

## SECTION 4

## Nutrition and Disease in the Japan Collaborative Cohort Study for Evaluation of Cancer (JACC)

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### Abstract

**Nutrition effects on mortality in the Japan Collaborative Cohort Study (JACC Study) were investigated using interview and follow up. Multivitamin and vitamin E use was found to be associated with lower mortality from cerebrovascular disease (CVD). For all causes, CVD and ischemic heart disease (IHD), total energy intake and cutting breakfast were associated with elevated, while rice intake, fruit, sweets, tofu, pickles, dried fish, deep-fried foods, tea and coffee and seaweed were generally linked with lowered mortality. Consistent across the sexes, protection was evident against lung cancer with seaweed, prostate cancer with fresh fish, and liver cancer with pork and rice intake. Positive associations were found between potato consumption and colon cancer, as well as for fat intake and liver cancer. Clearly, the diet has a major impact on chronic disease processes in the Japanese population.**

**Keywords:** Nutrition - dietary factors - cancer - cardiovascular disease - ischemic heart disease

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### Introduction

We investigated systematically the relationships of food and supplements with risk of mortality from total cancer, cancers of esophagus, stomach, colon, rectum, liver, gall bladder, pancreas, lung, breast, cervical uterus, prostate, kidney and urinary-tract, Hodgkin/non-Hodgkin lymphoma, multiple myeloma, leukemia, and ischemic heart disease and cerebrovascular disease. We did not present the data on associations between nutrient intakes and disease and some of them were reported elsewhere (Wakai et al, 2005).

We focused the findings of sex-specific, age-adjusted relative risks of statistical significance or borderline significance. Inconsistent results between the sexes, except for gender-specific cancers were interpreted carefully since the finding may be observed by chance or by confounding factors. Mechanisms for disease associations are discussed.

### Materials and Methods

Each participant was asked to record dietary patterns, preference, and the frequency of the intake of 39 foods (Iso et al, 2005). Five responses were possible for each food item: "rarely," "1 to 2 days per month," "1 to 2 days per week," "3 to 4 days per week," and "almost every day". The validity for the food frequency questionnaire was examined previously (Ozasa et al, 2005a; 2005b; Wakai et al, 2005). For each participant, the person years of follow-up were calculated from the date of filling out the baseline questionnaire to death, moving out of the community, or the end of 2003, whichever was first. The sex-specific relative risks of total mortality and cause-

specific mortality cerebrovascular disease were defined as the death rate among participants according to the responses to the diet questionnaire. The sex-specific and age-adjusted relative risks and their 95% confidence intervals were calculated after adjustment for age and area of the study by using the Cox proportional hazard model.

### Results

#### *Vitamin supplements* (Table 1)

We investigated the relationships of multivitamin, vitamins B1, C and E, liver oil, and other supplements with risk of mortality. The use of multivitamin was associated with lower mortality from cerebrovascular disease for women; a similar but weak trend was observed for men. The use of vitamin E was associated with lower mortality from cerebrovascular disease for men and women. Otherwise, there were no consistent associations between the supplement use and disease for both sexes. The excess mortality from liver cancer associated with multivitamin use and ischemic heart disease associated with vitamin B1 were observed only for women. The excess mortality from prostate cancer associated with vitamin B1 and gall bladder cancer associated with vitamin C use was observed for men.

#### *Dietary habits and patterns* (Table 2)

The Japanese-style breakfast was associated with lower mortality from all causes for men while cutting of breakfast was associated with higher mortality from all causes for men and women. The western-style breakfast was associated with lower mortality from stomach cancer and ischemic heart disease for men and cerebrovascular

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**Table 1. Age-adjusted Hazard Ratios\* and 95% Confidence Intervals(95% CI) According to Supplements**

	No. of subjects	Person -years	All causes		All cancers		Esophageal cancer		Stomach cancer		Colon cancer		Rectal cancer		Liver cancer	
			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)
<b>Men</b>																
Multivitamin																
no use	40,017	503,398	8,946	1.00	3,410	1.00	139	1.00	686	1.00	183	1.00	143	1.00	405	1.00
use	4,630	55,092	897	1.02(0.95-1.10)	353	1.02(0.92-1.15)	12	0.74(0.40-1.35)	64	0.96(0.74-1.26)	31	1.52(1.03-2.27)*	16	1.09(0.64-1.86)	38	1.08(0.76-1.53)
Vitamin B1																
no use	42,779	535,420	9,391	1.00	3,581	1.00	145	1.00	718	1.00	202	1.00	155	1.00	414	1.00
use	1,767	22,143	433	0.97(0.88-1.07)	172	1.01(0.86-1.18)	6	0.90(0.39-2.05)	30	0.91(0.63-1.31)	12	1.19(0.66-2.16)	3	0.37(0.12-1.18)*	28	1.22(0.83-1.81)
Vitamin C																
no use	42,867	537,309	9,450	1.00	3,622	1.00	147	1.00	725	1.00	205	1.00	153	1.00	428	1.00
use	1,657	20,054	371	1.06(0.95-1.18)	131	0.96(0.81-1.15)	4	0.70(0.26-1.89)	23	0.88(0.58-1.34)	9	1.04(0.53-2.04)	5	0.84(0.34-2.07)	14	0.80(0.47-1.37)
Vitamin E																
no use	43,286	542,260	9,556	1.00	3,651	1.00	148	1.00	736	1.00	202	1.00	155	1.00	424	1.00
use	1,248	15,225	262	0.92(0.81-1.04)	101	0.91(0.75-1.11)	3	0.68(0.22-2.15)	12	0.57(0.32-1.02)*	12	1.76(0.98-3.17)*	3	0.61(0.19-1.92)	18	1.23(0.76-1.98)
Liver oil																
no use	44,275	554,567	9,764	1.00	3,734	1.00	151	1.00	746	1.00	212	1.00	158	1.00	438	1.00
use	226	2,612	52	0.97(0.74-1.28)	18	0.91(0.57-1.45)	0	NA	2	0.55(0.14-2.22)	2	1.46(0.36-5.91)	0	NA	4	1.81(0.67-4.88)
Other supplement																
no use	42,758	535,475	9,428	1.00	3,592	1.00	147	1.00	718	1.00	203	1.00	151	1.00	424	1.00
use	1,848	22,663	399	0.98(0.89-1.09)	164	1.04(0.89-1.22)	4	0.56(0.21-1.52)	30	0.99(0.68-1.43)	12	1.22(0.68-2.20)	7	0.99(0.46-2.12)	19	1.17(0.73-1.86)
<b>Women</b>																
Multivitamin																
no use	55,366	721,071	6,308	1.00	2,027	1.00	21	1.00	343	1.00	184	1.00	78	1.00	195	1.00
use	5,616	67,398	527	0.98(0.90-1.08)	191	1.08(0.93-1.26)	3	1.58(0.45-5.48)	25	0.81(0.54-1.23)	25	1.42(0.92-2.19)	6	0.96(0.41-2.24)	24	1.63(1.04-2.55)*
Vitamin B1																
no use	58,236	753,802	6,474	1.00	2,119	1.00	22	1.00	350	1.00	201	1.00	81	1.00	207	1.00
use	2,617	33,417	356	1.03(0.93-1.15)	96	0.88(0.71-1.08)	2	2.31(0.53-10.17)	18	0.97(0.60-1.56)	8	0.80(0.39-1.63)	3	0.69(0.22-2.22)	12	1.01(0.56-1.83)
Vitamin C																
no use	57,564	746,116	6,528	1.00	2,108	1.00	23	1.00	354	1.00	197	1.00	79	1.00	206	1.00
use	3,271	40,968	299	0.93(0.82-1.04)	107	0.96(0.79-1.17)	1	1.23(0.16-9.39)	14	0.75(0.43-1.28)	12	1.18(0.65-2.13)	5	1.22(0.49-3.04)	13	1.11(0.63-1.97)
Vitamin E																
no use	56,607	733,636	6,458	1.00	2,069	1.00	23	1.00	344	1.00	198	1.00	77	1.00	204	1.00
use	4,276	53,935	372	0.92(0.83-1.03)	149	1.06(0.89-1.25)	1	0.95(0.12-7.25)	25	1.07(0.71-1.62)	11	0.86(0.46-1.59)	7	1.36(0.62-3.00)	15	0.97(0.57-1.67)
Liver oil																
no use	60,303	780,746	6,776	1.00	2,197	1.00	23	1.00	365	1.00	207	1.00	83	1.00	216	1.00
use	488	5,909	51	1.02(0.78-1.35)	19	1.14(0.73-1.80)	1	7.05(0.92-54.3)*	3	1.07(0.34-3.34)	2	1.19(0.29-4.83)	1	1.84(0.25-13.4)	3	1.98(0.63-6.25)
Other supplement																
no use	57,942	751,062	6,505	1.00	2,113	1.00	24	1.00	352	1.00	199	1.00	79	1.00	206	1.00
use	3,050	37,492	329	0.99(0.88-1.10)	105	0.96(0.78-1.16)	0	NA	17	0.88(0.54-1.45)	10	0.88(0.47-1.68)	5	1.38(0.55-3.44)	13	1.31(0.74-2.32)

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

**Table 1. Continued. Age-adjusted Hazard Ratios\* and 95% Confidence Intervals(95% CI) According to Supplements**

	No. of subjects	Person -years	Gall bladder cancer		Pancreas cancer		Lung cancer		Breast cancer		Uterine cervix cancer		Prostate cancer	
			No	HR(95%CI)	No	HR(95%CI)	No	HR(95%CI)	No	HR(95%CI)	No	HR(95%CI)	No	HR(95%CI)
<b>Men</b>														
<b>Multivitamin</b>														
no use	40,017	503,398	67	1.00	195	1.00	789	1.00	NA	NA	NA	149	1.00	NA
use	4,630	55,092	2	0.32(0.08-1.32)	19	1.00(0.62-1.63)	80	0.97(0.77-1.23)	NA	NA	NA	14	1.00(0.57-1.77)	NA
<b>Vitamin B1</b>														
no use	42,779	535,420	65	1.00	200	1.00	838	1.00	NA	NA	NA	149	1.00	NA
use	1,767	22,143	4	1.29(0.46-3.62)	12	1.40(0.77-2.54)	29	0.77(0.53-1.12)	NA	NA	NA	14	1.92(1.09-3.37)*	NA
<b>Vitamin C</b>														
no use	42,867	537,309	63	1.00	208	1.00	843	1.00	NA	NA	NA	156	1.00	NA
use	1,657	20,054	6	2.81(1.20-6.62)*	4	0.56(0.21-1.50)	24	0.79(0.53-1.19)	NA	NA	NA	7	1.14(0.53-2.45)	NA
<b>Vitamin E</b>														
no use	43,286	542,260	65	1.00	208	1.00	846	1.00	NA	NA	NA	159	1.00	NA
use	1,248	15,225	4	2.22(0.79-6.20)	4	0.69(0.25-1.87)	20	0.82(0.53-1.29)	NA	NA	NA	4	0.78(0.29-2.11)	NA
<b>Liver oil</b>														
no use	44,275	554,567	68	1.00	212	1.00	860	1.00	NA	NA	NA	163	1.00	NA
use	226	2,612	1	3.01(0.41-22.2)	0	NA	6	1.34(0.60-2.99)	NA	NA	NA	0	NA	NA
<b>Other supplement</b>														
no use	42,758	535,475	67	1.00	196	1.00	819	1.00	NA	NA	NA	157	1.00	NA
use	1,848	22,663	2	0.72(0.18-2.98)	16	2.02(1.20-3.40)**47	1.30(0.96-1.75)*	NA	NA	NA	NA	6	0.88(0.38-2.00)	NA
<b>Women</b>														
<b>Multivitamin</b>														
no use	55,366	721,071	83	1.00	187	1.00	231	1.00	92	1.00	32	1.00	NA	NA
use	5,616	67,398	7	0.97(0.44-2.14)	20	1.17(0.73-1.88)	23	1.05(0.67-1.63)	7	0.93(0.42-2.05)	3	0.99(0.30-3.34)	NA	NA
<b>Vitamin B1</b>														
no use	58,236	753,802	89	1.00	194	1.00	247	1.00	95	1.00	33	1.00	NA	NA
use	2,617	33,417	1	0.24(0.03-1.73)	13	1.43(0.81-2.54)	7	0.50(0.24-1.07)*	4	0.89(0.32-2.47)	2	1.17(0.27-4.98)	NA	NA
<b>Vitamin C</b>														
no use	57,564	746,116	86	1.00	197	1.00	239	1.00	93	1.00	31	1.00	NA	NA
use	3,271	40,968	4	0.95(0.35-2.64)	10	1.01(0.53-1.92)	15	1.06(0.63-1.81)	6	1.21(0.52-2.80)	4	2.46(0.85-7.14)*	NA	NA
<b>Vitamin E</b>														
no use	56,607	733,636	86	1.00	196	1.00	235	1.00	94	1.00	32	1.00	NA	NA
use	4,276	53,935	4	0.75(0.27-2.09)	11	0.89(0.48-1.65)	19	1.05(0.65-1.69)	5	0.73(0.29-1.82)	3	1.30(0.39-4.35)	NA	NA
<b>Liver oil</b>														
no use	60,303	780,746	90	1.00	206	1.00	253	1.00	98	1.00	34	1.00	NA	NA
use	488	5,909	0	NA	1	0.57(0.08-4.04)	2	0.97(0.24-3.90)	1	1.57(0.22-11.4)	1	4.28(0.57-32.0)	NA	NA
<b>Other supplement</b>														
no use	57,942	751,062	87	1.00	196	1.00	243	1.00	96	1.00	34	1.00	NA	NA
use	3,050	37,492	4	0.89(0.32-2.45)	11	1.04(0.56-1.92)	12	0.84(0.47-1.52)	3	0.78(0.24-2.48)	1	0.60(0.08-4.41)	NA	NA

\*Adjusted for age and area of study. \*\* p<0.01; \* p<0.05; †p<0.10 NA: not applicable

**Table 1. Continued. Age-adjusted Hazard Ratios<sup>#</sup> and 95% Confidence Intervals(95% CI) According to Supplements**

	No. of subjects	Person -years	Kidney cancer		Urothelial tract cancer		Non-Hodgkin's		Multiple myeloma		Myeloid leukemia		Ischemic heart disease		Cerebrovascular	
			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)
<b>Men</b>																
Multivitamin																
no use	40,017	503,398	41	1.00	76	1.00	82	1.00	45	1.00	38	1.00	572	1.00	1,172	1.00
use	4,630	55,092	3	0.61(0.19-2.01)	15	2.08(1.15-3.75)*	7	0.88(0.40-1.95)	4	0.94(0.33-2.68)	6	1.28(0.53-3.11)	64	1.17(0.90-1.53)	105	0.91(0.74-1.12)
Vitamin B1																
no use	42,779	535,420	43	1.00	85	1.00	85	1.00	46	1.00	39	1.00	607	1.00	1,223	1.00
use	1,767	22,143	1	0.41(0.06-3.01)	6	1.47(0.63-3.42)	4	1.00(0.36-2.76)	3	1.20(0.37-3.93)	5	2.80(1.08-7.30)*	29	1.06(0.72-1.54)	52	0.94(0.71-1.24)
Vitamin C																
no use	42,867	537,309	42	1.00	85	1.00	83	1.00	46	1.00	41	1.00	606	1.00	1,240	1.00
use	1,657	20,054	2	1.17(0.28-4.86)	6	1.98(0.85-4.59)	6	2.04(0.88-4.73) <sup>+</sup>	3	1.67(0.51-5.43)	3	1.79(0.55-5.84)	30	1.39(0.96-2.01) <sup>+</sup>	36	0.80(0.57-1.11)
Vitamin E																
no use	43,286	542,260	44	1.00	89	1.00	86	1.00	47	1.00	42	1.00	610	1.00	1,254	1.00
use	1,248	15,225	0	N.A.	2	0.75(0.18-3.06)	3	1.21(0.38-3.87)	2	1.31(0.31-5.46)	2	1.49(0.35-6.23)	26	1.47(0.99-2.19) <sup>+</sup>	21	0.59(0.38-0.90)*
Liver oil																
no use	44,275	554,567	44	1.00	91	1.00	88	1.00	49	1.00	44	1.00	631	1.00	1,269	1.00
use	226	2,612	0	NA	0	NA	1	2.20(0.30-16.0)	0	NA	0	NA	5	1.43(0.59-3.45)	6	0.82(0.37-1.82)
Other supplement																
no use	42,758	535,475	44	1.00	89	1.00	87	1.00	48	1.00	43	1.00	617	1.00	1,229	1.00
use	1,848	22,663	0	NA	2	0.52(0.13-2.13)	2	0.56(0.14-2.30)	1	0.46(0.06-3.34)	1	0.45(0.06-3.33)	18	0.70(0.44-1.12)	47	0.90(0.67-1.20)
<b>Women</b>																
Multivitamin																
no use	55,366	721,071	14	1.00	37	1.00	58	1.00	44	1.00	28	1.00	394	1.00	1,017	1.00
use	5,616	67,398	3	2.58(0.71-9.38)	3	1.25(0.36-4.28)	3	0.51(0.16-1.66)	3	0.94(0.28-3.13)	4	1.82(0.60-5.54)	38	1.13(0.80-1.59)	69	0.77(0.60-0.99)*
Vitamin B1																
no use	58,236	753,802	17	1.00	35	1.00	58	1.00	46	1.00	31	1.00	398	1.00	1,029	1.00
use	2,617	33,417	0	NA	4	1.83(0.63-5.32)	3	1.11(0.34-3.61)	1	0.46(0.06-3.41)	1	0.66(0.09-4.92)	34	1.53(1.07-2.18)*	55	1.07(0.81-1.41)
Vitamin C																
no use	57,564	746,116	17	1.00	39	1.00	59	1.00	46	1.00	32	1.00	407	1.00	1,039	1.00
use	3,271	40,968	0	NA	0	NA	2	0.58(0.14-2.43)	1	0.46(0.06-3.40)	0	NA	25	1.31(0.87-1.98)	45	0.97(0.72-1.32)
Vitamin E																
no use	56,607	733,636	15	1.00	38	1.00	56	1.00	46	1.00	31	1.00	410	1.00	1,041	1.00
use	4,276	53,935	2	3.33(0.73-15.3)	1	0.39(0.05-2.87)	6	1.45(0.61-3.46)	1	0.35(0.05-2.60)	1	0.48(0.06-3.64)	22	0.90(0.58-1.40)	43	0.75(0.55-1.02) <sup>+</sup>
Liver oil																
no use	60,303	780,746	17	1.00	39	1.00	61	1.00	46	1.00	32	1.00	429	1.00	1,076	1.00
use	488	5,909	0	NA	0	NA	0	NA	1	3.33(0.45-24.7)	0	NA	3	0.96(0.31-2.99)	7	0.86(0.41-1.81)
Other supplement																
no use	57,942	751,062	17	1.00	38	1.00	56	1.00	45	1.00	32	1.00	423	1.00	1,033	1.00
use	3,050	37,492	0	NA	1	0.62(0.08-4.54)	5	1.59(0.63-4.06)	2	1.05(0.25-4.42)	0	NA	10	0.46(0.24-0.86)*	52	0.99(0.75-1.32)

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

disease for women. The timing of supper was not associated with the risk of mortality.

#### *Rice intake* (Table 3)

The rice intake was associated with lower mortality from all causes, liver cancer, and ischemic heart disease for men and women. Similar inverse associations were observed between rice intake at age around 30 years and the risk of mortality. The exception was the positive association of rice intake at age around 30 years and mortality from lung cancer.

#### *Miso soup* (Table 3)

The intake of miso soup was associated with lower mortality from all causes for men and women and IHD for women. Interestingly, the intake of miso soup at age around 30 years was associated with lower mortality from breast and cervical cancer as well as all causes.

#### *Preference for salty foods* (Table 3)

There were no consistent associations between preference of salty foods and the risk of mortality, except for lowering with liver cancer in both sexes. A preference of salty foods tended to be associated with mortality from lung cancer and cerebrovascular disease.

#### *Preference for fatty foods* (Table 3)

There were no consistent associations between the preference of fatty foods and the risk of mortality, except for lower mortality from all causes for men and women.

#### *Dietary modification advised by health professionals* (Table 4)

Modification for salt intake was associated with higher mortality from ischemic heart disease for men and higher mortality from cerebrovascular disease for women. Modification for sugar intake was associated with higher mortality from liver and pancreas cancers for men and women and ischemic heart disease for men. Modification for total energy intake was positively associated with higher mortality from all causes and ischemic heart disease for men and women, higher mortality from colon cancer for women, and higher mortality from liver cancer for men. Modification for fat intake was associated with elevated mortality from all causes and ischemic heart disease for men, liver cancer in both genders, and pancreas cancer in women.

#### *Meat* (Table 5)

There were no consistent associations of beef, processed meat, chicken, with the risk of mortality. Pork intake was associated with lower mortality from all causes, liver cancer for both men and women. The liver intake was associated with higher mortality from cervical cancer.

#### *Egg, milk and dairy products* (Table 6)

Egg intake was associated with lower mortality from all causes for men and women, and lower mortality from cerebrovascular disease for women. The milk intake was associated with lower mortality from all causes and cerebrovascular disease, but with higher mortality from

liver cancer for men and women. The cheese intake was associated with lower mortality from all causes for men.

#### *Butter, margarine, fried foods* (Table 7)

The intake of margarine was associated with lower mortality from all causes and cerebrovascular disease for women. The intake of deep-fried foods was associated with lower mortality from all causes for men and women, lower mortality from ischemic heart disease for women and lower mortality from cerebrovascular disease for men. The intake of fried vegetables was associated with lower mortality from all causes for men and women, lower mortality from cerebrovascular disease for men.

#### *Fresh fish and fish products* (Table 8)

The intake of fresh fish was associated with lower mortality from all causes for men and women, lower mortality from prostate cancer for men, lower mortality from urothelial tract cancer, ischemic heart disease and cerebrovascular disease for women, but higher mortality from myeloid leukemia for men. The intake of fish paste products, i.e. kamaboko in Japanese, was associated with lower mortality from cerebrovascular disease for men and women. The intake of dried fish was associated with lower mortality from all causes, ischemic heart disease and cerebrovascular disease for men and women, and higher mortality from multiple myeloma for women.

#### *Vegetables and fruits* (Tables 9 and 10)

Intake of green and yellow vegetables was associated with lower mortality from all causes and cerebrovascular disease for men and women, and from lung cancer for men. Intake of sansai was associated with higher mortality from all causes for men and women. The intake of Chinese cabbage was associated with lower mortality from ischemic heart disease for men.

#### *Fungi and potato* (Table 11)

The intake of fungi tended to be associated with lower mortality from ischemic heart disease for men and women. The intake of potato was associated with lower mortality from all causes for men and women, lower mortality from ischemic heart disease only for women, but higher mortality from colon cancer for men and women.

#### *Seaweed* (Table 11)

The intake of seaweed was associated with lower mortality from all causes and lung cancer for men and women, and lower mortality for pancreatic cancer for men and for cerebrovascular disease for women.

#### *Pickles and soy sauce-preserved foods* (Table 12)

The intake of pickles was associated with lower mortality from all causes, ischemic heart disease and cerebrovascular disease. There was no association between the intake of soy sauce-preserved foods and mortality risk except for higher mortality from rectum cancer for women and lower mortality from urothelial tract cancer for men.

#### *Boiled-beans and soy-bean paste (tofu)* (Table 12)

The intake of boiled beans was associated with lower

**Table 2. Age-adjusted Hazard Ratios<sup>#</sup> and 95% Confidence Intervals(95% CI) According to Dietary Habits and Patterns**

	No. of subjects	Person -years	All causes		Esophageal cancer		Stomach cancer		Colon cancer		Rectal cancer		Liver cancer	
			No	HR(95%CI)	No	HR(95%CI)	No	HR(95%CI)	No	HR(95%CI)	No	HR(95%CI)	No	HR(95%CI)
<b>Men</b>														
Japanese-style breakfast														
not usually	13,432	169,048	3,121	1.00	1,203	1.00	218	1.00	57	1.00	57	1.00	194	1.00
usually	32,044	398,614	6,961	0.92(0.86-0.98)**	2,634	0.95(0.86-1.06)	117	1.33(0.74-2.40)	545	1.19(0.93-1.53)	157	0.87(0.57-1.32)	105	0.54(0.35-0.84)**
Western-style breakfast														
not usually	40,371	510,037	9,096	1.00	3,434	1.00	709	1.00	191	1.00	142	1.00	399	1.00
usually	5,101	57,589	985	0.93(0.87-1.00)*	403	1.00(0.89-1.12)	12	0.77(0.41-1.46)	54	0.66(0.50-0.89)**	23	0.93(0.58-1.48)	20	1.40(0.85-2.30)
Chagayau (Tea gruel) at breakfast														
not usually	44,099	551,252	9,683	1.00	3,680	1.00	726	1.00	207	1.00	157	1.00	448	1.00
usually	1,373	16,374	398	1.05(0.93-1.18)	157	1.05(0.87-1.28)	6	1.04(0.38-2.87)	37	1.26(0.84-1.90)	7	1.15(0.45-2.89)	5	0.82(0.28-2.39)
Other style breakfast														
not usually	44,153	551,695	9,753	1.00	3,704	1.00	740	1.00	202	1.00	156	1.00	445	1.00
usually	650	7,529	196	1.21(1.05-1.40)**	72	1.23(0.97-1.55)*	2	0.82(0.20-3.31)	15	1.28(0.77-2.14)	6	1.84(0.81-4.16)	5	2.12(0.86-5.21)
Cut breakfast														
No	44,315	553,413	9,922	1.00	3,778	1.00	752	1.00	211	1.00	157	1.00	452	1.00
Yes	1,165	14,301	160	1.29(1.10-1.51)**	59	1.10(0.85-1.42)	2	0.81(0.20-3.31)	11	1.04(0.57-1.90)	3	0.93(0.30-2.93)	5	2.02(0.82-5.01)
Supper at ordinary time														
Yes	14,181	185,467	3,040	1.00	1,171	1.00	37	1.00	215	1.00	54	1.00	203	1.00
No	30,896	377,626	6,888	0.94(0.86-1.02)	2,626	1.03(0.89-1.18)	111	1.06(0.55-2.07)	533	1.31(0.93-1.85)	157	1.02(0.59-1.76)	109	0.75(0.43-1.32)
<b>Women</b>														
Japanese-style breakfast														
not usually	19,785	254,797	2,324	1.00	717	1.00	115	1.00	55	1.00	24	1.00	75	1.00
usually	42,793	551,289	4,726	0.97(0.90-1.05)	1,565	1.10(0.96-1.26)	19	1.54(0.46-5.15)	258	1.23(0.87-1.73)	162	1.06(0.69-1.62)	64	1.21(0.56-2.64)
Western-style breakfast														
not usually	52,090	684,848	6,238	1.00	1,978	1.00	327	1.00	186	1.00	75	1.00	192	1.00
usually	10,482	121,156	813	0.83(0.77-0.90)**	304	0.93(0.82-1.07)	4	1.07(0.33-3.46)	46	0.88(0.63-1.24)	31	1.01(0.67-1.54)	13	1.47(0.77-2.80)
Chagayau (Tea gruel) at breakfast														
not usually	60,691	782,216	6,733	1.00	2,205	1.00	364	1.00	211	1.00	87	1.00	218	1.00
usually	1,883	23,814	318	1.16(1.01-1.34)*	77	0.89(0.67-1.17)	2	0.40(0.07-2.27)	9	0.41(0.19-0.88)*	6	0.68(0.26-1.76)	1	0.42(0.05-3.77)
Other style breakfast														
not usually	60,726	782,806	6,863	1.00	2,221	1.00	365	1.00	209	1.00	84	1.00	217	1.00
usually	802	9,633	117	1.27(1.06-1.53)**	27	0.93(0.63-1.36)	1	2.53(0.34-18.9)	5	1.03(0.43-2.50)	2	0.62(0.15-2.49)	1	0.92(0.13-6.62)
Cut breakfast														
No	61,419	791,308	6,970	1.00	2,256	1.00	370	1.00	216	1.00	87	1.00	222	1.00
Yes	1,164	14,833	81	1.25(1.00-1.56)*	26	0.99(0.67-1.46)	0	NA	3	0.79(0.25-2.46)	1	0.41(0.06-2.94)	1	0.94(0.13-6.80)
Supper at ordinary time														
Yes	16,434	224,391	2,064	1.00	655	1.00	105	1.00	50	1.00	28	1.00	79	1.00
No	45,518	573,916	4,818	0.91(0.82-1.02)	1,585	0.96(0.79-1.17)	18	0.31(0.09-1.05)*	265	1.14(0.68-1.92)	160	0.71(0.41-1.23)	59	0.68(0.29-1.58)

#Adjusted for age and area of study. \*\* p<0.01; \* p<0.05; †p<0.10 NA: not applicable

**Table 2. Continued. Age-adjusted Hazard Ratios<sup>a</sup> and 95% Confidence Intervals(95% CI) According to Dietary Habits and Patterns**

	No. of subjects	Person -years	Gall bladder cancer		Pancreas cancer		Lung cancer		Breast cancer		Uterine cervix cancer		Prostate cancer	
			No	HR(95%CI)	No	HR(95%CI)	No	HR(95%CI)	No	HR(95%CI)	No	HR(95%CI)	No	HR(95%CI)
<b>Men</b>														
Japanese-style breakfast														
not usually	13,432	169,048	26	1.00	71	1.00	272	1.00	NA	NA	NA	NA	51	1.00
usually	32,044	398,614	45	0.55(0.28-1.08) <sup>+</sup>	149	0.84(0.55-1.26)	623	0.92(0.75-1.14)	NA	NA	NA	NA	118	1.09(0.65-1.84)
Western-style breakfast														
not usually	40,371	510,037	65	1.00	190	1.00	801	1.00	NA	NA	NA	NA	149	1.00
usually	5,101	57,589	6	0.88(0.36-2.17)	30	1.48(0.97-2.25) <sup>+</sup>	94	0.96(0.76-1.21)	NA	NA	NA	NA	20	1.10(0.66-1.83)
Chagayu (Tea gruel) at breakfast														
not usually	44,099	551,252	67	1.00	207	1.00	854	1.00	NA	NA	NA	NA	163	1.00
usually	1,373	16,374	4	1.96(0.51-7.45)	13	1.29(0.63-2.64)	41	1.02(0.70-1.49)	NA	NA	NA	NA	6	1.17(0.43-3.18)
Other style breakfast														
not usually	44,153	551,695	68	1.00	210	1.00	857	1.00	NA	NA	NA	NA	168	1.00
usually	650	7,529	2	1.88(0.45-7.78)	5	1.49(0.61-3.63)	18	1.26(0.79-2.02)	NA	NA	NA	NA	0	NA
Cut of breakfast														
No	44,315	553,413	70	1.00	215	1.00	881	1.00	NA	NA	NA	NA	168	1.00
Yes	1,165	14,301	1	N.A	5	1.64(0.67-4.02)	14	1.11(0.65-1.89)	NA	NA	NA	NA	1	0.62(0.09-4.43)
Supper at ordinary time														
Yes	14,181	185,467	20	1.00	69	1.00	260	1.00	NA	NA	NA	NA	51	1.00
No	30,896	377,626	48	1.09(0.33-3.57)	146	0.92(0.52-1.61)	630	0.95(0.72-1.27)	NA	NA	NA	NA	117	1.52(0.61-3.74)
<b>Women</b>														
Japanese-style breakfast														
not usually	19,785	254,797	36	1.00	58	1.00	89	1.00	34	1.00	12	1.00	NA	NA
usually	42,793	551,289	58	0.60(0.34-1.04) <sup>+</sup>	159	1.25(0.80-1.95)	172	1.13(0.77-1.67)	68	1.14(0.59-2.17)	23	1.21(0.43-3.38)	NA	NA
Western-style breakfast														
not usually	52,090	684,848	79	1.00	185	1.00	224	1.00	88	1.00	30	1.00	NA	NA
usually	10,482	121,156	15	1.06(0.57-1.97)	32	1.08(0.72-1.64)	37	0.84(0.57-1.24)	14	0.97(0.52-1.81)	5	0.81(0.29-2.28)	NA	NA
Chagayu (Tea gruel) at breakfast														
not usually	60,691	782,216	90	1.00	207	1.00	251	1.00	100	1.00	34	1.00	NA	NA
usually	1,883	23,814	4	1.24(0.35-4.43)	10	1.22(0.54-2.74)	10	1.01(0.46-2.20)	2	1.10(0.25-4.92)	1	0.42(0.05-3.69)	NA	NA
Other style breakfast														
not usually	60,726	782,806	91	1.00	211	1.00	258	1.00	99	1.00	34	1.00	NA	NA
usually	802	9,633	1	0.84(0.12-6.07)	4	1.39(0.52-3.76)	1	0.28(0.04-2.01)	0	NA	1	2.31(0.31-17.1)	NA	NA
Cut of breakfast														
No	61,419	791,308	89	1.00	217	1.00	257	1.00	101	1.00	35	1.00	NA	NA
Yes	1,164	14,833	5	4.66(1.86-11.7) <sup>**</sup>	0	NA	4	1.36(0.50-3.67)	1	0.50(0.07-3.62)	0	NA	NA	NA
Supper at ordinary time														
Yes	16,434	224,391	23	1.00	52	1.00	78	1.00	35	1.00	10	1.00	NA	NA
No	45,518	573,916	70	1.62(0.51-5.18)	155	1.28(0.62-2.60)	175	0.80(0.47-1.36)	67	1.01(0.44-2.35)	25	0.99(0.23-4.22)	NA	NA

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

**Table 2. Continued.. Age-adjusted Hazard Ratios\* and 95% Confidence Intervals(95% CI) According to Dietary Habits and Patterns**

Men	No. of subjects	Person -years	Kidney cancer		Urothelial tract cancer		Non-Hodgkin's		Multiple myeloma		Myeloid leukemia		Ischemic heart disease		Cerebrovascular	
			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)
<b>Men</b>																
Japanese-style breakfast																
not usually	13,432	169,048	14	1.00	28	1.00	34	1.00	13	1.00	18	1.00	203	1.00	359	1.00
usually	32,044	398,614	31	1.43(0.53-3.85)	64	1.58(0.73-3.40)	59	0.78(0.40-1.49)	36	6.27(0.84-47.0) <sup>+</sup>	25	0.38(0.18-0.80)*	451	0.95(0.74-1.22)	943	0.96(0.80-1.16)
Western-style breakfast																
not usually	40,371	510,037	40	1.00	81	1.00	78	1.00	46	1.00	34	1.00	599	1.00	1185	1.00
usually	5,101	57,589	5	0.82(0.30-2.25)	11	1.04(0.52-2.08)	15	1.93(1.05-3.55)*	3	0.67(0.20-2.25)	9	2.22(0.99-5.00) <sup>+</sup>	55	0.73(0.55-0.99)*	116	0.89(0.72-1.09)
Chagayu (Tea gruel) at breakfast																
not usually	44,099	551,252	41	1.00	90	1.00	92	1.00	48	1.00	41	1.00	629	1.00	1251	1.00
usually	1,373	16,374	4	1.60(0.46-5.53)	2	0.43(0.09-1.99)	1	0.26(0.03-2.13)	1	0.38(0.04-3.59)	2	1.28(0.25-6.62)	25	0.99(0.62-1.60)	50	1.16(0.82-1.64)
Other style breakfast																
not usually	44,153	551,695	43	1.00	89	1.00	90	1.00	48	1.00	43	1.00	632	1.00	1257	1.00
usually	650	7,529	1	1.31(0.18-9.58)	2	1.33(0.32-5.44)	2	1.44(0.35-5.90)	0	NA	0	NA	15	1.41(0.84-2.37)	27	1.20(0.82-1.76)
Cut breakfast																
No	44,315	553,413	45	1.00	92	1.00	92	1.00	48	1.00	41	1.00	639	1.00	1286	1.00
Yes	1,165	14,301	0	NA	0	NA	1	0.83(0.11-6.01)	1	1.58(0.21-11.7)	2	2.48(0.58-10.6)	15	1.90(1.13-3.19)*	16	1.14(0.70-1.88)
Supper at ordinary time																
Yes	14,181	185,467	15	1.00	27	1.00	29	1.00	14	1.00	10	1.00	196	1.00	373	1.00
No	30,896	377,626	30	0.55(0.20-1.47)	65	2.43(0.59-10.1)	62	0.94(0.40-2.23)	34	1.65(0.39-7.08)	32	1.43(0.42-4.85)	449	1.11(0.77-1.59)	906	0.89(0.70-1.14)
<b>Women</b>																
Japanese-style breakfast																
not usually	19,785	254,797	4	1.00	16	1.00	18	1.00	17	1.00	6	1.00	162	1.00	327	1.00
usually	42,793	551,289	14	0.65(0.18-2.35)	24	1.28(0.37-4.49)	47	1.10(0.53-2.30)	31	1.51(0.50-4.56)	27	6.28(0.82-48.2) <sup>+</sup>	286	0.84(0.63-1.11)	804	0.99(0.82-1.19)
Western-style breakfast																
not usually	52,090	684,848	15	1.00	38	1.00	54	1.00	45	1.00	32	1.00	387	1.00	1031	1.00
usually	10,482	121,156	3	1.50(0.42-5.36)	2	0.43(0.09-1.95)	11	0.97(0.47-2.02)	3	0.44(0.13-1.56)	1	0.13(0.02-1.02) <sup>+</sup>	61	0.99(0.73-1.33)	101	0.61(0.49-0.76)**
Chagayu (Tea gruel) at breakfast																
not usually	60,691	782,216	17	1.00	40	1.00	63	1.00	47	1.00	32	1.00	411	1.00	1082	1.00
usually	1,883	23,814	1	2.63(0.25-27.8)	0	NA	2	0.98(0.20-4.86)	1	0.66(0.07-6.57)	1	3.79(0.41-35.0)	37	1.80(1.15-2.81)*	50	1.18(0.82-1.68)
Other style breakfast																
not usually	60,726	782,806	18	1.00	39	1.00	62	1.00	47	1.00	33	1.00	431	1.00	1107	1.00
usually	802	9,633	0	NA	1	2.74(0.37-20.4)	0	NA	1	1.88(0.26-13.8)	0	NA	8	1.32(0.66-2.67)	18	1.16(0.73-1.85)
Cut breakfast																
No	61,419	791,308	18	1.00	39	1.00	64	1.00	47	1.00	33	1.00	446	1.00	1117	1.00
Yes	1,164	14,833	0	NA	1	3.15(0.42-23.4)	1	1.10(0.15-8.0)	1	2.02(0.27-15.0)	0	NA	2	0.60(0.15-2.39)	15	1.54(0.92-2.57) <sup>+</sup>
Supper at ordinary time																
Yes	16,434	224,391	1	1.00	19	1.00	14	1.00	18	1.00	8	1.00	138	1.00	290	1.00
No	45,518	573,916	16	NA	21	0.32(0.11-0.94)*	50	0.89(0.32-2.49)	29	1.01(0.24-4.26)	25	1.75(0.24-13.0)	301	0.75(0.49-1.15)	806	0.91(0.69-1.21)

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

**Table 3. Age-adjusted Hazard Ratios\* and 95% Confidence Intervals(95% CI) According to Dietary Habits and Patterns**

	No. of subjects	Person -years	All causes		All cancers		Esophageal cancer		Stomach cancer		Colon cancer		Rectal cancer		Liver cancer	
			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)
<b>Men</b>																
Bowls of rice (at present)																
<3/day	11,522	139,125	2,790	1.00	1,006	1.00	40	1.00	201	1.00	60	1.00	44	1.00	146	1.00
3-4/day	20,352	252,803	4,828	0.92(0.88-0.97)**	1,842	0.99(0.91-1.07)	67	0.84(0.57-1.26)	341	0.92(0.77-1.10)	108	0.95(0.69-1.31)	80	0.93(0.64-1.35)	228	0.91(0.73-1.12)
≥5/day	12,829	166,800	2,156	0.78(0.73-0.83)**	912	0.87(0.80-0.96)**	41	0.81(0.51-1.27)	200	0.98(0.80-1.21)	43	0.69(0.46-1.04) <sup>+</sup>	36	0.68(0.43-1.08)	77	0.57(0.43-0.77)**
Bowls of rice (at 30 years old)																
<4/day	15,465	198,365	3,423	1.00	1,295	1.00	45	1.00	254	1.00	78	1.00	54	1.00	209	1.00
4-6/day	19,213	238,275	3,926	0.92(0.87-0.97)**	1,530	0.99(0.91-1.08)	63	1.16(0.73-1.84)	317	1.06(0.87-1.30)	92	0.89(0.63-1.26)	68	1.12(0.72-1.73)	168	0.88(0.68-1.13)
≥7/day	7,613	92,774	1,895	0.86(0.81-0.92)**	730	0.93(0.84-1.04)	32	1.23(0.72-2.11)	131	0.87(0.68-1.12)	34	0.70(0.45-1.10)	25	0.82(0.47-1.44)	51	0.60(0.42-0.85)**
Bowls of miso soup (at present)																
≤1/two day	10,597	128,560	2,036	1.00	809	1.00	25	1.00	147	1.00	49	1.00	41	1.00	105	1.00
1/day	20,026	252,317	4,503	0.95(0.89-1.01)	1,707	1.02(0.92-1.12)	76	1.18(0.68-2.02)	359	1.19(0.94-1.49)	94	0.79(0.52-1.19)	67	0.72(0.45-1.16)	154	0.93(0.69-1.26)
≥2/day	12,073	151,636	2,913	0.95(0.89-1.01) <sup>+</sup>	1,103	0.96(0.87-1.05)	46	1.40(0.84-2.35)	208	0.96(0.77-1.20)	63	0.87(0.58-1.28)	46	0.75(0.48-1.18)	172	1.07(0.83-1.38)
Bowls of miso soup (at 30 years old)																
≤1/two day	10,597	128,560	2,036	1.00	809	1.00	25	1.00	147	1.00	49	1.00	41	1.00	105	1.00
1/day	13,347	166,981	3,358	0.93(0.87-1.00)*	1,233	0.97(0.87-1.08)	53	1.05(0.59-1.86)	260	1.12(0.88-1.43)	74	0.88(0.57-1.36)	42	0.56(0.33-0.95)*	98	0.80(0.57-1.11)
≥2/day	18,752	236,972	4,058	0.95(0.90-1.01)	1,577	0.99(0.90-1.08)	69	1.39(0.86-2.26)	307	1.04(0.84-1.28)	83	0.81(0.56-1.17)	71	0.81(0.54-1.23)	228	1.08(0.84-1.37)
Preference for salty foods																
dislike	4,615	55,363	1,043	1.00	361	1.00	11	1.00	75	1.00	22	1.00	15	1.00	54	1.00
so-so	15,663	194,035	2,972	1.06(0.99-1.14) <sup>+</sup>	1,195	1.20(1.07-1.36)**	67	2.07(1.09-3.93)**	227	1.07(0.82-1.39)	57	0.90(0.55-1.48)	54	1.28(0.72-2.28)	119	0.72(0.52-1.00)*
like	17,071	209,333	3,652	1.00(0.93-1.07)	1,364	1.08(0.96-1.21)	36	0.89(0.45-1.76)	277	1.03(0.79-1.33)	92	1.15(0.72-1.83)	57	1.08(0.61-1.92)	118	0.60(0.43-0.83)**
Preference for fatty foods																
dislike	8,277	99,314	1,872	1.00	680	1.00	32	1.00	147	1.00	35	1.00	19	1.00	85	1.00
so-so	11,249	139,775	2,118	0.91(0.85-0.97)**	839	0.99(0.89-1.10)	33	0.80(0.49-1.31)	162	0.86(0.69-1.08)	44	0.95(0.61-1.49)	36	1.46(0.83-2.55)	70	0.63(0.46-0.87)**
like	18,039	221,832	3,768	0.91(0.86-0.96)**	1,441	0.97(0.88-1.06)	56	0.76(0.49-1.17)	274	0.83(0.68-1.02) <sup>+</sup>	90	1.12(0.76-1.66)	68	1.61(0.96-2.68) <sup>+</sup>	143	0.77(0.59-1.01) <sup>+</sup>
<b>Women</b>																
Bowls of rice (at present)																
<3/day	20,090	252,157	2,227	1.00	714	1.00	6	1.00	123	1.00	69	1.00	25	1.00	83	1.00
3/day	29,479	382,537	3,512	0.94(0.89-0.99)*	1,110	0.95(0.86-1.05)	12	1.16(0.42-3.15)	179	0.88(0.70-1.12)	102	0.85(0.62-1.16)	37	0.81(0.48-1.35)	114	0.86(0.64-1.15)
≥4/day	11,922	157,465	1,057	0.95(0.88-1.03)	396	1.04(0.91-1.18)	8	2.00(0.65-6.18)	64	0.96(0.70-1.33)	35	0.98(0.64-1.50)	25	1.81(1.01-3.24)*	21	0.50(0.31-0.82)**
Bowls of rice (at 30 years old)																
<4/day	27,372	361,142	2,916	1.00	973	1.00	8	1.00	155	1.00	76	1.00	44	1.00	118	1.00
4-5/day	13,267	169,135	1,159	0.89(0.83-0.96)**	398	0.88(0.77-0.99)*	4	0.75(0.22-2.58)	69	0.99(0.72-1.34)	37	0.94(0.62-1.43)	21	1.00(0.57-1.76)	35	0.67(0.45-1.00)*
≥6/day	17,003	213,840	2,224	0.88(0.83-0.94)**	726	0.94(0.85-1.05)	12	1.13(0.43-2.96)	121	0.96(0.73-1.26)	87	1.25(0.88-1.76)	19	0.53(0.29-0.97)*	51	0.59(0.41-0.86)**
Bowls of miso soup (at present)																
≤1/two day	17,493	215,832	1,690	1.00	579	1.00	4	1.00	87	1.00	55	1.00	19	1.00	56	1.00
1/day	21,927	288,464	2,550	0.91(0.85-0.98)*	819	0.92(0.81-1.04)	15	4.59(1.30-16.3)*	141	1.14(0.82-1.58)	83	0.71(0.47-1.07)	36	0.80(0.41-1.56)	73	0.85(0.55-1.31)
≥2/day	19,074	248,469	2,356	0.99(0.93-1.06)	758	0.97(0.87-1.09)	7	2.34(0.66-8.34)	134	1.18(0.89-1.58)	63	0.84(0.58-1.23)	31	1.02(0.56-1.85)	81	0.99(0.69-1.42)
Bowls of miso soup (at 30 years old)																
≤1/two day	17,493	215,832	1,690	1.00	579	1.00	4	1.00	87	1.00	55	1.00	19	1.00	56	1.00
1/day	14,023	184,857	1,897	0.91(0.84-0.98)*	594	0.93(0.81-1.07)	14	7.44(2.02-27.5)**	1081	1.24(0.88-1.76)	61	0.69(0.44-1.07) <sup>+</sup>	29	0.92(0.46-1.84)	56	0.91(0.58-1.45)
≥2/day	26,978	352,076	3,009	0.98(0.92-1.04)	983	0.96(0.86-1.07)	8	2.13(0.61-7.35)	167	1.15(0.87-1.51)	85	0.82(0.57-1.18)	38	0.93(0.52-1.66)	98	0.95(0.67-1.35)
Preference for salty foods																
dislike	9,590	119,607	1,047	1.00	333	1.00	6	1.00	51	1.00	28	1.00	11	1.00	40	1.00
so-so	13,586	169,899	1,438	1.05(0.97-1.14)	472	1.08(0.94-1.25)	7	0.87(0.29-2.63)	67	1.02(0.71-1.48)	55	1.50(0.95-2.38) <sup>+</sup>	20	1.20(0.57-2.52)	36	0.68(0.43-1.08)
like	28,107	356,657	2,730	0.93(0.87-1.00)*	908	0.96(0.84-1.09)	8	0.48(0.16-1.40)	157	1.11(0.80-1.52)	89	1.12(0.73-1.71)	32	0.89(0.45-1.78)	71	0.61(0.41-0.91)*
Preference for fatty foods																
dislike	17,425	215,448	2,085	1.00	636	1.00	7	1.00	107	1.00	61	1.00	28	1.00	65	1.00
so-so	7,622	96,260	715	1.04(0.95-1.13)	262	1.15(1.00-1.33) <sup>+</sup>	3	1.47(0.38-5.76)	38	1.04(0.72-1.52)	31	1.52(0.98-2.35) <sup>+</sup>	12	1.09(0.55-2.17)	19	0.83(0.50-1.40)
like	26,917	342,106	2,553	0.92(0.86-0.97)**	866	0.97(0.87-1.07)	12	1.38(0.54-3.55)	144	0.98(0.76-1.26)	79	0.93(0.67-1.31)	24	0.55(0.32-0.95)*	65	0.71(0.50-1.00)*

#Adjusted for age and area of study. \*\* p<0.01; \* p<0.05; <sup>+</sup>p<0.10

**Table 3. Continued. Age-adjusted Hazard Ratios\* and 95% Confidence Intervals(95% CI) According to Dietary Habits and Patterns**

No. of subjects	Person -years	Gall bladder cancer		Pancreas cancer		Lung cancer		Breast cancer		Uterine cervix cancer		Prostate cancer	
		No	HR(95%CI)	No	HR(95%CI)	No	HR(95%CI)	No	HR(95%CI)	No	HR(95%CI)	No	HR(95%CI)
<b>Men</b>													
Bowls of rice (at present)													
<3/day	11,522	139,125	1.00	56	1.00	212	1.00	NA	NA	NA	NA	46	1.00
3-4/day	20,352	252,803	1.00(0.58-1.70)	110	1.04(0.75-1.45)	418	1.06(0.90-1.26)	NA	NA	NA	NA	87	1.07(0.74-1.54)
≥5/day	12,829	166,800	0.36(0.16-0.84)*	49	0.82(0.55-1.22)	249	1.10(0.91-1.34)	NA	NA	NA	NA	31	0.92(0.57-1.49)
Bowls of rice (at 30 years old)													
<4/day	15,465	198,365	1.00	71	1.00	255	1.00	NA	NA	NA	NA	56	1.00
4-6/day	19,213	238,275	0.79(0.43-1.45)	83	0.87(0.60-1.24)	350	1.08(0.89-1.30)	NA	NA	NA	NA	65	1.08(0.70-1.67)
≥7/day	7,613	92,774	0.62(0.29-1.32)	48	0.95(0.63-1.45)	221	1.27(1.03-1.57)*	NA	NA	NA	NA	31	1.01(0.60-1.69)
Bowls of miso soup (at present)													
≤1/two day	10,597	128,560	1.00	56	1.00	181	1.00	NA	NA	NA	NA	32	1.00
1/day	20,026	252,317	1.21(0.53-2.79)	102	0.77(0.51-1.15)	408	1.09(0.88-1.34)	NA	NA	NA	NA	76	0.97(0.59-1.59)
≥2/day	12,073	151,636	1.57(0.73-3.38)	44	0.55(0.36-0.84)**	248	1.05(0.85-1.28)	NA	NA	NA	NA	53	0.95(0.59-1.51)
Bowls of miso soup (at 30 years old)													
≤1/two day	10,597	128,560	1.00	56	1.00	181	1.00	NA	NA	NA	NA	32	1.00
1/day	13,347	166,981	1.36(0.57-3.25)	76	0.74(0.48-1.13)	297	1.05(0.84-1.32)	NA	NA	NA	NA	60	0.99(0.59-1.66)
≥2/day	18,752	236,972	1.43(0.68-3.02)	70	0.62(0.42-0.90)*	359	1.07(0.89-1.30)	NA	NA	NA	NA	69	0.94(0.60-1.47)
Preference for salty foods													
dislike	4,615	55,363	1.00	23	1.00	73	1.00	NA	NA	NA	NA	17	1.00
so-so	15,663	194,035	1.35(0.53-3.41)	70	1.15(0.71-1.85)	298	1.57(1.22-2.04)**	NA	NA	NA	NA	45	1.09(0.62-1.92)
like	17,071	209,333	1.54(0.64-3.70)	75	0.96(0.60-1.54)	336	1.36(1.06-1.76)*	NA	NA	NA	NA	62	1.05(0.61-1.80)
Preference for fatty foods													
dislike	8,277	99,314	1.00	45	1.00	148	1.00	NA	NA	NA	NA	31	1.00
so-so	11,249	139,775	0.83(0.34-2.01)	47	0.85(0.56-1.28)	224	1.29(1.04-1.59)*	NA	NA	NA	NA	35	0.88(0.54-1.43)
like	18,039	221,832	1.66(0.82-3.35)	81	0.84(0.58-1.21)	343	1.09(0.90-1.32)	NA	NA	NA	NA	61	0.86(0.56-1.33)
<b>Women</b>													
Bowls of rice (at present)													
<3/day	20,090	252,157	1.00	66	1.00	72	1.00	32	1.00	9	1.00	NA	NA
3/day	29,479	382,537	0.77(0.49-1.23)	107	0.97(0.71-1.33)	136	1.24(0.92-1.66)	48	0.99(0.62-1.56)	17	1.27(0.56-2.90)	NA	NA
≥4/day	11,922	157,465	0.65(0.33-1.29)	33	0.98(0.63-1.52)	51	1.40(0.95-2.04)†	18	0.95(0.52-1.73)	8	1.40(0.52-3.81)	NA	NA
Bowls of rice (at 30 years old)													
≤3/day	27,372	361,142	1.00	81	1.00	101	1.00	53	1.00	17	1.00	NA	NA
4-5/day	13,267	169,135	0.35(0.16-0.77)**	41	0.97(0.66-1.44)	43	1.02(0.69-1.51)	19	0.85(0.49-1.49)	7	0.90(0.35-2.30)	NA	NA
≥6/day	17,003	213,840	0.85(0.51-1.42)	76	1.04(0.74-1.47)	96	1.37(0.98-1.91)†	19	0.70(0.39-1.27)	7	0.63(0.24-1.67)	NA	NA
Bowls of miso soup (at present)													
≤1/two day	17,493	215,832	1.00	48	1.00	73	1.00	30	1.00	13	1.00	NA	NA
1/day	21,927	288,464	1.02(0.54-1.94)	85	1.12(0.74-1.70)	83	0.82(0.56-1.20)	35	0.76(0.42-1.36)	10	0.66(0.24-1.78)	NA	NA
≥2/day	19,074	248,469	1.36(0.78-2.38)	65	1.04(0.70-1.53)	90	0.93(0.67-1.30)	30	0.77(0.45-1.32)	10	0.65(0.27-1.55)	NA	NA
Bowls of miso soup (at 30 years old)													
≤1/two day	17,493	215,832	1.00	48	1.00	73	1.00	30	1.00	13	1.00	NA	NA
1/day	14,023	184,857	0.98(0.49-2.00)	62	1.15(0.74-1.79)	61	0.88(0.58-1.34)	14	0.39(0.19-0.80)*	4	0.34(0.09-1.23)†	NA	NA
≥2/day	26,978	352,076	1.30(0.76-2.23)	88	1.05(0.72-1.52)	112	0.90(0.66-1.23)	51	0.88(0.55-1.43)	16	0.75(0.34-1.63)	NA	NA
Preference for salty foods													
dislike	9,590	119,607	1.00	34	1.00	34	1.00	13	1.00	2	1.00	NA	NA
so-so	13,586	169,899	1.77(0.92-3.41)†	42	0.98(0.62-1.55)	57	1.34(0.87-2.06)	13	0.65(0.30-1.40)	7	2.56(0.53-12.41)	NA	NA
like	28,107	356,657	0.95(0.50-1.80)	98	1.05(0.71-1.56)	95	1.02(0.69-1.52)	48	1.17(0.63-2.17)	18	3.16(0.73-13.70)	NA	NA
Preference for fatty foods													
dislike	17,425	215,448	1.00	58	1.00	69	1.00	27	1.00	9	1.00	NA	NA
so-so	7,622	96,260	0.73(0.35-1.54)	33	1.59(1.03-2.44)*	33	1.37(0.90-2.09)	9	0.69(0.32-1.49)	4	1.15(0.35-3.78)	NA	NA
like	26,917	342,106	0.75(0.46-1.21)	90	1.11(0.80-1.55)	96	1.00(0.73-1.37)	40	0.92(0.56-1.50)	15	1.17(0.51-2.68)	NA	NA

\*Adjusted for age and area of study. \*\* p<0.01; † p<0.05; ‡ p<0.10 NA: not applicable

**Table 3. Continued. Age-adjusted Hazard Ratios\* and 95% Confidence Intervals(95% CI) According to Dietary Habits and Patterns**

	No. of subjects	Person -years	Kidney cancer		Urothelial tract cancer		Non-Hodgkin's		Multiple myeloma		Myeloid leukemia		Ischemic heart disease		Cerebrovascular	
			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)
<b>Men</b>																
Bowls of rice (at present)																
<3/day	11,522	139,125	16	1.00	25	1.00	22	1.00	12	1.00	15	1.00	210	1.00	356	1.00
3-4/day	20,352	252,803	20	0.72(0.37-1.39)	43	0.98(0.59-1.62)	47	1.23(0.72-2.09)	24	1.06(0.53-2.13)	18	0.67(0.33-1.36)	306	0.79(0.66-0.95)*	624	0.91(0.79-1.03)
≥5/day	12,829	166,800	8	0.44(0.18-1.07)*	22	1.04(0.57-1.91)	21	1.01(0.54-1.91)	10	0.79(0.33-1.88)	10	0.54(0.23-1.27)	118	0.59(0.47-0.75)**	280	0.83(0.70-0.98)*
Bowls of rice (at 30 years old)																
<4/day	15,465	198,365	23	1.00	31	1.00	32	1.00	17	1.00	15	1.00	225	1.00	426	1.00
4-6/day	19,213	238,275	16	0.52(0.26-1.04)*	34	0.94(0.53-1.67)	35	0.98(0.56-1.74)	18	1.13(0.49-2.61)	19	0.98(0.45-2.12)	252	0.87(0.71-1.07)	516	0.88(0.76-1.02)*
≥7/day	7,613	92,774	3	0.15(0.04-0.54)**	22	1.14(0.60-2.18)	19	1.17(0.60-2.27)	10	1.24(0.47-3.27)	9	0.99(0.39-2.53)	122	0.85(0.66-1.09)	242	0.79(0.66-0.94)**
Bowls of miso soup (at present)																
≤1/two day	10,597	128,560	12	1.00	23	1.00	20	1.00	7	1.00	12	1.00	139	1.00	227	1.00
1/day	20,026	252,317	16	0.87(0.36-2.10)	38	0.76(0.40-1.41)	43	1.08(0.58-2.03)	23	2.10(0.80-5.49)	18	0.90(0.37-2.21)	268	0.82(0.64-1.04)	636	0.97(0.81-1.15)
≥2/day	12,073	151,636	16	1.21(0.55-2.68)	30	0.86(0.49-1.54)	23	0.80(0.42-1.49)	15	1.31(0.51-3.38)	10	0.76(0.31-1.86)	198	0.95(0.76-1.20)	354	0.96(0.81-1.15)
Bowls of miso soup (at 30 years old)																
≤1/two day	10,597	128,560	12	1.00	23	1.00	20	1.00	7	1.00	12	1.00	139	1.00	227	1.00
1/day	13,347	166,981	9	0.64(0.23-1.77)	32	0.95(0.49-1.84)	31	1.07(0.54-2.10)	15	1.70(0.61-4.74)	13	0.97(0.36-2.59)	209	0.88(0.68-1.14)	492	0.97(0.80-1.17)
≥2/day	18,752	236,972	23	1.20(0.57-2.51)	36	0.77(0.44-1.35)	35	0.87(0.49-1.55)	23	1.60(0.66-3.85)	15	0.78(0.34-1.74)	257	0.89(0.72-1.11)	498	0.96(0.82-1.14)
Preference for salty foods																
dislike	4,615	55,363	2	1.00	10	1.00	10	1.00	4	1.00	5	1.00	71	1.00	130	1.00
soso	15,663	194,035	13	2.36(0.53-10.5)	32	1.31(0.64-2.69)	22	0.77(0.36-1.63)	12	1.09(0.35-3.41)	16	1.00(0.36-2.77)	189	0.98(0.75-1.30)	404	1.19(0.98-1.46)*
like	17,071	209,333	21	3.04(0.71-13.0)	26	0.79(0.38-1.66)	41	1.16(0.58-2.32)	24	1.71(0.59-4.95)	17	0.92(0.34-2.51)	245	0.97(0.75-1.27)	468	1.03(0.85-1.25)
Preference for fatty foods																
dislike	8,277	99,314	6	1.00	12	1.00	16	1.00	11	1.00	10	1.00	128	1.00	238	1.00
soso	11,249	139,775	17	2.55(1.00-6.52)*	23	1.65(0.82-3.34)	19	0.92(0.47-1.80)	12	0.88(0.38-2.01)	11	0.84(0.35-2.00)	140	0.88(0.69-1.12)	264	0.87(0.73-1.04)
like	18,039	221,832	15	1.25(0.48-3.24)	34	1.40(0.72-2.71)	40	1.13(0.63-2.03)	14	0.59(0.26-1.30)	17	0.78(0.36-1.72)	236	0.84(0.68-1.04)	513	0.97(0.83-1.13)
<b>Women</b>																
Bowls of rice (at present)																
<3/day	20,090	252,157	4	1.00	11	1.00	18	1.00	19	1.00	9	1.00	161	1.00	342	1.00
3/day	29,479	382,537	7	0.98(0.29-3.35)	21	1.11(0.53-2.32)	36	1.25(0.70-2.23)	20	0.60(0.32-1.14)	17	1.22(0.54-2.78)	211	0.81(0.65-1.00)*	590	0.99(0.86-1.13)
≥4/day	11,922	157,465	8	4.85(1.35-17.4)*	7	1.48(0.54-4.02)	11	1.05(0.48-2.32)	9	0.92(0.40-2.10)	6	1.92(0.66-5.59)	60	0.80(0.58-1.09)	154	0.98(0.81-1.20)
Bowls of rice (at 30 years old)																
≤3/day	27,372	361,142	6	1.00	24	1.00	18	1.00	24	1.00	14	1.00	199	1.00	435	1.00
4-5/day	13,267	169,135	2	0.55(0.11-2.72)	5	0.58(0.21-1.62)	17	2.01(0.96-4.23)*	4	0.33(0.11-0.97)*	9	1.51(0.61-3.73)	59	0.69(0.50-0.93)*	198	0.94(0.79-1.13)
≥6/day	17,003	213,840	9	1.43(0.49-4.19)	10	0.64(0.28-1.49)	23	1.82(0.88-3.77)	15	0.72(0.35-1.46)	9	1.07(0.42-2.74)	128	0.67(0.52-0.86)**	363	0.83(0.71-0.97)*
Bowls of miso soup (at present)																
≤1/two day	17,493	215,832	6	1.00	11	1.00	14	1.00	14	1.00	6	1.00	121	1.00	232	1.00
1/day	21,927	288,464	9	0.80(0.25-2.63)	11	0.63(0.24-1.69)	24	1.46(0.67-3.22)	14	0.54(0.23-1.28)	14	1.91(0.63-5.78)	135	0.69(0.52-0.92)*	451	1.08(0.89-1.30)
≥2/day	19,074	248,469	4	0.52(0.15-1.89)	17	0.88(0.40-1.95)	22	1.37(0.68-2.75)	19	0.96(0.46-1.97)	12	1.53(0.55-4.24)	154	0.94(0.73-1.20)	382	1.18(1.00-1.40)*
Bowls of miso soup (at 30 years old)																
≤1/two day	17,493	215,832	6	1.00	11	1.00	14	1.00	14	1.00	6	1.00	121	1.00	232	1.00
1/day	14,023	184,857	7	0.88(0.24-3.19)	8	0.64(0.22-1.84)	18	1.71(0.73-4.04)	14	0.91(0.37-2.23)	8	1.44(0.43-4.88)	107	0.75(0.55-1.02)*	336	1.05(0.86-1.28)
≥2/day	26,978	352,076	6	0.56(0.18-1.79)	20	0.84(0.39-1.82)	28	1.33(0.68-2.61)	19	0.74(0.36-1.52)	18	1.72(0.66-4.51)	182	0.87(0.68-1.11)	497	1.17(1.00-1.38)
Preference for salty foods																
dislike	9,590	119,607	7	1.00	2	1.00	15	1.00	7	1.00	6	1.00	76	1.00	160	1.00
soso	13,586	169,899	5	0.48(0.15-1.51)	9	3.36(0.72-15.7)	13	0.68(0.32-1.46)	14	1.61(0.64-4.05)	8	0.89(0.31-2.58)	87	0.94(0.69-1.28)	253	1.18(0.96-1.44)
like	28,107	356,657	7	0.31(0.11-0.90)*	13	2.20(0.49-9.83)	28	0.65(0.35-1.23)	14	0.74(0.30-1.85)	13	0.68(0.26-1.79)	162	0.82(0.62-1.08)	453	1.00(0.84-1.21)
Preference for fatty foods																
dislike	17,425	215,448	6	1.00	8	1.00	17	1.00	10	1.00	10	1.00	138	1.00	356	1.00
soso	7,622	96,260	2	0.92(0.18-4.62)	1	0.34(0.04-2.71)	2	0.33(0.08-1.45)	8	2.30(0.90-5.91)*	6	1.45(0.52-4.03)	41	1.01(0.71-1.44)	105	0.90(0.72-1.12)
like	26,917	342,106	10	1.15(0.41-3.18)	18	1.59(0.69-3.68)	37	1.52(0.85-2.71)	20	1.49(0.70-3.21)	11	0.73(0.31-1.72)	155	0.93(0.74-1.17)	422	0.90(0.78-1.04)

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\*Adjusted for age and area of study. \*\* p<0.01; \* p<0.05; † p<0.10