	317	1.00	1.03 (0.88, 1.20)	
Prostate	C61	28	0.93 (0.61, 1.42)	110	1.00	17	0.54 (0.32, 0.91)*	69	1.00	63	1.00	1.02 (0.71, 1.47)	
Kidney	C64	10	1.24 (0.59, 2.59)	28	1.00	7	1.12 (0.48, 2.59)	21	1.00	12	1.00	0.79 (0.38, 1.66)	
Urothelial tract	C65-C67	11	0.60 (0.31, 1.16)	63	1.00	16	0.93 (0.53, 1.63)	38	1.00	34	1.00	1.15 (0.70, 1.87)	
Non-Hodgkin lymphoma	C82-C85	19	1.18 (0.69, 2.01)	59	1.00	11	0.85 (0.44, 1.63)	40	1.00	30	1.00	1.00 (0.61, 1.66)	
Multiple myeloma	C90	9	1.14 (0.54, 2.43)	29	1.00	8	1.21 (0.54, 2.67)	22	1.00	15	1.00	0.96 (0.48, 1.92)	
Myeloid leukaemia	C92	5	0.58 (0.23, 1.50)	34	1.00	5	0.79 (0.30, 2.04)	22	1.00	15	1.00	1.14 (0.57, 2.28)	
Ischaemic heart diseases	I20-I25	111	1.03 (0.83, 1.27)	395	1.00	119	1.21 (0.98, 1.49) ⁺	268	1.00	248	1.00	1.23 (1.03, 1.48)*	
Cerebrovascular diseases	I60-I69	185	0.93 (0.79, 1.09)	756	1.00	301	1.49 (1.30, 1.70)**	498	1.00	555	1.00	1.28 (1.12, 1.45)**	
Female/Observed Person-years			227,447	500,227	51,717	466,194	189,912						
All causes		1,619	0.99 (0.94, 1.05)	3,874	1.00	1,155	1.42 (1.33, 1.52)**	3,097	1.00	2,399	1.00	1.34 (1.26, 1.41)**	
All cancers	C00-C97	548	0.94 (0.85, 1.04)	1,362	1.00	263	1.13 (0.99, 1.29) ⁺	1,157	1.00	655	1.00	1.08 (0.98, 1.20)	
Esophagus	C15	11	3.09 (1.27, 7.55)*	9	1.00	5	2.65 (0.86, 8.19) ⁺	15	1.00	6	1.00	0.60 (0.22, 1.69)	
Stomach	C16	83	0.87 (0.67, 1.12)	227	1.00	51	1.22 (0.89, 1.66)	196	1.00	106	1.00	0.96 (0.75, 1.24)	
Colon	C18	46	0.87 (0.61, 1.22)	127	1.00	28	1.17 (0.77, 1.78)	119	1.00	64	1.00	0.91 (0.66, 1.25)	
Rectum	C19-C20	21	0.93 (0.56, 1.56)	54	1.00	9	1.03 (0.50, 2.12)	48	1.00	23	1.00	0.74 (0.43, 1.25)	
Liver	C22	61	1.11 (0.81, 1.52)	123	1.00	28	1.34 (0.88, 2.05)	89	1.00	77	1.00	1.62 (1.17, 2.24)**	
Gall bladder	C23	26	1.02 (0.64, 1.64)	58	1.00	6	0.57 (0.24, 1.33)	49	1.00	28	1.00	1.28 (0.79, 2.08)	
Pancreas	C25	46	0.82 (0.58, 1.16)	132	1.00	23	0.95 (0.60, 1.49)	111	1.00	63	1.00	1.11 (0.80, 1.53)	
Lung	C33-C34	52	0.71 (0.52, 0.97)*	170	1.00	25	0.87 (0.57, 1.34)	138	1.00	68	1.00	1.02 (0.75, 1.38)	
Breast	C50	30	0.97 (0.63, 1.50)	67	1.00	4	0.57 (0.21, 1.59)	48	1.00	27	1.00	1.34 (0.82, 2.21)	
Cervix uteri	C53	8	1.02 (0.44, 2.37)	18	1.00	4	1.92 (0.62, 5.92)	15	1.00	10	1.00	1.84 (0.79, 4.26)	
Kidney	C64	5	1.79 (0.58, 5.52)	8	1.00	4	2.57 (0.74, 8.96)	9	1.00	8	1.00	1.64 (0.60, 4.46)	
Urothelial tract	C65-C67	11	1.29 (0.60, 2.77)	18	1.00	9	2.38 (1.04, 5.47)*	16	1.00	11	1.00	1.11 (0.50, 2.47)	
Non-Hodgkin lymphoma	C82-C85	17	1.08 (0.60, 1.95)	35	1.00	10	2.13 (1.02, 4.42)*	34	1.00	22	1.00	1.47 (0.84, 2.58)	
Multiple myeloma	C90	12	0.90 (0.46, 1.76)	31	1.00	4	0.70 (0.24, 2.02)	21	1.00	13	1.00	1.18 (0.57, 2.46)	
Myeloid leukaemia	C92	8	1.13 (0.48, 2.63)	17	1.00	6	2.27 (0.86, 6.01) ⁺	19	1.00	9	1.00	1.06 (0.46, 2.42)	
Ischaemic heart diseases	I20-I25	114	1.15 (0.91, 1.45)	225	1.00	78	1.39 (1.07, 1.81)*	185	1.00	158	1.00	1.42 (1.14, 1.77)**	
Cerebrovascular diseases	I60-I69	225	0.86 (0.73, 1.00)*	635	1.00	209	1.37 (1.16, 1.61)**	476	1.00	447	1.00	1.50 (1.31, 1.72)**	

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

Table 3. Age-adjusted Hazard Ratios (HRs)[#] and 95% Confidence Intervals(95% CI) for Selected Causes of Death for Susceptibility to Colds, Expectorator, Eczema and Urticaria

Disease/ICD10	Susceptibility to Cold			Neither			Susceptibility to Expectorator			Susceptibility to Eczema or Urticaria							
	No	Yes	No	N	HR	(95% CI)	N	HR	(95% CI)	N	HR	(95% CI)	N	HR	(95% CI)		
Male/Person-years	262,566	87,520	216,070	196,935	55,493	352,769	80,080	28,471									
All causes	4,498	1,784	1.17 (1.10, 1.23)**	1,753	0.96 (0.91, 1.01)	3,245	1.00	3,463	1.22 (1.21, 1.33)**	1,359	1.53 (1.44, 1.64)**	5,893	1.00	1,324	1.04 (0.98, 1.11)	548	1.11 (1.01, 1.21)*
All cancers C00-97	1,750	625	1.04 (0.95, 1.14)	677	0.93 (0.85, 1.02)	1,272	1.00	1,313	1.27 (1.12, 1.32)**	479	1.39 (1.25, 1.55)**	2,246	1.00	493	1.01 (0.91, 1.11)	214	1.13 (0.99, 1.31)*
Esophagus C15	77	1.00	21 (0.82, 0.51, 1.34)	29	0.88 (0.57, 1.35)	53	1.00	45	0.96 (0.64, 1.44)	29	2.16 (1.37, 3.40)**	103	1.00	17	0.76 (0.46, 1.28)	7	0.88 (0.41, 1.90)
Stomach C16	344	1.00	113 (0.99, 0.80, 1.22)	146	1.02 (0.84, 1.25)	289	1.00	239	0.97 (0.81, 1.15)	75	0.98 (0.76, 1.27)	458	1.00	88	0.88 (0.70, 1.11)	35	0.95 (0.67, 1.34)
Colon C18	102	1.00	27 (0.76, 0.49, 1.16)	49	1.14 (0.81, 1.61)	75	1.00	74	1.12 (0.81, 1.55)	29	1.40 (0.91, 2.16)	124	1.00	36	1.35 (0.92, 1.95)	11	1.04 (0.56, 1.94)
Rectum C19-20	79	1.00	19 (0.71, 0.43, 1.17)	33	1.02 (0.67, 1.54)	53	1.00	60	1.37 (0.93, 2.00)	20	1.44 (0.86, 2.41)	100	1.00	23	1.08 (0.68, 1.72)	7	0.84 (0.39, 1.82)
Liver C22	191	1.00	82 (1.19, 0.91, 1.54)	51	0.64 (0.46, 0.87)**	137	1.00	132	1.16 (0.90, 1.49)	47	1.18 (0.84, 1.64)	220	1.00	58	1.21 (0.90, 1.63)	33	1.57 (1.08, 2.27)*
Gall bladder C23	30	1.00	9 (0.91, 0.43, 1.93)	18	1.51 (0.83, 2.73)	31	1.00	19	0.70 (0.39, 1.26)	7	0.83 (0.37, 1.90)	45	1.00	7	0.73 (0.33, 1.62)	3	0.82 (0.26, 2.67)
Pancreas C25	101	1.00	32 (0.92, 0.62, 1.37)	40	0.97 (0.67, 1.41)	74	1.00	70	1.14 (0.82, 1.59)	33	1.62 (1.08, 2.46)**	123	1.00	27	1.02 (0.67, 1.55)	16	1.56 (0.93, 2.64)*
Lung C33-34	415	1.00	162 (1.16, 0.97, 1.39)	151	0.89 (0.73, 1.07)	242	1.00	354	1.76 (1.49, 2.08)**	145	2.23 (1.81, 2.74)**	531	1.00	114	0.97 (0.79, 1.19)	52	1.17 (0.88, 1.55)
Prostate C61	85	1.00	29 (1.00, 0.66, 1.53)	21	0.64 (0.39, 1.03)*	63	1.00	52	1.04 (0.71, 1.51)	17	0.92 (0.54, 1.58)	96	1.00	17	0.87 (0.52, 1.47)	12	1.39 (0.76, 2.54)
Kidney C64	19	1.00	6 (0.82, 0.33, 2.07)	9	1.03 (0.46, 2.28)	18	1.00	16	1.00 (0.50, 1.98)	1	0.21 (0.03, 1.55)	28	1.00	5	0.74 (0.28, 1.92)	2	0.79 (0.19, 3.35)
Urothelial tract C65-67	39	1.00	15 (1.11, 0.61, 2.02)	16	1.01 (0.56, 1.82)	31	1.00	30	1.18 (0.71, 1.97)	13	1.52 (0.79, 2.92)	50	1.00	15	1.39 (0.78, 2.50)	5	1.12 (0.45, 2.83)
Non-Hodgkin lymphoma	35	1.00	18 (1.47, 0.83, 2.61)	17	1.08 (0.61, 1.94)	39	1.00	26	0.71 (0.43, 1.17)	5	0.48 (0.19, 1.23)	55	1.00	10	0.78 (0.39, 1.53)	2	0.45 (0.11, 1.85)
Multiple myeloma C90	20	1.00	5 (0.71, 0.27, 1.90)	13	1.43 (0.71, 2.87)	17	1.00	20	1.24 (0.65, 2.38)	0	N.A	29	1.00	8	1.20 (0.55, 2.62)	1	0.46 (0.06, 3.37)
Myeloid leukaemia C92	25	1.00	8 (0.91, 0.41, 2.02)	5	0.42 (0.16, 1.09)	15	1.00	17	1.18 (0.59, 2.37)	5	1.30 (0.47, 3.59)	31	1.00	5	0.66 (0.26, 1.71)	2	0.78 (0.18, 3.27)
Myeloid leukaemia C92	286	1.00	114 (1.16, 0.93, 1.44)	125	1.07 (0.87, 1.33)	224	1.00	217	1.15 (0.95, 1.39)	87	1.42 (1.10, 1.82)**	395	1.00	70	0.82 (0.63, 1.05)	44	1.31 (0.95, 1.79)*
Ischaemic heart diseases	647	1.00	194 (0.89, 0.76, 1.04)	225	0.90 (0.76, 1.06)	452	1.00	451	1.23 (1.07, 1.40)**	152	1.21 (1.01, 1.46)*	789	1.00	171	1.05 (0.89, 1.24)	69	1.06 (0.83, 1.35)
Cerebrovascular diseases	365,386	144,491	162,492	162,492	464,216	169,950	26,243	497,333	117,480	41,397							
All causes	3,029	1,377	1.16 (1.09, 1.24)**	1,194	0.98 (0.92, 1.05)	3,721	1.00	1,402	1.06 (0.99, 1.12)*	335	1.37 (1.23, 1.54)**	4,202	1.00	828	0.98 (0.91, 1.06)	327	1.09 (0.97, 1.22)
All cancers C00-97	988	1.00	404 (1.02, 0.91, 1.14)	446	1.08 (0.97, 1.21)	1,258	1.00	473	1.03 (0.93, 1.15)	79	0.97 (0.77, 1.22)	1,395	1.00	285	0.95 (0.84, 1.09)	98	0.91 (0.74, 1.12)
Esophagus C15	11	1.00	7 (1.74, 0.67, 4.49)	5	1.22 (0.42, 3.57)	15	1.00	3	0.66 (0.19, 2.29)	4	5.16 (1.65, 16.1)**	22	1.00	1	0.23 (0.03, 1.72)	2	1.31 (0.30, 5.65)
Stomach C16	182	1.00	61 (0.84, 0.63, 1.13)	62	0.82 (0.61, 1.10)	213	1.00	71	0.92 (0.70, 1.21)	14	1.04 (0.60, 1.79)	235	1.00	43	0.85 (0.61, 1.18)	13	0.74 (0.42, 1.29)
Colon C18	95	1.00	51 (1.34, 0.95, 1.89)*	37	0.93 (0.63, 1.36)	122	1.00	53	1.18 (0.85, 1.64)	4	0.52 (0.19, 1.40)	142	1.00	27	0.89 (0.59, 1.36)	7	0.66 (0.31, 1.42)
Rectum C19-20	33	1.00	25 (1.95, 1.16, 3.30)*	10	0.75 (0.37, 1.53)	51	1.00	41	0.64 (0.33, 1.24)	4	1.28 (0.46, 3.59)	52	1.00	9	0.87 (0.43, 1.78)	6	1.56 (0.66, 3.67)
Liver C22	93	1.00	39 (1.03, 0.70, 1.52)	37	1.03 (0.71, 1.50)	127	1.00	41	0.93 (0.65, 1.35)	5	0.53 (0.21, 1.29)	123	1.00	24	0.94 (0.60, 1.46)	18	1.69 (1.02, 2.78)*
Gall bladder C23	46	1.00	12 (0.65, 0.34, 1.23)	22	1.11 (0.67, 1.86)	58	1.00	19	0.85 (0.51, 1.45)	3	0.79 (0.25, 2.53)	60	1.00	14	1.06 (0.59, 1.91)	5	1.09 (0.43, 2.73)
Pancreas C25	98	1.00	31 (0.79, 0.53, 1.18)	54	1.35 (0.96, 1.90)*	123	1.00	48	1.09 (0.77, 1.53)	5	0.61 (0.25, 1.49)	138	1.00	28	0.99 (0.65, 1.49)	9	0.87 (0.44, 1.71)
Lung C33-34	108	1.00	47 (1.03, 0.73, 1.46)	54	1.15 (0.82, 1.60)	131	1.00	62	1.25 (0.92, 1.71)	12	1.39 (0.77, 2.53)	155	1.00	37	1.03 (0.72, 1.49)	3	0.24 (0.08, 0.74)*
Breast C50	46	1.00	18 (1.00, 0.58, 1.73)	17	0.86 (0.49, 1.51)	54	1.00	21	1.11 (0.66, 1.86)	4	1.20 (0.43, 3.35)	60	1.00	15	1.14 (0.64, 2.03)	3	0.58 (0.18, 1.86)
Cervix uteri C53	15	1.00	6 (1.01, 0.39, 2.62)	6	0.86 (0.33, 2.24)	21	1.00	5	0.63 (0.24, 1.69)	1	0.84 (0.11, 6.36)	21	1.00	3	0.58 (0.17, 1.97)	1	0.57 (0.08, 4.27)
Kidney C64	10	1.00	1 (0.28, 0.04, 2.18)	5	1.14 (0.39, 3.35)	7	1.00	6	2.19 (0.73, 6.52)	1	2.66 (0.33, 21.76)	16	1.00	1	0.32 (0.04, 2.40)	0	N.A
Urothelial tract C65-67	16	1.00	3 (0.50, 0.15, 1.73)	5	0.78 (0.28, 2.16)	16	1.00	7	1.16 (0.47, 2.84)	3	2.70 (0.78, 9.40)	20	1.00	4	1.11 (0.37, 3.28)	2	1.57 (0.36, 6.80)
Non-Hodgkin lymphoma	28	1.00	14 (1.16, 0.61, 2.22)	15	1.17 (0.62, 2.20)	38	1.00	18	1.18 (0.67, 2.09)	2	0.82 (0.20, 3.44)	41	1.00	9	0.91 (0.44, 1.89)	4	1.19 (0.42, 3.35)
Multiple myeloma C90	18	1.00	9 (1.30, 0.58, 2.91)	9	1.26 (0.56, 2.84)	27	1.00	10	1.07 (0.51, 2.24)	1	0.57 (0.08, 4.21)	28	1.00	4	0.70 (0.24, 2.03)	4	1.91 (0.66, 5.52)
Myeloid leukaemia C92	13	1.00	4 (0.74, 0.24, 2.29)	10	1.83 (0.78, 4.27)	17	1.00	7	1.07 (0.44, 2.62)	2	1.62 (0.37, 7.10)	18	1.00	5	1.33 (0.48, 3.65)	3	2.09 (0.60, 7.25)
Ischaemic heart diseases	190	1.00	88 (1.21, 0.94, 1.56)	76	1.06 (0.81, 1.39)	230	1.00	91	1.19 (0.93, 1.52)	21	1.37 (0.87, 2.15)	260	1.00	51	1.03 (0.76, 1.40)	26	1.40 (0.93, 2.09)
Cerebrovascular diseases	556	1.00	200 (0.94, 0.80, 1.10)	182	0.83 (0.70, 0.99)**	643	1.00	212	0.93 (0.79, 1.09)	53	1.25 (0.94, 1.66)	704	1.00	133	0.98 (0.81, 1.19)	53	1.12 (0.84, 1.48)

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

Table 4. Age-adjusted Hazard Ratios (HRs)[#] and 95% Confidence Intervals(95% CI) for Selected Causes of Death with Sports Participation and Walking

Disease ICD10	Sports time (per week)						Walking time (per day)						Duration of sports in the schooltimes															
	>3 hours		1-2 hours		<1 hour		>1 hour		0.5-1 hour		<0.5 hours		Little		Only a short period		Yes											
	No	HR	No	HR	No	HR (95% CI)	No	HR	No	HR (95% CI)	No	HR (95% CI)	No	HR	No	HR (95% CI)	No	HR (95% CI)										
Male/Person-years	64,872	76,923	314,610	216,749	82,678	130,914	206,544	79,144	120,300																			
All causes	1,290	1.00	1,198	1.17 (1.08, 1.27)**	5,128	1.27 (1.19, 1.35)**	3,400	1.00	1,426	1.10 (1.04, 1.17)**	2,358	1.34 (1.27, 1.42)**	3,886	1.00	950	0.95 (0.88, 1.02)	1,589	1.00 (0.94, 1.06)										
All cancers C00-97	531	1.00	475	1.07 (0.95, 1.22)	1,932	1.07 (0.97, 1.18)	1,414	1.00	537	1.00 (0.91, 1.11)	805	1.07 (0.98, 1.17)	1,472	1.00	359	0.89 (0.79, 1.00) ⁺	660	1.06 (0.97, 1.17)										
Esophagus C15	18	1.00	21	1.32 (0.70, 2.50)	85	1.26 (0.75, 2.11)	60	1.00	24	1.09 (0.68, 1.76)	32	1.03 (0.67, 1.60)	65	1.00	19	0.94 (0.56, 1.60)	26	0.96 (0.60, 1.53)										
Stomach C16	93	1.00	90	1.22 (0.91, 1.63)	391	1.26 (1.00, 1.59)*	288	1.00	97	0.91 (0.72, 1.15)	168	1.14 (0.94, 1.38)	295	1.00	65	0.82 (0.62, 1.08)	122	0.98 (0.79, 1.22)										
Colon C18	40	1.00	40	1.11 (0.71, 1.72)	97	0.67 (0.46, 0.98)*	85	1.00	34	1.03 (0.69, 1.53)	46	0.96 (0.67, 1.38)	76	1.00	26	1.15 (0.73, 1.82)	47	1.40 (0.97, 2.04) ⁺										
Rectum C19-20	17	1.00	21	1.37 (0.72, 2.61)	89	1.39 (0.82, 2.35)	62	1.00	21	0.89 (0.54, 1.47)	34	1.01 (0.66, 1.54)	68	1.00	20	1.05 (0.63, 1.76)	24	0.76 (0.47, 1.21)										
Liver C22	47	1.00	55	1.27 (0.86, 1.88)	201	1.14 (0.83, 1.58)	127	1.00	44	0.87 (0.61, 1.22)	106	1.43 (1.10, 1.86)**	156	1.00	37	0.85 (0.59, 1.23)	82	1.11 (0.85, 1.46)										
Gall bladder C23	6	1.00	12	2.70 (1.01, 7.21)*	38	2.09 (0.87, 4.97) ⁺	23	1.00	9	1.05 (0.49, 2.29)	20	1.80 (0.98, 3.31) ⁺	29	1.00	9	1.22 (0.56, 2.67)	8	0.74 (0.34, 1.64)										
Pancreas C25	32	1.00	23	0.87 (0.51, 1.49)	115	1.03 (0.69, 1.53)	88	1.00	25	0.77 (0.49, 1.20)	50	1.09 (0.76, 1.55)	82	1.00	21	0.92 (0.56, 1.52)	39	1.10 (0.74, 1.62)										
Lung C33-34	147	1.00	90	0.77 (0.59, 1.00) ⁺	468	0.97 (0.80, 1.17)	346	1.00	143	1.09 (0.90, 1.33)	158	0.85 (0.71, 1.03)	335	1.00	81	0.90 (0.76, 1.15)	159	1.17 (0.96, 1.41)										
Prostate C61	25	1.00	21	1.13 (0.63, 2.02)	78	1.18 (0.74, 1.86)	66	1.00	26	0.96 (0.61, 1.52)	25	0.73 (0.46, 1.16)	66	1.00	14	0.96 (0.53, 1.72)	31	1.15 (0.75, 1.78)										
Kidney C64	6	1.00	5	1.02 (0.31, 3.38)	24	1.22 (0.49, 3.04)	12	1.00	10	2.18 (0.94, 5.08) ⁺	12	1.84 (0.82, 4.15)	17	1.00	5	0.99 (0.35, 2.80)	5	0.73 (0.26, 2.01)										
Urothelial tract C65-67	16	1.00	10	0.87 (0.39, 1.92)	41	0.93 (0.52, 1.69)	33	1.00	10	0.78 (0.38, 1.58)	24	1.39 (0.82, 2.37)	40	1.00	6	0.61 (0.26, 1.47)	13	0.81 (0.43, 1.53)										
Non-Hodgkin's C82-85	10	1.00	15	1.73 (0.77, 3.89)	38	1.11 (0.54, 2.25)	26	1.00	16	1.61 (0.86, 3.02)	19	1.38 (0.76, 2.51)	36	1.00	8	0.58 (0.28, 1.21)	9	0.69 (0.32, 1.52)										
Multiple myeloma C90	3	1.00	7	2.62 (0.67, 10.25)	25	2.41 (0.72, 8.07)	13	1.00	6	1.25 (0.48, 3.32)	16	2.29 (1.09, 4.81)*	19	1.00	5	0.89 (0.32, 2.46)	4	0.51 (0.17, 1.53)										
Myeloid leukaemia C92	8	1.00	6	0.74 (0.26, 2.17)	23	0.73 (0.32, 1.66)	22	1.00	6	0.70 (0.28, 1.73)	9	0.72 (0.33, 1.58)	16	1.00	5	0.96 (0.35, 2.66)	7	0.95 (0.38, 2.36)										
Ischaemic heart I20-25	82	1.00	80	1.23 (0.90, 1.67)	335	1.31 (1.02, 1.67)*	215	1.00	97	1.18 (0.93, 1.50)	161	1.43 (1.16, 1.76)**	240	1.00	73	1.21 (0.92, 1.58)	95	0.95 (0.75, 1.21)										
Cerebrovascular I60-69	182	1.00	143	1.05 (0.84, 1.31)	687	1.31 (1.11, 1.55)**	445	1.00	173	1.01 (0.85, 1.21)	325	1.48 (1.28, 1.71)**	533	1.00	130	1.02 (0.84, 1.24)	185	0.87 (0.73, 1.03)										
Female/Person-years	63,804	87,831	486,855	313,080	122,331	167,104	365,641	102,145	112,862																			
All causes	632	1.00	651	1.08 (0.97, 1.21)	3,861	1.23 (1.13, 1.34)**	2,272	1.00	1,027	1.13 (1.05, 1.22)**	1,625	1.39 (1.30, 1.49)**	3,284	1.00	515	0.86 (0.78, 0.94)**	622	0.95 (0.88, 1.04)										
All cancers C00-97	198	1.00	215	1.01 (0.84, 1.23)	1,302	1.16 (1.00, 1.35) ⁺	797	1.00	340	1.07 (0.95, 1.22)	504	1.22 (1.08, 1.36)**	1,074	1.00	219	0.97 (0.84, 1.13)	237	0.99 (0.86, 1.14)										
Esophagus C15	3	1.00	5	2.10 (0.49, 8.95)	15	1.08 (0.31, 3.79)	11	1.00	2	0.52 (0.11, 2.35)	8	1.74 (0.68, 4.43)	15	1.00	1	0.52 (0.07, 4.02)	4	1.74 (0.56, 5.38)										
Stomach C16	38	1.00	33	0.88 (0.55, 1.42)	206	1.03 (0.72, 1.46)	133	1.00	62	1.20 (0.89, 1.63)	82	1.24 (0.94, 1.64)	179	1.00	31	0.92 (0.62, 1.37)	47	1.29 (0.93, 1.79)										
Colon C18	21	1.00	20	0.96 (0.52, 1.77)	128	1.15 (0.72, 1.84)	75	1.00	43	1.45 (0.99, 2.11) ⁺	49	1.28 (0.88, 1.84)	108	1.00	28	1.23 (0.79, 1.92)	18	0.79 (0.48, 1.31)										
Rectum C19-20	6	1.00	11	1.68 (0.62, 4.57)	48	1.31 (0.56, 3.09)	34	1.00	15	1.14 (0.62, 2.11)	12	0.68 (0.34, 1.33)	37	1.00	10	1.17 (0.55, 2.50)	6	0.69 (0.29, 1.66)										
Liver C22	14	1.00	19	1.28 (0.64, 2.56)	129	1.57 (0.90, 2.73)	61	1.00	25	1.03 (0.65, 1.65)	57	1.84 (1.27, 2.66)**	92	1.00	19	1.08 (0.64, 1.81)	23	1.11 (0.69, 1.76)										
Gall bladder C23	8	1.00	7	0.81 (0.29, 2.25)	58	1.33 (0.63, 2.82)	40	1.00	16	0.98 (0.55, 1.76)	18	0.80 (0.45, 1.41)	47	1.00	12	1.14 (0.58, 2.23)	7	0.67 (0.30, 1.49)										
Pancreas C25	20	1.00	18	0.83 (0.44, 1.57)	129	1.15 (0.72, 1.86)	82	1.00	27	0.79 (0.51, 1.23)	51	1.13 (0.79, 1.61)	111	1.00	21	0.93 (0.57, 1.51)	20	0.81 (0.50, 1.31)										
Lung C33-34	20	1.00	29	1.34 (0.76, 2.39)	146	1.28 (0.80, 2.06)	99	1.00	37	0.92 (0.63, 1.35)	52	1.00 (0.71, 1.41)	122	1.00	24	0.97 (0.62, 1.52)	30	1.11 (0.74, 1.66)										
Breast C50	4	1.00	9	1.55 (0.47, 5.05)	64	2.00 (0.72, 5.51)	24	1.00	16	1.71 (0.91, 3.23) ⁺	31	2.47 (1.43, 4.25)**	44	1.00	14	1.13 (0.60, 2.13)	14	1.01 (0.55, 1.88)										
Cervix uteri C53	3	1.00	1	0.26 (0.03, 2.48)	23	1.09 (0.32, 3.68)	11	1.00	4	0.91 (0.29, 2.87)	10	1.84 (0.78, 4.37)	18	1.00	3	0.66 (0.19, 2.30)	4	0.79 (0.26, 2.38)										
Kidney C64	2	1.00	1	0.47 (0.04, 5.28)	13	1.27 (0.28, 5.70)	6	1.00	4	1.90 (0.50, 6.38)	7	2.49 (0.83, 7.48)	11	1.00	0	N.A.	1	0.44 (0.06, 3.45)										
Urothelial tract C65-67	3	1.00	2	0.61 (0.10, 3.66)	22	1.51 (0.45, 5.13)	11	1.00	9	1.90 (0.78, 4.60)	5	0.78 (0.27, 2.26)	17	1.00	2	0.69 (0.16, 3.02)	3	0.81 (0.24, 2.79)										
Non-Hodgkin's C82-85	7	1.00	8	1.04 (0.37, 2.89)	38	0.94 (0.41, 2.13)	23	1.00	13	1.39 (0.70, 2.75)	13	0.99 (0.49, 1.99)	33	1.00	5	0.55 (0.20, 1.45)	7	0.87 (0.38, 1.99)										
Multiple myeloma C90	4	1.00	5	1.11 (0.30, 4.18)	21	0.87 (0.30, 2.56)	13	1.00	6	1.15 (0.44, 3.05)	12	1.74 (0.78, 3.86)	17	1.00	1	0.26 (0.03, 2.07)	10	2.58 (1.16, 5.75)**										
Myeloid leukaemia C92	3	1.00	3	0.79 (0.16, 3.93)	19	1.12 (0.33, 3.84)	17	1.00	3	0.41 (0.12, 1.42)	6	0.59 (0.23, 1.52)	16	1.00	1	0.22 (0.03, 1.75)	3	0.72 (0.21, 2.52)										
Ischaemic heart I20-25	33	1.00	44	1.57 (1.00, 2.48) ⁺	245	1.63 (1.13, 2.35)**	147	1.00	70	1.17 (0.88, 1.56)	92	1.17 (0.90, 1.54)	194	1.00	33	0.97 (0.66, 1.45)	33	0.93 (0.64, 1.35)										
Cerebrovascular I60-69	103	1.00	113	1.22 (0.93, 1.60)	630	1.33 (1.08, 1.64)**	377	1.00	163	1.07 (0.89, 1.29)	281	1.43 (1.22, 1.67)**	553	1.00	72	0.77 (0.59, 0.99)*	97	0.94 (0.76, 1.17)										

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

Table 5. Age-adjusted Hazard Ratios (HRs)# and 95% Confidence Intervals(95% CI)for Selected Causes of Death with Watching TV

Observed person- /Male years / Female	Average hours spent watching TV per day						
	Less than 2 hours		2-4 hours		More than 4 hours		
	No	HR	No	HR (95%CI)	No	HR (95%CI)	
	ICD10						
		196,345		275,528		92,437	
		273,704		349,504		170,467	
Male							
All causes		3,332	1.00	4,230	1.06 (1.00, 1.12) ⁺	2,318	1.27 (1.19, 1.36)**
All cancers	C00-C97	1,277	1.00	1,700	1.15 (1.04, 1.27)**	810	1.26 (1.13, 1.41)**
Esophagus	C15	49	1.00	68	0.93 (0.59, 1.48)	33	1.17 (0.69, 1.98)
Stomach	C16	250	1.00	350	1.18 (0.95, 1.47)	144	1.13 (0.87, 1.45)
Colon	C18	61	1.00	101	1.20 (0.79, 1.82)	49	1.33 (0.83, 2.12)
Rectum	C19-C20	53	1.00	82	1.22 (0.77, 1.95)	28	1.06 (0.61, 1.86)
Liver	C22	184	1.00	160	1.02 (0.75, 1.39)	106	1.55 (1.12, 2.17)**
Gall bladder	C23	22	1.00	29	1.69 (0.73, 3.94)	17	2.09 (0.85, 5.16)
Pancreas	C25	74	1.00	103	1.09 (0.74, 1.60)	41	0.97 (0.62, 1.53)
Lung	C33-C34	291	1.00	397	1.12 (0.93, 1.37)	197	1.27 (1.02, 1.59)*
Prostate	C61	52	1.00	76	1.46 (0.88, 2.43)	40	1.45 (0.84, 2.52)
Kidney	C64	17	1.00	19	1.23 (0.53, 2.84)	9	1.32 (0.50, 3.48)
Urothelial tract	C65-C67	34	1.00	32	1.02 (0.54, 1.95)	27	1.79 (0.92, 3.50) ⁺
Non-Hodgkin lymphoma	C82-C85	35	1.00	41	1.10 (0.60, 2.01)	14	0.87 (0.41, 1.83)
Multiple myeloma	C90	21	1.00	20	0.76 (0.35, 1.67)	8	0.70 (0.27, 1.81)
Myeloid leukaemia	C92	13	1.00	21	1.32 (0.54, 3.23)	10	1.69 (0.62, 4.63)
Ischaemic heart diseases	I20-I25	206	1.00	262	1.07 (0.84, 1.35)	172	1.51 (1.17, 1.94)**
Cerebrovascular diseases	I60-I69	414	1.00	556	1.03 (0.87, 1.21)	309	1.21 (1.01, 1.45)*
Female							
All causes		2,344	1.00	2,577	0.92 (0.86, 0.99)*	1,913	1.05 (0.97, 1.14)
All cancers	C00-C97	755	1.00	860	0.94 (0.83, 1.07)	623	1.13 (0.99, 1.30) ⁺
Esophagus	C15	7	1.00	14	1.07 (0.39, 2.90)	6	0.75 (0.23, 2.46)
Stomach	C16	127	1.00	139	0.90 (0.66, 1.23)	101	1.08 (0.77, 1.50)
Colon	C18	61	1.00	86	1.01 (0.67, 1.51)	66	1.25 (0.81, 1.92)
Rectum	C19-C20	35	1.00	31	0.65 (0.36, 1.20)	18	0.69 (0.35, 1.37)
Liver	C22	68	1.00	79	1.57 (0.94, 2.63) ⁺	74	2.38 (1.41, 4.02)**
Gall bladder	C23	31	1.00	38	0.86 (0.48, 1.54)	22	0.81 (0.42, 1.55)
Pancreas	C25	65	1.00	80	0.85 (0.57, 1.28)	64	1.10 (0.72, 1.68)
Lung	C33-C34	86	1.00	106	1.12 (0.76, 1.65)	66	1.16 (0.76, 1.76)
Breast	C50	36	1.00	36	1.17 (0.62, 2.23)	26	1.72 (0.86, 3.41)
Cervix uteri	C53	14	1.00	12	0.71 (0.28, 1.80)	8	0.86 (0.30, 2.43)
Kidney	C64	8	1.00	3	0.14 (0.04, 0.55)**	7	0.53 (0.18, 1.54)
Urothelial tract	C65-C67	16	1.00	15	1.72 (0.51, 5.76)	8	1.39 (0.38, 5.15)
Non-Hodgkin's lymphoma	C82-C85	12	1.00	34	3.51 (1.34, 9.19)*	18	3.17 (1.14, 8.77)*
Multiple myeloma	C90	22	1.00	16	0.51 (0.24, 1.11) ⁺	10	0.51 (0.21, 1.22)
Myeloid leukemia	C92	8	1.00	15	2.02 (0.52, 7.83)	10	2.04 (0.50, 8.36)
Ischemic heart disease	I20-I25	154	1.00	157	1.01 (0.75, 1.35)	124	1.14 (0.84, 1.55)
Cerebrovascular disease	I60-I69	341	1.00	444	0.94 (0.79, 1.12)	306	0.95 (0.78, 1.15)

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

and 0.72) in both genders. Moreover, a decreased risk of death from cancer of all sites (HR = 0.88) and IHD (HR = 0.69) was noted in women with an increased risk of myeloid leukemia (HR = 2.38) in men. Participating in stomach cancer screening was associated with decreased risk of death from all causes (HR = 0.78 and 0.79) and cancer of all sites (HR = 0.78 and 0.80), stomach (HR = 0.60 and 0.76) and CVD (HR = 0.75 and 0.71). Moreover, decreased risk of death from stomach cancer (HR = 0.76) in men and liver cancer (HR = 0.70) and multiple myeloma (HR = 0.31) in women was apparent.

2) Interest in health screening

Low or no interest in health screening was associated with increased risk of death from all causes (HR = 1.30 for men and HR = 1.34 for women), cancer of all sites

(HR = 1.19 and 1.30) and stomach (HR = 1.58 and 1.65), as well as CVD (HR = 1.41 and 1.37). In women, there was a link with increased risk of death from breast cancer (HR = 2.57).

Discussion

Prolonged intestinal transit time might not only increase the duration of contact between carcinogens in the stools and the gut wall, but could also concentrate carcinogens by increasing colonic water absorption. In the present study, there was no significant association between bowel movement and the risk of death from cancer of colon and rectum in both genders. However, examination of incident cases in the JACC Study (Kojima

Table 6. Age-adjusted Hazard Ratios (HRs)[#] and 95% Confidence Intervals (95% CI) of Selected Causes of Death for Participation and Interest in Health Screening

Disease ICD10	Screening for circulatory disease				Medical examination				Chest X-ray				Screening for stomach cancer				Interest in health screening or adult diseases					
	No		Yes		No		Yes		No		Yes		No		High		Moderate		Low/No			
	No	HR	No	HR	No	HR	No	HR	No	HR	No	HR	No	HR	No	HR	No	HR	No	HR		
Male/Person-years	261,929		201,310		404,424		38,372		238,078		189,259		325,023		137,504		98,308		205,782		71,623	
All causes	4,687	1.00	3,434	0.89 (0.84,0.93)**	7,252	1.00	364	0.78 (0.70,0.86)**	4,160	1.00	3,274	0.91 (0.87,0.96)**	5,812	1.00	2,264	0.78 (0.75,0.83)**	1,657	1.00	3,212	1.02 (0.96,1.09)	1,329	1.30 (1.20,1.40)**
All cancers	1,792	1.00	1,351	0.89 (0.83,0.96)**	2,778	1.00	176	0.91 (0.78,1.06)	1,536	1.00	1,300	0.97 (0.90,1.01)	2,247	1.00	881	0.78 (0.72,0.84)**	646	1.00	1,249	1.00 (0.91,1.11)	477	1.19 (1.05,1.35)**
Esophagus	68	1.00	61	0.98 (0.68,1.42)	112	1.00	11	1.31 (0.70,2.45)	51	1.00	69	1.48 (0.99,2.21) ⁺	84	1.00	45	0.94 (0.64,1.38)	25	1.00	60	1.17 (0.72,1.92)	18	1.13 (0.60,2.14)
Stomach	381	1.00	235	0.71 (0.60,0.85)**	555	1.00	25	0.64 (0.42,0.95)*	305	1.00	250	0.90 (0.74,1.08)	468	1.00	143	0.60 (0.49,0.73)**	118	1.00	2,410	1.18 (1.03,1.49)	105	1.58 (1.18,2.10)**
Colon	108	1.00	79	0.93 (0.68,1.28)	167	1.00	12	1.00 (0.55,1.81)	95	1.00	74	1.01 (0.72,1.43)	133	1.00	53	0.83 (0.59,1.16)	34	1.00	81	1.21 (0.80,1.83)	31	1.47 (0.88,2.44)
Rectum	76	1.00	56	0.80 (0.54,1.18)	120	1.00	3	0.33 (0.11,1.06) ⁺	64	1.00	57	0.92 (0.61,1.39)	97	1.00	35	0.70 (0.46,1.05) ⁺	23	1.00	53	1.07 (0.65,1.78)	27	1.72 (0.96,3.05) ⁺
Liver	196	1.00	164	1.06 (0.85,1.33)	309	1.00	18	0.76 (0.47,1.23)	172	1.00	117	0.89 (0.68,1.16)	259	1.00	97	0.83 (0.65,1.06)	77	1.00	126	0.87 (0.64,1.16)	40	0.91 (0.61,1.36)
Gall bladder	31	1.00	24	0.84 (0.47,1.48)	50	1.00	2	0.68 (0.16,2.83)	27	1.00	23	0.87 (0.47,1.61)	39	1.00	16	0.69 (0.38,1.27)	9	1.00	22	1.17 (0.52,2.60)	10	1.71 (0.67,4.37)
Pancreas	87	1.00	95	1.37 (1.00,1.88)*	154	1.00	12	1.16 (0.64,2.10)	91	1.00	75	0.92 (0.66,1.30)	124	1.00	56	0.87 (0.63,1.22)	37	1.00	68	0.89 (0.59,1.35)	23	0.91 (0.53,1.57)
Lung	419	1.00	316	0.83 (0.71,0.97)*	646	1.00	44	1.02 (0.75,1.39)	344	1.00	342	1.09 (0.93,1.29)	529	1.00	207	0.72 (0.61,0.85)**	153	1.00	294	1.00 (0.81,1.23)	110	1.16 (0.89,1.50)
Prostate	81	1.00	54	0.87 (0.60,1.28)	117	1.00	7	1.17 (0.54,2.54)	64	1.00	57	1.17 (0.78,1.75)	93	1.00	40	0.93 (0.63,1.37)	38	1.00	49	0.70 (0.45,1.09)	15	0.68 (0.37,1.26)
Kidney	29	1.00	11	0.52 (0.25,1.08) ⁺	36	1.00	3	1.11 (0.34,3.64)	22	1.00	13	0.89 (0.42,1.86)	26	1.00	13	1.26 (0.63,2.52)	6	1.00	15	1.04 (0.40,2.69)	7	1.33 (0.44,4.04)
Urothelial tract	44	1.00	27	0.76 (0.45,1.27)	65	1.00	3	0.77 (0.24,2.46)	42	1.00	26	0.76 (0.44,1.33)	52	1.00	19	0.77 (0.44,1.33)	15	1.00	35	1.27 (0.66,2.43)	10	1.08 (0.46,2.52)
Non-Hodgkin's	44	1.00	30	0.91 (0.55,1.50)	66	1.00	7	1.45 (0.66,3.22)	39	1.00	27	0.96 (0.56,1.65)	47	1.00	27	1.33 (0.81,2.19)	14	1.00	36	1.20 (0.64,2.27)	8	0.81 (0.33,1.96)
Multiple myeloma	21	1.00	15	1.02 (0.50,2.09)	35	1.00	1	0.40 (0.05,2.93)	17	1.00	15	1.32 (0.61,2.82)	21	1.00	15	1.71 (0.84,3.49)	8	1.00	18	0.96 (0.42,2.22)	3	0.46 (0.12,1.76)
Myeloid leukaemia	16	1.00	20	1.88 (0.91,3.89) ⁺	33	1.00	3	1.13 (0.34,3.74)	13	1.00	21	2.38 (1.10,5.15)*	26	1.00	10	0.94 (0.44,2.04)	10	1.00	16	0.75 (0.33,1.73)	7	0.97 (0.35,2.67)
Ischaemic heart	293	1.00	219	0.94 (0.77,1.13)	448	1.00	28	0.96 (0.65,1.42)	288	1.00	194	0.82 (0.67,1.01) ⁺	367	1.00	145	0.84 (0.69,1.03) ⁺	107	1.00	215	1.16 (0.90,1.49)	81	1.32 (0.97,1.80) ⁺
Cerebrovascula	615	1.00	461	0.93 (0.82,1.06)	963	1.00	37	0.64 (0.46,0.89)**	580	1.00	428	0.85 (0.74,0.98)*	786	1.00	290	0.75 (0.65,0.86)**	207	1.00	442	1.13 (0.95,1.35)	185	1.41 (1.15,1.74)**
Female/Person-years	375,250		293,444		613,599		22,907		316,180		305,091		446,439		220,650		145,264		308,779		84,457	
All causes	3,454	1.00	2,228	0.83 (0.78,0.88)**	5,286	1.00	96	0.67 (0.55,0.82)**	3,045	1.00	2,163	0.81 (0.76,0.86)**	4,156	1.00	1,497	0.79 (0.74,0.84)**	1,073	1.00	2,299	1.08 (1.00,1.16) ⁺	919	1.34 (1.22,1.47)**
All cancers	1,108	1.00	745	0.85 (0.76,0.94)**	1,722	1.00	37	0.71 (0.51,0.98)*	939	1.00	759	0.88 (0.79,0.98)*	1,325	1.00	523	0.80 (0.72,0.89)**	354	1.00	797	1.16 (1.01,1.32)*	261	1.30 (1.10,1.55)**
Esophagus	13	1.00	10	0.92 (0.38,2.22)	20	1.00	1	2.27 (0.30,17.21)	11	1.00	11	0.90 (0.36,2.27)	13	1.00	10	1.56 (0.65,3.70)	4	1.00	9	1.35 (0.37,4.97)	3	1.34 (0.25,7.04)
Stomach	181	1.00	119	0.76 (0.59,0.98)*	281	1.00	5	0.65 (0.27,1.59)	148	1.00	134	0.92 (0.70,1.20)	216	1.00	83	0.76 (0.58,0.99)*	55	1.00	132	1.35 (0.96,1.91) ⁺	47	1.65 (1.08,2.51)*
Colon	120	1.00	68	0.70 (0.51,0.96)*	177	1.00	5	0.94 (0.38,2.29)	101	1.00	80	0.83 (0.59,1.15)	130	1.00	59	0.89 (0.63,1.22)	37	1.00	90	1.26 (0.84,1.89)	26	1.18 (0.69,2.02)
Rectum	47	1.00	26	0.61 (0.36,1.03) ⁺	67	1.00	1	0.45 (0.06,3.24)	41	1.00	27	0.63 (0.36,1.09) ⁺	53	1.00	21	0.74 (0.44,1.26)	16	1.00	27	0.76 (0.40,1.44)	13	1.27 (0.59,2.74)
Liver	106	1.00	77	0.88 (0.64,1.22)	162	1.00	3	0.61 (0.20,1.93)	88	1.00	71	0.90 (0.63,1.29)	134	1.00	50	0.70 (0.50,0.99)*	26	1.00	74	1.42 (0.89,2.26)	21	1.50 (0.82,2.73)
Gall bladder	43	1.00	32	1.00 (0.61,1.66)	69	1.00	2	0.90 (0.22,3.69)	31	1.00	38	1.68 (0.98,2.87) ⁺	53	1.00	21	0.93 (0.55,1.59)	12	1.00	38	2.22 (1.06,4.68)*	10	1.98 (0.77,5.08)
Pancreas	112	1.00	71	0.91 (0.66,1.26)	168	1.00	5	0.95 (0.39,2.32)	98	1.00	76	0.98 (0.69,1.38)	122	1.00	60	1.16 (0.83,1.61)	36	1.00	75	1.11 (0.73,1.70)	34	1.65 (1.00,2.72) ⁺
Lung	119	1.00	96	1.09 (0.82,1.46)	202	1.00	5	0.85 (0.35,2.07)	102	1.00	93	1.01 (0.73,1.40)	149	1.00	64	0.85 (0.62,1.16)	52	1.00	98	1.04 (0.73,1.50)	15	0.58 (0.32,1.06) ⁺
Breast	50	1.00	32	0.76 (0.46,1.24)	75	1.00	2	0.66 (0.16,2.71)	36	1.00	34	1.09 (0.64,1.85)	62	1.00	21	0.75 (0.44,1.26)	8	1.00	39	2.02 (0.92,4.46) ⁺	15	2.57 (1.05,6.28)*
Cervix uteri	19	1.00	11	0.78 (0.35,1.75)	29	1.00	0	NA	18	1.00	8	0.43 (0.16,1.11) ⁺	25	1.00	4	0.37 (0.13,1.11) ⁺	5	1.00	11	1.00 (0.33,3.10)	6	1.78 (0.50,6.38)
Kidney	5	1.00	8	2.47 (0.76,8.05)	13	1.00	0	NA	9	1.00	4	1.09 (0.31,3.78)	9	1.00	4	1.09 (0.31,3.78)	3	1.00	6	0.75 (0.19,3.01)	2	0.71 (0.12,4.30)
Urothelial tract	20	1.00	12	0.82 (0.37,1.80)	31	1.00	0	NA	15	1.00	10	1.00 (0.40,2.49)	27	1.00	5	0.53 (0.20,1.42)	4	1.00	8	0.99 (0.28,3.42)	7	2.44 (0.66,8.99)
Non-Hodgkin's	32	1.00	19	0.75 (0.41,1.40)	50	1.00	0	NA	30	1.00	19	0.61 (0.32,1.15)	34	1.00	18	0.93 (0.50,1.70)	8	1.00	28	1.84 (0.81,4.20)	8	2.14 (0.76,6.05)
Multiple myeloma	19	1.00	17	1.20 (0.59,2.43)	33	1.00	0	NA	20	1.00	13	0.77 (0.33,1.62)	31	1.00	5	0.31 (0.12,0.82)*	6	1.00	12	0.99 (0.35,2.78)	6	1.68 (0.51,5.57)
Myeloid leukaemia	14	1.00	10	1.17 (0.48,2.83)	22	1.00	1	1.43 (0.19,10.81)	13	1.00	9	1.07 (0.41,2.81)	18	1.00	6	0.86 (0.33,2.21)	8	1.00	7	0.51 (0.17,1.50)	5	1.24 (0.37,4.16)
Ischaemic heart	240	1.00	141	0.80 (0.64,1.00)*	346	1.00	11	1.30 (0.71,2.37)	226	1.00	122	0.69 (0.54,0.88)**	290	1.00	89	0.79 (0.61,1.01) ⁺	74	1.00	139	0.94 (0.70,1.27)	59	1.05 (0.73,1.52)
Cerebrovascular	566	1.00	358	0.84 (0.73,0.97)*	857	1.00	12	0.55 (0.31,0.97)**	540	1.00	328	0.72 (0.61,0.85)**	702	1.00	213	0.71 (0.61,0.84)**	173	1.00	380	1.08 (0.89,1.30)	168	1.37 (1.10,1.72)**

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

et al, 2004) showed infrequent BMs to be associated with increased risk of colorectal cancer. Constipation was further found to be linked to risk of death from gall bladder cancer (Yagyu et al., 2004). The JACC Study Group has showed that a tendency toward diarrhea was inversely associated with the risk of gall bladder cancer death (Yagyu et al., 2004).

Longer sleeping durations was associated with the risk of total death and mortality from several causes (Tamakoshi et al., 2004). The mechanism underlying this association is not clear. Sleep duration is influenced by various factors including lifestyle and physical and psychological conditions and our findings would not necessarily indicate that changing sleep duration positively toward 7 hours would be likely to reduce the mortality risk.

The subjects with susceptibility to cold and eczema and urticaria had increased risk of death from several causes. The immune system plays an important part in susceptibility to colds and allergic conditions. Smoking also can irritate the airways and increase expectoration as well as susceptibility to colds. There have been few prospective studies of the association between allergic disorders and cancer. Susceptibility to colds, eczema and urticaria, and expectoration are affected by various factors including smoking, the results of these associations of mortality may require those considerations.

Beneficial effects of physical activity were observed. The JACC Study Group has reported that walking and sports participation might reduce the risk of mortality from IHD and CVD (Noda et al., 2005). The JACC Study Group also reported that measuring physical activity level with these single-item questions used by the JACC Study may be appropriate for establishing baseline data that reflects long-term physical activity in a large-scale cohort study targeting lifestyle-related diseases (Iwai et al., 2001).

Health screening plays an important role in early detection of disease and prevention of disease. From the results of the present study, there were significantly lower risks of death from several causes among the subjects who participated in screening or the subjects with high interests in health screening. The JACC Study Group has reported that a reduction in risk of death from stomach cancer and other causes was associated with screening participation in screening for stomach cancer (Mizoue et al, 2003). The participation in screening was associated with the decreased risk of other causes that were not aimed diseases. This association might be the results of not only the effect of screening but the behavioral characteristics of the screening participants. The JACC Study Group also reported that increased risk for IHD and all-cause mortality was observed in men and women with low interest and women with no participation in health screening (Ikeda et al, 2005).

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