Supplementary Online Content

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This supplementary material has been provided by the authors to give readers additional information about their work.

eTable 1. PNNS-GS: Components and Scores According to PNNS Recommendations

	Recommendation	Scoring criteria	Score
1.Fruits and vegetables	At least 5/d	[0-3.5[	0
		[3.5-5[	0.5
		[5-7.5[	1
		≥7.5	2
2.Bread, cereals, potatoes and legumes	At each meal according to appetite	[0-1[	0
		[1-3[	0.5
		[3-6[	1
		≥6	0.5
3.Whole grain food	Choose whole grains and whole-grain breads more often	[0-1/3[	0
		[1/3-2/3[	0.5
		≥2/3	1
4.Milk and dairy products	3/d (≥55-years-old: 3 to 4/d)	[0-1[	0
		[1-2.5[	0.5
		[2.5-3.5] (≥55-years-old: [2.5-4.5])	1
		>3.5 (55-years-old: >4.5)	0
5.Meat, poultry seafood and eggs	1 to 2/d	0	0
		]0-1[	0.5
		[1-2]	1
		>2	0.5
6.Seafood	At least 2/week	<2/week	0
		≥2/week	1
7.Added fat	Limit consumption	Lipids from added fat>16% energy intake/d	0
		Lipids from added fat≤16% energy intake/d	1
8.Vegetable added fat	Favor fat of vegetable origin	No use of vegetable oil or ratio vegetable oil/total added fats≤0.5	0
		No use of added fats or ratio vegetable oil/total added fats >0.5	1
9.Sweetened foods	Limit consumption	Added sugar from sweetened foods	-0.5

		≥17.5% energy intake/d	
		Added sugar from sweetened foods 17.5-12.5% energy intake/d	0
		Added sugar from sweetened foods <12.5% energy intake/d	1
Beverages			
10.Non-alcoholic beverages	Drink water as desired	<1l water and >250 ml soda/d	0
	Limit sweetened beverages: no more than 1 glass/d	≥1l water and >250 ml soda/d	0.5
		<1l water and ≤250 ml soda/d	0.75
		≥1l water and ≤250 ml soda/d	1
11.Alcohol	Women advised to drink ≤2 glasses of wine/d and ≤3 glasses/d for men	Ethanol >20 g/d for women and >30g/d for men	0
		Ethanol ≤20 g/d for women and ≤30g/d for men	0.8
		Abstainers and irregular consumers (<once a week)	1
12.Salt	Limit consumption	>12g/d	-0.5
		]10-12]g/d	0
		]8-10]g/d	0.5
		]6-8]g/d	1
		≤6 g/d	1.5
13.Physical activity	At least the equivalent of 30 min/d of brisk walking	[0-30[min/d	0
		[30-60[min/d	1
		≥60 min/d	1.5

Abbreviations: mPNNS-GS, modified Programme National Nutrition Santé-Guideline Score ; PNNS, Programme National Nutrition Santé

eTable 2. Baseline Characteristics Among Included and Excluded Participants, NutriNet-Santé Cohort, France[a]

	Included	Excluded	P[b]
Organic food score (0-32)	8.87 (7.36)	8.53 (7.39)	<0.0001
Age (years)	44.23 (14.49)	43.39 (14.60)	<0.0001
Female (%)	78.0	77.1	<0.0001
Education level (%)			<0.0001
Primary	0.7	0.6	
Secondary	18.2	23.7	
Undergraduate	16.6	18.6	
Postgraduate	64.5	57.1	
Occupational status (%)			<0.0001
Unemployed	5.9	7.0	
Student	7.7	9.4	
Self-employed, farmer	1.9	2.6	
Employee, manual worker	19.3	21.8	
Intermediate professions	17.6	15.7	
Managerial staff, intellectual profession	23.6	21.2	
Retired	18.4	15.9	
Never employed	5.7	6.4	
Monthly income per household unit (%)			<0.0001
< 1,200€	16.2	20.8	
1,200-1,800€	24.6	25.3	

> 1,800-2,700€	23.7	21.2	
> 2,700€	24.2	20.0	
Unwilling to answer	11.2	12.7	
Cohabiting (%)	81.8	80.0	<0.0001
Body mass index (kg/m²)	23.73 (4.49)	24.45 (5.16)	<0.0001
Baseline use of dietary supplement (%)	45.4	31.3	<0.0001
Energy intake (kcal/d)[c]	1912.87 (495.00)	1874.28 (519.96)	<0.0001
mPNNS-GS (/13.5)	7.81 (1.73)	7.38 (1.67)	<0.0001
Smoking status (%)			<0.0001
Never smoker	50.9	47.7	
Former smoker	33.7	32.2	
Current smoker	15.4	20.1	
Physical activity (%)			0.025
Low	28.7	28.6	
Moderate	37.6	34.4	
High	20.3	20.7	
Missing data	13.4	16.3	
Postmenopausal status (%)[d]	20.8	19.3	<0.0001
Use of hormonal treatment for menopause (%)[d]	4.6	3.8	0.01
Use of oral contraception (%)[d]	20.2	19.6	<0.0001

Abbreviations: mPNNS-GS, modified Programme National Nutrition Santé-Guideline Score

[a]Values are means (SD) or % as appropriate

[b]P-value based on linear trend for continuous variables or Mantel-Haenszel chi-square test for categorical variables

[c]Energy intake without alcohol

[d]Among women

eTable 3. Parameter Estimates and Hazard Ratios (HR) with 95% Confidence Intervals (95% CI) for All Variables Included in the Main Model, NutriNet-Santé Cohort, France

Variable	Coding	Parameter estimate	HR	Lower CI	Upper CI
Organic food score (ref=Q1)					
	Q2	-0.06277	0.939	0.810	1.088
	Q3	-0.08157	0.922	0.793	1.071
	Q4	-0.2926	0.746	0.632	0.882
Sex (ref=Female)	Male	-0.43015	0.650	0.496	0.854
Occupational status (ref=Self-employed, farmer)					
	Unemployed	0.01231	1.012	0.601	1.706
	Student	-0.12301	0.884	0.368	2.125
	Employee, manual worker	0.11235	1.119	0.702	1.785
	Intermediate professions	0.23246	1.262	0.794	2.006
	Managerial staff, intellectual profession	0.02602	1.026	0.646	1.631
	Retired	0.48144	1.618	1.012	2.588

	Never employed	0.16101	1.175	0.715	1.930
Education level (ref= Post-secondary graduate)					
	Unidentified	-0.09839	0.906	0.469	1.752
	<High school diploma	0.00102	1.001	0.868	1.155
	High school diploma	0.075	1.078	0.921	1.155
Marital status (ref=Single)	Cohabiting	-0.08531	0.918	0.742	1.137
Monthly income per household unit (ref=Unwilling to answer)					
	< 1,200€	0.04262	1.044	0.815	1.336
	1,200-1,800€	-0.03457	0.966	0.781	1.195
	> 1,800-2,700€	0.01629	1.016	0.826	1.251
	> 2,700€	0.06034	1.062	0.864	1.306
Physical activity (ref=Low)					
	Moderate	-0.02769	0.973	0.832	1.137
	High	-0.07358	0.929	0.791	1.091
	Missing data	-0.10322	0.902	0.739	1.102

Smoking status (ref=Never smoker)					
	Former smoker	0.12268	1.131	1.004	1.273
	Current smoker	0.07954	1.083	0.901	1.301
Alcohol intake (g/d)		0.00511	1.005	1.001	1.009
Family history of cancer (ref=Yes)	No family history of cancer	-0.24121	0.786	0.703	0.878
Body mass index (kg/m^2)		0.01067	1.011	0.998	1.024
Height (cm)		0.01477	1.015	1.006	1.024
Energy intake (kcal/d)		0.0000127	1	1	1
mPNNS-GS (/13.5)		0.00511	1.005	1.001	1.009
Fiber intake (g/d)		-0.00548	0.995	0.984	1.005
Processed meat intake (g/d)		-0.00147	0.999	0.996	1.001
Red meat intake (g/d)		0.0004484	1	0.999	1.002
Parity (ref=0)					
	1 child	-0.0756	0.927	0.735	1.169
	2 children	-0.02871	0.972	0.789	1.197
	>2 children	-0.1705	0.843	0.671	1.060
Postmenopausal status (ref=No)		-0.30295	0.739	0.609	0.896
Use of hormonal treatment for menopause (ref=No)		0.16575	1.180	0.963	1.446

Use of contraception (ref=No)	Yes	0.08115	1.085	0.867	1.356

eTable 4. Factor Loadings of the Two First PCA-Extracted Factors, NutriNet-Santé Cohort, France[a]

	Factor 1	Factor 2
Food group		
Vegetables	0.59	0.27
Fruit	0.49	0.14
Wholegrain bread	0.39	0.06
Nuts	0.39	0.11
Water and non-sweet beverages (excluding juices)	0.31	0.18
Dried fruits	0.31	0.08
Vegetable oils	0.20	0.32
Sweet products	0.01	0.38
Potatoes	-0.08	0.36
Butter	-0.14	0.39
Alcoholic beverages	-0.18	0.38
Cheese	-0.19	0.41
Bread, rusks	-0.30	0.48
Processed meat	-0.32	0.28

Abbreviation: PCA, principal component analysis

[a]Only food groups with a factor loading >|0.3| for at least one of the two factors are displayed in the table

eTable 5. Multivariable Associations Between the Organic Food Score (Modeled as a Continuous Variable and as Quartiles) and Overall Cancer Risk, Additional Models, NutriNet-Santé Cohort, France, 2009 to 2016

	Q1	Q2	Q3	Q4	P-trend[a]	HR for a 5-point increase	P
Cases/non-cases	360/16471	358/17286	353/16887	269/16962			
Suppl. model 4[b]	1 (ref)	0.94 (0.81-1.09)	0.92 (0.79-1.07)	0.74 (0.63-0.87)	0.0005	0.92 (0.88-0.96)	<0.0001
Suppl. model 5[c]	1 (ref)	0.95 (0.82-1.10)	0.93 (0.80-1.09)	0.76 (0.64-0.89)	0.002	0.92 (0.89-0.96)	0.0002
Suppl. model 6[d]	1 (ref)	0.91 (0.75-1.11)	0.89 (0.72-1.09)	0.70 (0.56-0.88)	0.004	0.91 (0.86-0.96)	0.001

Abbreviations: HR, hazard ratio; mPNNS-GS, Programme National Nutrition Santé Guideline Score without the physical activity component; Q, quartile

[a]P-value for linear trend obtained from the quartile classification by modeling organic food score quartiles as an ordinal variable

[b]Suppl. model 4 is adjusted for age (time-scale) and sex, occupational status, education, marital status, monthly income, physical activity, smoking status, alcohol consumption, family history of cancer, month of inclusion, body mass index, height, energy intake, mPNNS-GS and for women, parity, menopausal status, hormonal replacement treatment and oral contraception

[c]Suppl. model 5 is Suppl. model 4 + further adjustments for fiber, processed meat and meat consumption and ultra-processed food

[d]Suppl. model 6 is Suppl. model 4 + further adjustments for fiber, processed meat and meat consumption, with cases occurring during the first two-years of follow-up removed (numbers of cases across quartiles were: 204, 195, 187, 136)

eTable 6. Parameter Estimates and Hazard Ratios (HR) with 95% Confidence Intervals (95% CI) for a 'Tandem' Variable Combining Both Different Diet Quality Levels (Reflected by the mPNNS-GS) and Organic Food Consumption Frequencies, NutriNet-Santé Cohort, France

'Tandem' variable[a]	Parameter estimate	HR	Lower CI	Upper CI
High organic food score + **high mPNNS-GS** vs. low organic food score + low mPNNS-GS	-0.27	0.78	0.58	1.01
High organic food score + **medium mPNNS-GS** vs. low organic food score + low mPNNS-GS	-0.34	0.71	0.53	0.95
High organic food score + **low mPNNS-GS** vs. low organic food score + low mPNNS-GS	-0.46	0.63	0.45	0.88

Abbreviations: mPNNS-GS, modified Programme National Nutrition Santé-Guideline Score

[a]High organic food score: belonging to quartile 4 of the organic food score; low organic food score: belonging to quartile 1 of the organic food score; high mPNNS-GS: belonging to tertile 3 of the mPNNS-GS; medium mPNNS-GS: belonging to tertile 2 of the mPNNS-GS; low mPNNS-GS: belonging to tertile 1 of the mPNNS-GS

eTable 7. Dietary Characteristics of Participants According to Quartiles of the Organic Food Score, NutriNet-Santé Cohort, France[a]

	Quartiles of the Organic Food Score				
	Q1	Q2	Q3	Q4	P[b]
N	16831	17644	17240	17231	
Organic food score (0-32)	0.72 (0.82)	4.95 (1.41)	10.36 (1.69)	19.36 (4.28)	<0.0001
Nutrient intakes					
% carbohydrates[c]	42.60 (6.90)	42.97 (6.82)	43.10 (7.01)	43.53 (7.18)	<0.0001
% lipids[c]	39.29 (6.62)	39.00 (6.47)	38.99 (6.60)	39.56 (6.78)	0.0004
% proteins[c]	17.80 (3.97)	17.72 (3.93)	17.58 (4.04)	16.60 (3.95)	<0.0001
MUFA (g/d)	30.76 (11.21)	30.28 (10.78)	30.35 (11.12)	31.35 (11.74)	<0.0001
PUFA (g/d)	11.46 (5.37)	11.28 (5.03)	11.44 (5.36)	12.48 (6.22)	<0.0001
SFA (g/d)	34.54 (13.33)	33.50 (12.66)	32.95 (12.83)	31.74 (12.56)	<0.0001
Animal proteins (g/d)	58.56 (19.90)	56.47 (19.42)	54.33 (19.84)	46.79 (20.35)	<0.0001
Vegetable proteins (g/d)	23.69 (7.90)	24.31 (7.87)	25.47 (8.57)	28.40 (10.52)	<0.0001
Alcohol (g/d)	8.34 (13.84)	8.18 (13.11)	8.17 (12.19)	7.54 (11.30)	<0.0001
Beta-carotene (g/d)	3057.31 (2479.4)	3287.75 (2523.8)	3544.41 (2657.4)	4102.32 (3224.9)	<0.0001
Calcium (mg/d)	943.26 (319.41)	939.26 (312.57)	941.71 (315.80)	916.81 (305.90)	<0.0001
Cholesterol (mg/d)	329.76 (146.68)	319.67 (142.60)	313.47 (142.45)	289.95 (141.84)	<0.0001
Iron (mg/d)	12.74 (4.69)	13.05 (4.78)	13.64 (4.94)	14.97 (5.57)	<0.0001
Fibers (g/d)	17.88 (6.55)	18.87 (6.84)	20.05 (7.20)	22.60 (8.31)	<0.0001

Sodium (mg/d)	2764.38 (950.43)	2722.91 (912.94)	2701.14 (920.35)	2624.57 (911.11)	<0.0001
Folates (µg/d)	312.09 (113.27)	324.22 (114.62)	337.50 (119.16)	361.93 (130.77)	<0.0001
Vitamin C (mg/d)	110.62 (82.54)	117.15 (74.90)	121.75 (75.03)	126.34 (96.72)	<0.0001
Vitamin E (mg/d)	11.46 (4.99)	11.44 (4.71)	11.58 (4.85)	12.55 (5.53)	<0.0001
Main food group intakes (g/d)					
Vegetables	196.94 (120.71)	213.20 (121.39)	228.70 (121.94)	255.95 (131.37)	<0.0001
Fruit	168.80 (147.33)	185.35 (150.51)	199.97 (154.83)	215.65 (158.03)	<0.0001
Vegetable oils	7.97 (8.21)	8.25 (8.34)	8.62 (8.53)	10.49 (10.11)	<0.0001
Legumes	9.11 (22.54)	9.93 (23.16)	11.38 (25.09)	18.31 (33.89)	<0.0001
Nuts	1.55 (7.35)	1.90 (7.34)	3.16 (10.59)	6.69 (15.29)	<0.0001
Potatoes	47.26 (50.96)	44.26 (48.69)	44.12 (49.45)	44.05 (49.59)	<0.0001
Fish	28.16 (35.74)	30.41 (36.90)	31.91 (38.10)	31.45 (37.14)	<0.0001
Processed meat	23.67 (29.40)	21.15 (27.12)	18.85 (24.92)	15.12 (22.49)	<0.0001
Meat	48.72 (44.51)	44.59 (41.44)	40.77 (40.67)	31.44 (36.81)	<0.0001
Poultry	26.50 (33.39)	25.92 (32.89)	24.69 (32.21)	20.08 (29.20)	<0.0001
Eggs	13.20 (20.99)	13.02 (20.36)	13.36 (20.66)	14.23 (21.21)	<0.0001
Milk	93.46 (126.66)	83.30 (119.36)	73.03 (114.51)	50.45 (94.82)	<0.0001

Abbreviations: MUFA, monounsaturated fatty acids; PUFA, polyunsaturated fatty acids; SFA, saturated fatty acids

[a]Values are means (SD)

[b]P-value based on linear trend

[c]As % of energy intake (without alcohol)

eAppendix. Cancer Risk Modeling

Data were analyzed by cancer sites with significant numbers of cases, namely breast, prostate, skin (melanoma and spinocellular carcinoma) and colorectal cancers. Lymphomas were also investigated as of relevance in relation to organic food consumption.

Participants contributed person-time until the date of cancer diagnosis, the date of the last completed questionnaire, the date of death, or November 30, 2016, whichever occurred first. For analysis by cancer site, other cases than the one of interest were censored at the diagnosis date. Thus, other cancer events were considered to be non-cases for the cancer studied and participants contributed person time until the date of diagnosis of their cancer. For breast cancer, supplemental analyses stratified by menopausal status were performed among women. Women contributed person-time to each model according to age at menopause.

Proportional hazards assumption was assessed graphically. A first model was adjusted for age (time-scale) and sex. A second model (main model) was further adjusted for month of inclusion, occupational status, educational level, marital status, monthly income, physical activity, smoking status, alcohol intake, family history of cancer, body mass index (BMI), height, energy intake without alcohol, mPNNS-GS, dietary fiber intake and consumption of meat and processed meat. For women, additional adjustments were performed for the number of biological children, menopausal status at baseline, hormonal treatment for menopause at baseline and oral contraception use at baseline. **eTable 3** provides the parameter estimates and HR (95%CI) for all the independent variables entered into the main model.

Further adjustments for ultra-processed food, fruit and vegetable consumption, dietary supplement use and sun exposure were performed but did not substantially change the risk estimates (data not shown).

In order to consider potential residual confounding related to dietary patterns not captured by the mPNNS-GS, an additional model was adjusted for ultra-processed food consumption, fruit

and vegetable consumption, and western and healthy dietary patterns (model 3). To do so, we performed a principal component analysis (PCA) on 59 food groups. Dietary patterns extracted by PCA are independent linear combinations of the food group consumptions, maximizing the explained variance. For each participant, the individual pattern score was calculated by summing the intake of the 59 food groups, weighted by their factor loading. **eTable 4** provides the loadings of the two first PCA-extracted factors**.**

Additional models (Suppl. models 4 and 5) with different types of adjustments were also performed. Analyses were also performed after excluding cancer cases diagnosed during the two first years of individual follow-up to restrict potential reverse causality bias (Suppl. model 6) (**eTable 5**).

In addition, to examine the combined effects of various diet quality levels and high frequency of organic food consumption on cancer risk, we created a 'tandem' variable based on both quartiles of the organic food score and tertiles of the mPNNS-GS, consisting of 12 modalities. Each modality represented a particular combination of the two aforementioned scores. For instance, a high-quality diet and high frequency of organic food consumption (defined as belonging to both Q4 of the organic food score and tertile 3 of the mPNNS-GS) was modality 1 while low-quality diet and low frequency of organic food consumption (defined as belonging to both Q1 of the organic food score and tertile 1 of the mPNNS-GS) was modality 12. Analyses were performed using model 2 covariates (reference=belonging to Q1 of the organic food score and tertile 1 of the mPNNS-GS) (**eTable 6)**.

Additionally, as the different food categories included in the organic food score represent different exposure levels to residual pesticides (plant products are more likely to contain pesticide residues than animal products) [1], a simplified score relying on the main plant-based food groups (fruit; vegetables; flour; soy-based products; bread and cereals; grains and legumes) was also computed in a sensitivity analysis. The association between the simplified

organic food score and risk of cancer was examined using models adjusted for model 2 covariates.

To determine whether the associations varied according to major confounders, we also conducted tests for interactions. In addition, in order to identify vulnerable subgroups, we investigated the association between the organic food score (modeled as quartiles, Q4 vs. Q1, using model 2 covariates) and overall cancer risk stratified by the following factors: sex, age (using median-age as a cut-off), education level, family history of cancer, overall dietary quality, BMI and tobacco status.

eReference

1. EFSA. The 2015 European Union Report on Pesticide Residues in Food. EFSA Journal, 11(3), 3130. 2017.