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ORIGINAL ARTICLE

Diet quality and mortality: a population-based prospective study of men

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Background/Objectives: To study quality of diet in relation to all-cause mortality, cardiovascular disease (CVD) and cancer mortality.
Subjects/Methods: The population-based prospective Cohort of Swedish Men (COSM) included 40 837 men, 45–79 years of age, who filled in a FFQ (96 food items) and were CVD- and cancer-free at baseline. Quality of diet was assessed by Recommended Food Score (RFS) based on 36 items and Non-Recommended Food Score (Non-RFS) based on 16 items. Cox's proportional hazards regression models were used to estimate the hazard ratios (HRs) of mortality and 95% confidence intervals (CIs). Multivariate HRs for RFS and Non-RFS were adjusted for age, education, physical activity, martial status, self-perceived health status, smoking status, dietary supplements use, WHR, alcohol use, intake of energy and mutually adjusted.
Results: Between 1998 and 2005, 4501 deaths from all-causes were registered. Between 1998 and 2003, there were 1394 CVD and 759 cancer deaths. High RFS ($\geqslant 28$) compared with low ($\leqslant 20$) was associated with lower risk of all-cause mortality (HR: 0.81; 95% CI: 0.71–0.91; *P*-value for trend < 0.0001) and CVD mortality (HR: 0.71; 95% CI: 0.54–0.93; *P*-value for trend $= 0.003$). In contrast, men with high Non-RFS ($\geqslant 5$) had higher risk of all-cause (HR: 1.21; 95% CI: 1.09–1.34; *P*-value for trend $= 0.001$) and CVD mortality (HR: 1.27; 95% CI: 1.05–1.54; *P*-value for trend $= 0.07$) compared to those with low Non-RFS ($\leqslant 2$ items). No significant associations with cancer mortality were observed.
Conclusions: Both measures of diet quality, RFS and Non-RFS, showed statistically significant associations with all-cause and CVD mortality (recommended foods inversely while nonrecommended foods positively), but not with cancer mortality.
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Introduction

Epidemiologic studies indicate that quality of diet together with lifestyle factors have considerable influence on mortality. The use of diet scores or indicators, based on a combination of dietary exposures instead of on single nutrients for assessing overall diet quality, has recently become common. Currently used dietary scores—Healthy Diet Indicator (Huijbregts *et al*., 1997), Diet Quality Index (Popkin *et al*., 1996; Seymour *et al*., 2003), Healthy Eating Index (Kennedy *et al*., 1995), Mediterranean Diet Score (Trichopoulou *et al*., 1995, 2003, 2005a, b; Haveman-Nies *et al*., 2003; Knoops *et al*., 2004; Lagiou *et al*., 2007)—take into account several food groups (but not diversity of foods within a specific food group) in combination with specific nutrients and/or other nutritional indicators. The main advantage of those scores is that they all present one joint measure of different dietary aspects instead of several independent measures. Those scores, however, have some limitations, because their parts based on nutrients and/or nutritional indicators (in contrast to food products) may be difficult in direct communication with a general public. Similarly, dietary patterns defined by factor analysis based

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solely on food-frequency questionnaires (FFQs) may be difficult in direct communication with a general public because one cluster included several food products (Osler *et al*., 2001; Shimazu *et al*., 2007).

The Recommended Food Score (RFS) is a simple approach based only on foods with beneficial effects on health (Kushi *et al*., 1999; Hu and Willett, 2002; Report WHO/FAO, 2003; Genkinger *et al*., 2004) and has been applied by Kant *et al*. (2000). We previously extended this approach by adding even scores for Non-Recommended Foods (Non-RFS), (that is, foods which consumption should be limited (Willett, 1994; Hu *et al*., 2001; Report WHO/FAO, 2003)), and examined the association of RFS and Non-RFS with mortality in women (Michels and Wolk, 2002).

In this effort to further development of a simple measure of diet quality that takes into account a variety of foods consumed, the list of recommended and nonrecommended foods was extended, and the frequency categories of their intake were changed. We examined the association between the diet quality, described by the consumption of recommended and nonrecommended foods and all-cause, cardiovascular disease (CVD) and cancer mortality in a large population-based Cohort of Swedish Men (COSM).

Subjects and methods

Study population

The study was conducted in the COSM from central Sweden (Västmanland and Örebro Counties) in years 1997–1998. A questionnaire was sent to all men in the age from 45 to 79 years. The participation rate was 49%. We excluded men with missing or incorrect national identification number, those who returned questionnaires incomplete ($n=352$), those with a previous cancer diagnosis other than non-melanoma skin cancer ($n=2592$), those with a history of CVD ($n=5069$). Finally, this study included 40 837 men.

Information about socio-demographic data, waist and hip circumferences, total physical activity, self-perceived health status, smoking status, alcohol drinking and dietary supplement use was collected using a special developed self-administered questionnaire.

Collection of dietary data

Dietary information was collected through a self-administered FFQ assessing dietary intake during the last year. A total of 96 food items were chosen on the basis of most commonly consumed foods in the study population as well as foods with high concentration of some nutrients and/or bioactive substances, like liver or garlic. Frequency of consumption was reported according to eight possible categories: never/seldom, 1–3 times per month, 1–2 times per week, 3–4 times per week, 5–6 times per week, once a day, 2 times a day, $\geqslant 3$ times per day. Intakes of nutrients were calculated by multiplying the frequency of consumption of each food item by the nutrient content of appropriate age-specific portion sizes obtained from the Swedish Food Administration Database (Bergstrom *et al*., 1991).

Relative validity of the FFQ has been evaluated among 248 men, 40–74 years of age from central Sweden, by using fourteen 24-h recall telephone interviews (Messerer *et al*., 2004). The Spearman's correlation coefficients (r) between nutrient intake obtained by FFQ and 24-h recall ranged from 0.37 (α-tocopherol) to 0.77 (calcium). The interclass correlations between the first and the second FFQ (filled in 1 year apart) were from 0.56 (β-carotene) to 0.76 (saturated fatty acids).

The study was approved by the Regional Ethical Committee at Karolinska Institutet.

Assessment of diet quality

Incorporating dietary guidelines (Report WHO/FAO, 2003) and results from large epidemiological studies (Willett, 1994; Kushi *et al*., 1999; Hu *et al*., 2001; Hu and Willett, 2002; Genkinger *et al*., 2004), we defined two measurements of diet quality, that is, RFS and Non-RFS.

The RFS included 36 items: 13 vegetables (carrot, beetroot, cabbage/red cabbage, cauliflower, broccoli/brussel sprouts, tomatoes/tomato juice, pepper, lettuce/iceberg lettuce, spinach, onion/leek, green peas, soy bean products, mixed vegetables), 6 fruits (apples/pears, bananas, berry fruits, oranges/citrus fruits, other fruits, orange/grapefruit juice), 7 cereal products (whole grain bread, crisp bread type 'Wasa' bread, oatmeal, gruel/other porridge, cereals/muesli, rice, oat/wheat bran), 5 types of fish and seafood (herring/mackerel, salmon, cod/saithe/fishfingers, caviar, shellfish), 3 different low-fat dairy products (low-fat milk ($\leqslant 0.5\%$ fat) and medium-fat milk (1.5%), low-fat sour milk/yoghurt, low-fat cheese (10–17%)), nuts/almonds and olive oil. When each recommended food item was consumed at least 1–3 times per month or more, 1 point was assigned. The frequency of consumption lower than this was assigned 0 points. The RFS was calculated as the sum of points, with a maximum value of 36 points. Because the RFS used in our study included 50% more food items than in work previously presented by Kant *et al*. (2000); therefore, we used lower frequency of consumption for scoring.

The Non-RFS included the following 16 food items: 3 red meat products (pork, beef/veal, minced meat/hamburgers/meatballs), 5 processed meat products (sausage as main dish, meat/sausage on sandwiches, liver/kidney, blood pudding, liver pate), 3 high-fat dairy products (cheese (28% fat), butter (80% fat), cream/crème fraiche), white bread, sweets (combined buns/cakes and biscuits/wafers/rusks and gateau/pastries) and 3 other products (combined potato chips/popcorn and fried potatoes/French fries, mayonnaise, ice cream). Consumption of any of these nonrecommended products 3 times per week or more often was assigned 1 point, and if less often 0 points; subjects could receive a maximum of 16 points. In the present study, the list of

Non-RFS foods includes 16 items most of which are consumed habitually on daily basis, and the list of RFS items includes variety of 36 foods, most of which are consumed less frequently. To reflect the differences in frequency consumption patterns between RFS and Non-RFS, we used different cutoff points when creating our scores.

The remaining food items on the FFQ were considered as 'neutral', for example, chicken/other poultry, eggs/omelets, some cereal products such as pancake, spaghetti/macaroni, cottage/cream cheese, tea, coffee and so on. These food items were not included in any of the scores.

In the initial phase of analyses, we divided men into quartiles according to their RFS and Non-RFS indices. Men from the second and the third quartiles of RFS and of Non-RFS were combined into 'medium' categories. Taking into account the above, and non-normal distribution of scores, the 'low' and the 'high' categories were set with the following cutoffs: for RFS, men who reported consumption of $\leqslant 20$ products from the recommended list were included in the 'low' category, while 'high' category included men with $\geqslant 28$ points. For Non-RFS, the 'low' category comprised of men who consumed few products from the nonrecommended list (0–2 points) and the 'high' category—men who consumed 5 or more products from this list.

Ascertainment of cases and follow-up

Information on dates of death and migration from the study area (through 31 December 2005) was obtained through the Swedish Death and Population registers at Statistics Sweden. Information about causes of death (through 31 December 2003) was obtained through the Swedish Register of Death Causes at the National Board of Health and Welfare. The deaths from cardiovascular (codes I00-I79) and cancer (codes C00-C97) causes were classified according to the International Classification of Diseases, ninth revision.

Statistical analysis

Cox's proportional hazards regression models were used to estimate the hazard ratios (HRs) and 95% confidence intervals (CIs) of all-cause mortality, CVD and cancer mortality among men, separately in categories of RFS and Non-RFS. The 'low' category of RFS and Non-RFS were considered as the references categories.

Multivariate HR estimates were adjusted for age (continuous variable), marital status (single, married, divorced or widower), education (less than high school, high school or university), total physical activity ($\leqslant 38.8$ and >38.8 MET $\times$ hour/days, measured as metabolic equivalents (Norman *et al*., 2001)), self-perceived health status (very good, good, average, bad or very bad), waist-to-hip ratio (<0.94, $\geqslant 0.94$), smoking status (never, former or current), dietary supplement use (regular use, occasional use or no use), alcohol use ($\leqslant 5$ and >5 g ethanol per day) and total energy of diet (quartiles). Multivariate HR estimates for RFS and Non-RFS were mutually adjusted.

Tests for linear trend were conducted by using values for RFS and Non-RFS as continuous variables. We examined the relationship between both RFS and Non-RFS and all-cause mortality, cardiovascular and cancer mortality according to levels of waist-to-hip ratio, total physical activity level, smoking status and alcohol consumption, and tested the statistical significance of the interactions with the likelihood ratio test. SAS, version 9.1 (SAS Institute Inc., Cary, NC, USA) was used for all analyses. All reported *P*-values are two-sided; *P*-values $\leqslant 0.05$ were considered statistically significant. Kaplan–Meier curves were plotted using Stata, Version 9.2 (StataCorp, College Station, TX, USA) to show the probability of survival by categories of RFS and Non-RFS. The survival time is in days, but for the clarity of figure we rescale and present the survival time in years.

Results

Age-standardized baseline characteristics of the study population by categories of RFS and Non-RFS are shown in Table 1. Men with low RFS (low diet quality) as compared to those with high RFS were older and had lower self-perceived health status; fewer of them had university education, were married and used dietary supplements, while more were smokers. With an increased RFS, the intake of energy, vitamins and alcohol also increased. Men with high RFS ($\geqslant 28$ items) compared to those with low RFS ($\leqslant 20$) had 52% higher intake of fruits and vegetables (466 ± 205 vs 306 ± 201 g per day), and also 19% higher intake of meat and meat products (127 ± 68 vs 107 ± 92 g per day).

Men with low Non-RFS (high diet quality) had higher education level. The differences in the intake of nutrients between assigned categories of Non-RFS were small except for energy intake. Men with high Non-RFS ($\geqslant 5$ items) compared to those with low Non-RFS (1–2 items) had 73% higher intake of meat and meat products (176 ± 147 vs 102 ± 43 g per day), and also 20% higher intake of fruits and vegetables (447 ± 271 vs 374 ± 186 g per day). The Spearman's correlation between RFS and Non-RFS was 0.11.

During an average of 7.7 years of follow-up (314 435 person-years, 1997–2005), 4501 deaths from all-causes were registered. Between 1997 and 2003 inclusive, 1394 CVD deaths and 759 cancer deaths were registered.

Kaplan–Meier curves by categories of RFS and Non-RFS were presented in Figure 1. With increasing consumption of recommended foods, the age- and multivariate-adjusted HRs of all-cause and cardiovascular mortality were statistically significantly lower (Table 2). For HR of cancer mortality, the similar statistically significant association was observed after age-adjusted, but not after multivariate-adjusted.

In contrast to the above, an increasing consumption of the nonrecommended foods was associated with statistically significantly higher age- and multivariate-adjusted HRs for

Table 1 Age-standardized baseline characteristics of a cohort of 40 837 Swedish men aged 45–79 by categories of Recommended- and Non-Recommended Food Score

	RFS[a]			*Non-RFS*[b]		
	Low ⩽20 points, n = *12 914*	*Medium 21–27 points,* n = *19 382*	*High ⩾28 points,* n = *8395*	*Low ⩽2 points,* n = *16 602*	*Medium 3–4 points,* n = *14 012*	*High ⩾5 points,* n = *5828*
Food score (median (range))	16 (1–20)	24 (21–27)	29 (28–36)	2 (1–2)	3 (3–4)	5 (5–16)
Daily intake of foods included in the scores (mean (s.d.), frequency per day)	8.6 (4.4)	11.0 (4.2)	12.6 (4.2)	6.6 (3.5)	7.1 (3.1)	9.0 (3.2)
Age (mean (s.d.), years)	62.3 (10.0)	58.6 (9.2)	56.8 (8.4)	59.5 (9.6)	59.5 (9.5)	60.5 (9.7)
Waist-to-hip ratio (mean (s.d.))	0.95 (0.08)	0.94 (0.07)	0.94 (0.06)	0.94 (0.07)	0.94 (0.07)	0.95 (0.08)
Total physical activity (mean (s.d.), MET × hour/day)	41.8 (5.2)	41.5 (4.9)	41.5 (4.6)	41.5 (4.8)	41.6 (4.9)	41.9 (5.1)
University education, >12 years (%)	10.8	17.2	21.7	17.7	14.9	12.4
Married (%)	72.1	85.8	89.4	82.6	82.1	82.1
Health status, very good and good (%)[c]	68.7	76.6	80.0	75.6	74.1	73.2
Regular dietary supplement use (%)	12.9	15.4	17.9	15.4	14.9	13.9
Smoking (%)						
Never	31.3	36.3	40.7	36.5	35.6	37.0
Current	31.6	22.6	18.0	23.4	24.9	25.2
Percent of energy (mean (s.d.))						
Total protein	15.2 (3.1)	15.3 (2.3)	15.4 (1.9)	15.3 (2.3)	15.1 (2. 2)	15.1 (2.2)
Total carbohydrates	48.0 (7.4)	48.5 (6.1)	48.7 (5.0)	48.8 (6.2)	48.5 (5.6)	46.9 (5.5)
Total fat	34.0 (6.4)	33.1 (5.3)	32.7 (4.5)	32.9 (5.4)	33.4 (4.7)	35.2 (4.6)
Saturated fat	15.8 (4.0)	15.0 (3.3)	14.5 (2.7)	15.0 (3.4)	15.1 (3.0)	15.8 (2.8)
Monounsaturated fat	11.6 (2.2)	11.3 (1.8)	11.2 (1.5)	11.2 (1.8)	11.5 (1.6)	12.3 (1.6)
Polyunsaturated fat	4.2 (1.0)	4.4 (0.8)	4.6 (0.8)	4.4 (0.9)	4.4 (0.8)	4.6 (0.8)
Daily intake (mean (s.d.))						
Energy (MJ)	10.0 (3.5)	11.0 (3.2)	11.4 (3.0)	10.4 (3.3)	10.6 (3.1)	12.6 (3.3)
Alcohol (g)	8.5 (11.2)	10.3 (9.9)	11.3 (9.2)	9.5 (10.1)	9.9 (9.9)	11.3 (10.8)
Dietary fiber (g)	26.0 (12.4)	30.8 (11.7)	33.5 (11.5)	29.7 (12.4)	29.3 (11.5)	32.3 (11.7)
Vitamin E (mg)	7.4 (3.1)	8.7 (2.8)	9.4 (2.8)	8.1 (2.8)	8.3 (2.9)	10.0 (3.2)
β-Carotene (μg)	2089 (1896)	2849 (1735)	3355 (1774)	2623 (1846)	2674 (1804)	3248 (2029)
Vitamin C (mg)	79 (58)	113 (58)	133 (60)	102 (61)	106 (60)	127 (70)
Folate (μg)	272 (121)	337 (110)	382 (109)	315 (116)	318 (121)	382 (141)
Calcium (mg)	1373 (745)	1467 (688)	1509 (636)	1444 (703)	1402 (643)	1523 (641)

Abbreviations: RFS, Recommended Food Score; Non-RFS, Non-Recommended Food Score.
[a]RFS included: 13 vegetables (carrot, beetroot, cabbage/red cabbage, cauliflower, broccoli/brussel sprouts, tomatoes/tomato juice, pepper, lettuce/iceberg lettuce, spinach, onion/leek, green peas, soy bean products, mixed vegetables), 6 fruits (apples/pears, bananas, berries fruits, oranges/citrus fruits, other fruits, orange/grapefruit juice), 7 cereal products (whole meal bread, crisp bread-type Wasa bread, oatmeal, gruel/other porridge, cereals/muesli, rice, bran of wheat/oats), 5 types of fish and sea food (herring/mackerel, salmon/whitefish, cod/saithe/fishfingers, caviar, shellfish), 3 low-fat dairy products (low-fat milk (⩽0.5% fat) and medium-fat milk (1.5%), low-fat sour milk/yoghurt, low-fat cheese (10–17%)), nuts/almonds and olive oil. Men who reported consumption of above-mentioned products at least 1–3 times per month received points (maximum 36 points).
[b]Non-RFS included three red meat products (pork, beef/veal, minced meat/hamburgers/meatballs), five processed meat products (sausage as main dish, meat/sausage on sandwiches, liver/kidney, blood pudding, liver pate), three high-fat dairy products (cheese (28% fat), butter (80% fat), cream/crème fraiche), white bread, sweets (combined buns/cakes and biscuits/wafers/rusks and gateau/pastries) and three other products (combined potato chips/popcorn and fried potatoes/French fries, mayonnaise, ice cream). Men who reported intake of these foods at least 3 times per week received points (maximum 16 points).
[c]Self-reported.

all-cause mortality; a similar tendency for CVD mortality was observed (Table 2). A significant association between Non-RFS and cancer mortality was not observed.

Furthermore, we examined whether the observed significant relationships between RFS and Non-RFS and all-cause, CVD and cancer mortality varied by categories of smoking status, physical activity, alcohol consumption and waist/hip ratio. There were not statistically significant interactions between RFS and Non-RFS and any of mentioned factors in relation to all-cause, CVD and cancer mortality.

Discussion

In this large population-based prospective study, we found that better quality of diet, as defined by consumption of a high variety of recommended foods and limited consumption of nonrecommended foods, was associated with lower mortality in men. Those who reported consumption of 28 or more items from the list of 36 recommended foods at least 1–3 times per month had 19% lower risk of all-cause mortality and 29% lower risk of CVD mortality compared

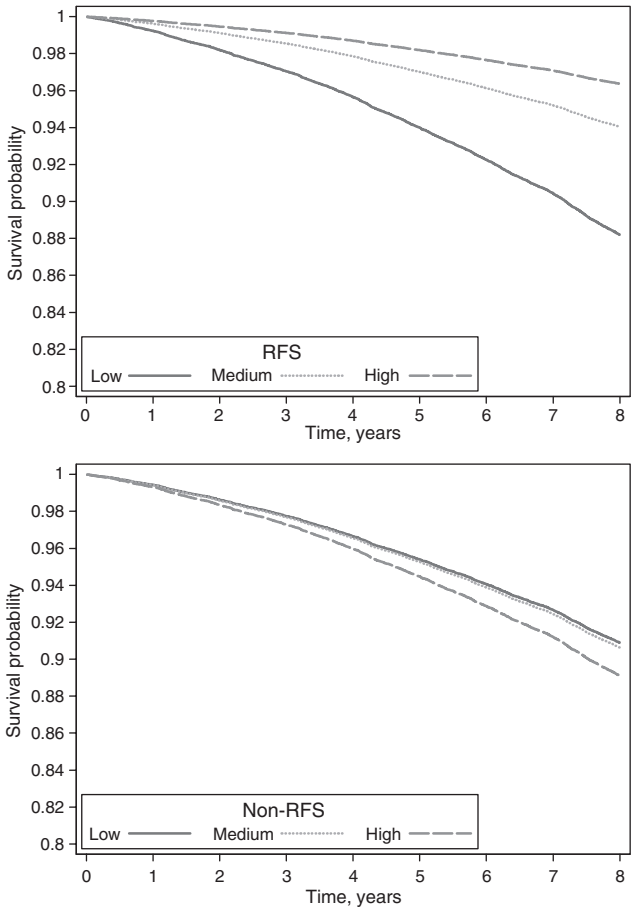

Figure 1 Kaplan–Meier survival curves for the study population by categories of Recommended Food Score (RFS) and Non-Recommended Food Score (Non-RFS) for all-cause mortality.

to men who consumed less than 20 such foods. We also observed that Non-RFS was related to increased all-cause and CVD mortality. Among men who consumed 5 or more food items from the list of 16 nonrecommended foods 3 times per week or more all-cause mortality was statistically significantly higher by 21% and CVD mortality by 27% than among those who consumed only 1–2 of such foods. We did not observe an association between RFS or Non-RFS and cancer mortality.

Similar results were reported in other studies, although the diet scores were based on a varying numbers of recommended foods. Kant *et al*. (2000) found in a cohort of 42 254 American women that a higher diet quality was associated with 31% lower risk of all-cause mortality and 33% lower risk of CVD mortality compared to subjects with the lower diet quality. Similarly, Swedish women, participants of Mammography Screening Cohort (Michels and Wolk, 2002), who followed a healthy diet had a statistically significant lower (42%) risk of all-cause mortality and lower (53%) risk of CVD mortality than women who consumed few of these foods. In contrast to our results, Michels and Wolk (2002) did not observed association between Non-RFS and all-cause and CVD mortality. In that study, however, subjects received scores when they declared the intake of products from the nonrecommended food list only 1–3 times per month. In our investigation, more frequent consumption of these products was scored as nonrecommended (that is, at least 3 times per week).

Our approach to quantify the quality of diet by RFS and Non-RFS is in many aspects similar to the Mediterranean Diet Score (high intake of fruits, vegetables, cereal products and olive oil, and low intake of meat, meat products and dairy products) which is commonly used in epidemiologic studies to assess quality of diet. Trichopoulou *et al*. (2003, 2005a) and Knoops *et al*. (2004) reported a series of inverse relationships between the Mediterranean diet and all-cause mortality as well as CVD mortality in their studies.

Our results do not confirm inverse associations between variety of recommended foods and cancer mortality observed by Kant *et al*. (2000) and Michels and Wolk (2002). The length of follow-up (5 years) in our study was shorter than in two previously mentioned studies (up to 8–10 years). This shorter duration of observation could be insufficient for the development of some types of cancer. Cancer is not a homogenous disease and diet-related mechanisms may vary between different types of cancer. Moreover, other works have suggested that using FFQs may allow for too much measurement error to detect relationships between diet and cancer risk (Bingham *et al*., 2003; Kristal *et al*., 2005; Freedman *et al*., 2006).

Our results indicated that great diversity of foods from the recommended list has a beneficial effect on health. Recommended foods contributed to the healthy diet score already when eaten 1–3 times per month, indicating that not only frequency but also diversity of healthy food products is important for health. With regard to foods from the nonrecommended list, five food items consumed at a higher frequency (at least 3 times per week and more) were associated with higher all-cause and CVD mortality in the present study. A lower frequency of consumption (1–3 times per month), as scored in the Michels and Wolk (2002) study did not give similar results. These findings suggested that the frequency of intake of foods from the nonrecommended list is also important.

Grouping foods into simple qualitative lists of recommended and nonrecommended items makes the RFS and Non-RFS approach easy to communicate as a healthy diet message. Additional quantitative information about minimum frequency of consumption of recommended foods (minimum 1–3 times per month) and maximum frequency of consumption of nonrecommended foods (maximum 2 times per week, that is, less than 3 times per week) also makes this assessment of diet quality easy to use in practice. This simplified approach to both qualitative and quantitative aspects of healthy diet can be easily used by public health workers.

Table 2 Age- and multivariate-adjusted hazard ratios (HRs) and 95% confidence intervals (CIs) for all-cause mortality, CVD and cancer mortality by categories of RFS and Non-RFS among 40 837 Swedish men

	RFS				*Non-RFS*			
	Low ⩽20 points	*Medium 21–27 points*	*High ⩾28 points*	P-*value for trend*[b]	*Low ⩽2 points*	*Medium 3–4 points*	*High ⩾5 points*	P-*value for trend*[b]
All-cause mortality								
No. of deaths	2313	1688	467		1739	1532	741	
Age-adjusted HR (95% CI)	1.00	0.72 (0.66–0.77)	0.57 (0.51–0.65)	<0.0001	1.00	1.04 (0.96–1.13)	1.19 (1.07–1.32)	0.001
Multivariate-adjusted HR (95% CI)[a]	1.00	0.92 (0.85–1.00)	0.81 (0.71–0.91)	<0.0001	1.00	1.04 (0.96–1.14)	1.21 (1.09–1.34)	0.001
CVD mortality								
No. of deaths	761	506	119		547	464	242	
Age-adjusted HR (95% CI)	1.00	0.70 (0.60–0.81)	0.48 (0.38–0.62)	<0.0001	1.00	1.03 (0.88–1.22)	1.25 (1.04–1.52)	0.03
Multivariate-adjusted HR (95% CI)[a]	1.00	0.92 (0.78–1.07)	0.71 (0.54–0.93)	0.003	1.00	1.04 (0.88–1.22)	1.27 (1.05–1.54)	0.07
Cancer mortality								
No. of deaths	337	311	108		294	247	138	
Age-adjusted HR (95% CI)	1.00	0.91 (0.77–1.09)	0.91 (0.71–1.15)	0.006	1.00	0.95 (0.79–1.15)	1.20 (0.97–1.67)	0.26
Multivariate-adjusted HR (95% CI)[a]	1.00	1.03 (0.86–1.24)	1.09 (0.84–1.41)	0.28	1.00	0.94 (0.78–1.13)	1.17 (0.94–1.46)	0.49

Abbreviations: CVD, cardiovascular disease; RFS, Recommended Food Score; Non-RFS, Non-Recommended Food Score.
[a]Multivariate HRs and 95% CIs adjusted for age, marital status, education, self-reported health status, smoking status, dietary supplement use, physical activity, waist-to-hip ratio, alcohol consumption and total energy intake; RFS or Non-RFS are mutually adjusted.
[b]Two-sided *P*-value for test of linear trend was calculated with the Wald statistic by using RFS or Non-RFS as continuous variables.

Although using the FFQ has more limitations than other methods of intake assessment and in our study dietary data were collected once as well as data on the portion size were collected only for limited products (otherwise age-specific portion size were used) the strengths of our study are the population-based and prospective design, and detailed data on variety of diets of our participants (96 food items). In our study, various food products included in the RFS and Non-RFS have equal weight in scoring, and the men who consumed a certain food product multiple times per week were scored the same as someone who consumed this product only once per week. This does not necessarily mean that increasing intake of a product will have the equivalent effect on health as intake of other foods. This could mean that consumption of some products from the recommended or from the nonrecommended lists could be interchangeable (for example, cabbage and carrots as vegetables from RFS and meat and sausages from Non-RFS).

Analyses were controlled for several potential confounders. The FFQ, which we used to collect data, had a reasonable validity. Measurement error in assessing dietary intake in a prospective setting would not be related to the outcome, and it could potentially have attenuated rather then exaggerated the true associations. We cannot rule out the possibility that some unmeasured confounders or residual confounding by the covariates accounted for the observed associations.

In conclusion, this study indicated that a diet including a high variety of recommended foods (vegetables, fruit, whole grain products, fish and low-fat dairy products) was associated with a lower all-cause and CVD mortality, while a diet with frequent consumption of nonrecommended foods (meats, white bread, sweets, chips, high animal fat content products) was associated with a higher all-cause and CVD mortality.

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