

Supplementary information:

Supplementary Material S1: Flowchart for decomposition of ingredients and matching

Supplementary Material S2: Details on the computation of the sPNNS-GS2 score

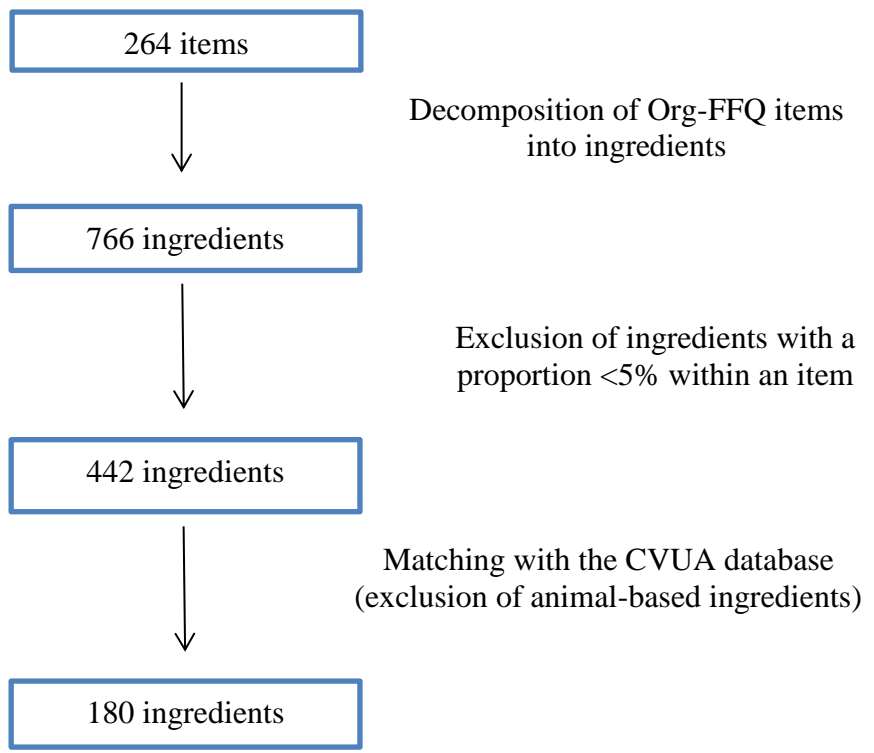
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Supplementary Material S1: Flowchart for decomposition of ingredients and matching



Supplementary Material S2: Details on the computation of the simplified Programme National Nutrition Santé Guideline Score 2 (sPNNS-GS2 score)

Dietary components	Recommendation	Criteria ¹	Score	
Fruits and vegetables (weight=3)	At least 5 servings/day, with 1 max as juice and 1 max as dried	[0 - 3.5[	0
		[3.5 - 5[	0.5
		[5 - 7.5[	1
		≥7.5	2	
	Prefer organic fruits	Most of the time	0.5	
		Occasionally	0.25	
		Never	0	
	Prefer organic vegetables	Most of the time	0.5	
		Occasionally	0.25	
		Never	0	
Nuts (weight=1)	A handful/day	0	0	
		]0 - 0.5[	0.5
		[0.5- 1.5[	1
		≥1.5	0	
Legumes (weight=1)	At least 2 servings/week	0 /week	0	
		]0-2[/week	0.5
		≥2 /week	1	
	Prefer organic legumes	Most of time	0.5	
		Occasionally	0.25	
		Never	0	
Whole-grain food (weight=2)	Every day	0	0	
		]0 - 1[	0.5
		[1 - 2[	1
		≥2	1.5	
	Prefer organic bread	Most of the time	0.5	
		Occasionally	0.25	
		Never	0	
	Prefer organic grains	Most of the time	0.5	
		Occasionally	0.25	
		Never	0	
Milk and dairy products (weight=1)	2 servings/day	[0 - 0.5[	0
		[0.5 - 1.5[	0.5
		[1.5 - 2.5[	1
		≥2.5	0	
Red meat (weight=2)	Limit consumption	[0 - 500[g/week	0	
		[500 - 750[g/week	-1	
		≥750 g/week	-2	
Processed meat (weight=3)	Limit consumption	[0 - 150[g/week	0	
		[150 - 300[g/week	-1	
		≥300 g/week	-2	
	Prefer white ham over other processed meat ²	Ratio <50%	0	
		Ratio ≥50%	0.5	
Fish and seafood (weight=2)	2 servings/week	[0 - 1.5[servings/week	0	
		[1.5 - 2.5[servings/week	1	
		[2.5 - 3.5[servings/week	0.5	
		≥3.5 servings/week	0	
		Fatty fish 1 serving/week	[0 - 0.5[servings/week	0
			[0.5 - 1.5[servings/week	1

		≥ 1.5 servings/week	
Added fat (weight=2)	Avoid overeating	$>16\%$ of EIWA ^c	0
		$\leq 16\%$ of EIWA	1.5
	Prefer ALA-rich and olive oil over other oils	Ratio $<50\%$	0
		Ratio $\geq 50\%$	1
Prefer vegetal fat over animal fat	Ratio $>50\%$	0	
	Ratio $\leq 50\%$	1	
Sugary foods (weight=3)	Limit consumption	$<10\%$ of EIWA	0
		$[10-15\%$ of EIWA	-1
		$\geq 15\%$ of EIWA	-2
Sweet-tasting beverages ³ (weight=3)	Limit consumption	0 mL/day	0
		$]0 - 250[$ mL/day	-0.5
		$[250 - 750[$ mL/day	-1
		≥ 750 mL/day	-2
Alcoholic beverages (weight=3)	Limit consumption	0 g/week	0.5
		$]0-100[$ g/week	0
		$]100-150[$	-1
		$]150-200[$ g/week	-1.5
		>200 g/week	-2
Salt (weight=3)	Limit consumption	<6 g/day	1
		$[6-8[$ g/day	0
		$[8-10[$ g/day	-0.5
		$[10-12[$ g/day	-1
		≥ 12 g/day	-2

Abbreviations: EIWA: energy intake without alcohol, ALA: α -linolenic acid, PNNS-GS2: Programme

National Nutrition Santé – Guideline Score 2

¹ Servings per day unless otherwise is stated

² Conditional: the 0.5 bonus point only occurs if total processed meat consumption is more than 150 g/week

³ Sweetened beverages are specifically sugary sweeten beverages, artificially sweetened beverages and fruit juices

Supplementary Material S3: Details on the NOVA classification

All food and beverage items of the NutriNet-Santé composition table were categorized by a team of three trained dietitians into one of the four food groups in NOVA, a food classification system based on industrial food processing criteria.

Classification was then reviewed by a committee constituted of three dietitians and five researchers, specialized in nutritional epidemiology.

In case of uncertainty for a given food/beverage product, researchers seek consensus based on the proportion of homemade and artisanal foods versus industrial brands declared by participants.

Ultra-processed foods are treated with varied industrial processes including hydrogenation, hydrolysis, extruding, moulding, reshaping, and pre-processing by frying. Flavouring agents, colours, emulsifiers, humectants, non-sugar sweeteners and other cosmetic additives are often added to these products to imitate sensorial characteristics of unprocessed or minimally processed foods and their culinary preparations. The UPF group is defined by opposition to the other NOVA groups: “unprocessed or minimally processed foods” (fresh, dried, grounded, chilled, frozen, pasteurized or fermented staple foods such as fruits, vegetables, pulses, rice, pasta, eggs, meat, fish or milk), “processed culinary ingredients” (salt, vegetable oils, butter, sugar and other substances extracted from foods and used in kitchens to transform unprocessed or minimally processed foods into culinary preparations) and “processed foods” (canned vegetables with added salt, sugar-coated dry fruits, meat products only preserved by salting, cheeses and freshly made unpackaged breads, and other products manufactured with the addition of salt, sugar or other substances of the “processed culinary ingredients” group). Home-made and artisanal food preparations were identified and decomposed using standardized recipes, and ingredients classified through the NOVA classification.

Supplementary Material S4: Details of the Non-Negative Matrix Factorization (NMF) procedure

Non-negative Matrix Factorization (NMF) is a non-supervised data decomposition method, proposed by Lee¹ to deal with non-negative data using non-negativity constraints.

This method is relevant for non-negative data with excess zeros and measurement error such as exposure to pesticides constrained by the detection limits of dosing techniques.

The purpose of NMF is to explain observed data through a limited number of components approximating the original data as accurately as possible.

The matrix representing the basis components and the matrix of mixture coefficients are constrained to have non-negative values, and no orthogonality or independence constraints are imposed on the basis components.

Let X be a matrix ($n \times p$) containing only non-negative values and without a row or column containing only 0 and r a relatively small integer $< n$ and $< p$.

The non-negative factorization of matrix X is the search for two matrices W ($n \times r$) and H ($r \times p$) containing only positive or zero values and whose product approaches X so that $X \approx WH$.

The factorization is solved by searching for a local optimum of the optimization problem:

$$\min_{W, H \geq 0} [L(X, WH)]$$

L is a loss function measuring approximation quality. Since the objective is usually to reduce the dimension of the original data, the factorization rank r is in practice often chosen such that $r \ll \min(n, p)$. This equation is solved by a multiplicative algorithm based on a gradient descent approach.

Supplementary Table S1: Nutritional characteristics of the participants at baseline, NutriNet-Santé Study, 2014 (N=13,149)

	All participants	Non-cases	Cases	P¹
N	13,149	12,980	169	
Energy intake without alcohol (kcal/day)	1900.40 (577.18)	1901.07 (577.40)	1848.64 (559.36)	0.24
Ethanol, grams/day	7.09 (9.60)	7.09 (9.60)	7.05 (9.34)	0.95
sPNNS-GS2 score	3.38 (3.19)	3.38 (3.19)	3.28 (3.41)	0.68
provegetarian score	35.92 (5.70)	35.92 (5.69)	35.63 (6.13)	0.50
Special diet, %				
Omnivorous	96.50	96.50	96.45	0.80
Pesco-Vegetarian	1.86	1.86	1.18	
Vegetarian	1.29	1.28	1.78	
Vegan	0.36	0.35	0.59	
PANDiet score (/100)	65.84 (7.78)	65.84 (7.79)	65.62 (7.55)	0.75
Carbohydrates (% of alcohol free energy intake)	38.81 (7.35)	38.81 (7.36)	38.95 (6.55)	0.80
Lipids (% of alcohol-free energy intake)	41.91 (7.20)	41.91 (7.20)	41.72 (7.28)	0.73
Protein (% of alcohol-free energy intake)	18.87 (3.69)	18.87 (3.69)	18.90 (3.71)	0.92
Plant / total protein ratio	0.33 (0.13)	0.33 (0.13)	0.32 (0.13)	0.12
Proportion of individuals with organic food in the diet ≥ 50%, %	13.89	13.95	9.47	0.09
Proportion of organic food in the diet	0.24 (0.21)	0.24 (0.21)	0.21 (0.21)	0.04
Proportion of ultra-processed food in the diet	0.15 (0.07)	0.15 (0.07)	0.14 (0.07)	0.35
Proportion of processed food in the diet	0.09 (0.05)	0.09 (0.05)	0.10 (0.06)	0.21
Proportion of unprocessed food in the diet	0.74 (0.08)	0.74 (0.08)	0.74 (0.09)	0.69

PANDiet score: Probability of Adequate Nutrient Intake score ; sPNNS-GS2: Simplified Programme National Nutrition Santé Guideline Score 2

¹P-values for comparisons between cases and non-cases using Chi-square tests or Wilcoxon tests, as appropriate.

Supplementary Table S2: Characteristics of quintiles for NMF Component 1, NutriNet-Santé Study, 2014 (N=13,149)

NMF Component 1	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5	P-value for trend	P¹
N	2629	2630	2630	2630	2630		
Age, years, mean (SD)	60.23 (7.40)	59.98 (7.30)	60.26 (7.24)	60.59 (7.36)	61.37 (7.59)	<0.0001	<0.0001
Monthly income per household unit, %						0.20	0.002
<€1200	10.80	9.73	8.86	8.71	8.37		
€1200-1800	22.59	22.24	21.10	20.99	21.22		
€1800-2700	27.42	27.95	27.57	29.09	28.40		
>€2700	31.04	33.16	35.25	35.10	33.50		
Unwilling to answer	8.14	6.92	7.22	6.12	8.52		
Smoking habits, %						0.0003	0.01
Current smoker	10.38	9.62	8.37	8.40	8.21		
Former smoker	43.59	42.55	41.14	41.83	42.36		
Never smoker	46.03	47.83	50.49	49.77	49.43		
Educational level, %						0.90	0.15
Less than high-school diploma	26.89	26.84	25.55	26.50	27.87		
High school diploma	18.18	16.08	19.05	17.19	17.38		
Post Graduate	54.93	57.07	55.40	56.31	54.75		
Occupational status, %						0.63	<0.0001
Employee, manual worker	13.05	11.60	12.47	12.13	12.21		
Intermediate profession	11.72	13.16	13.73	13.65	12.32		
Managerial or intellectual profession	15.14	15.55	14.18	14.07	11.83		
Retired	46.86	47.03	48.14	49.58	52.97		
Self-employed, farmer	1.90	1.98	1.63	1.25	1.18		
Unemployed or never employed	11.34	10.69	9.85	9.32	9.51		
Place of residence, %						<0.0001	<0.0001
Rural community	24.04	24.22	24.14	22.43	20.04		
Urban unit with a population <20,000 inhabitants	16.93	16.77	15.32	15.86	13.99		
Urban unit with a population between 20,000 and 200,000	20.62	19.73	18.17	19.13	19.62		
Urban unit with a population >200,000 inhabitants	38.42	39.28	42.36	42.59	46.35		
Body Mass Index >25 kg/m², %	34.27	38.78	35.97	35.67	26.24	<0.0001	<0.0001
Physical activity, %						0.30	0.015
High	35.60	34.03	35.55	35.48	36.81		
Moderate	34.54	37.91	35.78	36.92	35.17		
Low	18.94	17.30	17.22	16.62	15.29		
Missing data	10.92	10.76	11.44	10.99	12.74		
Use of hormonal treatment for menopause, %						0.14	<0.0001
Yes	9.08	9.61	12.27	11.09	12.53		
No	84.65	83.59	82.72	83.55	82.00		
Missing data	6.27	6.80	5.01	5.36	5.47		
Parity, %						0.008	<0.0001
No children	17.63	12.95	13.06	14.51	14.20		
One child	19.03	16.64	17.51	16.75	17.89		
2 children	37.69	42.23	39.84	40.30	40.56		
More than 2 children	25.65	28.18	29.59	28.45	27.35		
Family history of cancer, %	51.43	52.85	51.25	52.51	53.23	0.29	0.52

NMF: Non-Negative Matrix Factorization

¹P-value for Chi-square comparisons or linear regressions as appropriate across quintiles.

Supplementary Table S3: Nutritional characteristics of the participants across quintiles of NMF Component 1, NutriNet-Santé Study, 2014 (N=13,149)

NMF Component 1	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5	P-value for trend	P ¹
N	2629	2630	2630	2630	2630		
Energy intake without alcohol, kcal/day	1747.04 (573.34)	1803.04 (535.53)	1896.91 (554.73)	1977.80 (570.57)	2077.14 (589.17)	<0.0001	<0.0001
Ethanol, grams/day	7.14 (10.81)	7.17 (9.59)	6.72 (9.10)	7.40 (9.23)	7.04 (9.15)	<0.0001	0.14
sPNNS-GS2 score	3.73 (3.20)	3.23 (3.22)	3.36 (3.12)	3.16 (3.25)	3.40 (3.14)	<0.0001	<0.0001
provegetarian score	37.16 (5.95)	35.43 (5.64)	35.47 (5.59)	35.64 (5.59)	35.90 (5.52)	<0.0001	<0.0001
Special diet, %							
Omnivorous	92.93	96.88	97.53	97.79	97.38	<0.0001	<0.0001
Pesco-Vegetarian	3.27	1.41	1.56	1.41	1.63		
Vegetarian	2.89	1.52	0.65	0.65	0.72		
Vegan	0.91	0.19	0.27	0.15	0.27		
PANDiet score (/100)	66.03 (7.98)	65.45 (7.39)	65.82 (7.61)	65.94 (7.76)	65.94 (8.16)	0.04	0.06
Carbohydrates (% of alcohol free energy intake)	37.54 (7.91)	37.89 (7.16)	38.36 (6.93)	39.30 (7.00)	40.95 (7.22)	<0.0001	<0.0001
Lipids (% of alcohol-free energy intake)	43.68 (7.81)	42.62 (6.86)	42.13 (6.83)	41.17 (6.82)	39.95 (7.10)	<0.0001	<0.0001
Protein (% of alcohol-free energy intake)	18.47 (4.09)	19.15 (3.77)	19.11 (3.60)	19.06 (3.46)	18.55 (3.46)	<0.0001	<0.0001
Plant / total protein ratio	0.38 (0.17)	0.32 (0.13)	0.32 (0.12)	32 (0.12)	0.33 (0.12)	<0.0001	<0.0001
Proportion of organic food in the diet	0.39 (0.26)	0.25 (0.20)	0.22 (0.18)	0.19 (0.17)	0.15 (0.15)	<0.0001	<0.0001
Proportion of individuals with organic food in the diet ≥ 50%, %	38.30	13.76	8.78	5.59	3.04	<0.0001	<0.0001
Proportion of ultra-processed food in the diet	0.15 (0.08)	0.15 (0.08)	0.15 (0.07)	0.14 (0.07)	0.14 (0.07)	<0.0001	<0.0001
Proportion of processed food in the diet	0.09 (0.05)	0.09 (0.05)	0.09 (0.04)	0.09 (0.05)	0.09 (0.05)	<0.0001	<0.0001
Proportion of unprocessed food in the diet	0.74 (0.09)	0.73 (0.09)	0.74 (0.08)	0.74 (0.08)	0.75 (0.08)	<0.0001	<0.0001

NMF: Non-Negative Matrix Factorization; PANDiet score: Probability of Adequate Nutrient Intake score ; sPNNS-GS2: Simplified Programme National Nutrition Santé Guideline Score 2

¹P-value for Chi-square comparisons or linear regressions as appropriate across quintiles.

Supplementary Table S4: Characteristics of quintiles for NMF Component 2, NutriNet-Santé Study, 2014 (N=13,149)

NMF Component 2	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5	P-value for trend	P ¹
N	2629	2630	2630	2630	2630		
Age, years, mean (SD)	59.50 (7.37)	59.48 (7.19)	60.34 (7.27)	60.81 (7.24)	62.29 (7.52)	<0.0001	<0.0001
Monthly income per household unit, %						0.42	0.0002
<€1200	10.57	9.20	8.44	8.90	9.35		
€1200-1800	22.56	22.28	20.34	21.10	21.86		
€1800-2700	27.01	28.10	28.90	28.33	28.10		
>€2700	33.02	34.60	35.06	34.07	31.29		
Unwilling to answer	6.85	5.82	7.26	7.60	9.39		
Smoking habits, %						0.008	0.018
Current smoker	9.43	10.19	9.43	8.29	7.64		
Former smoker	41.35	43.16	42.40	42.93	41.63		
Never smoker	49.22	46.65	48.17	48.78	50.72		
Educational level, %						0.0003	<0.0001
Less than high-school diploma	24.34	24.18	24.41	28.67	32.05		
High school diploma	17.76	18.59	16.58	17.26	17.68		
Post Graduate	57.89	57.22	59.01	54.07	50.27		
Occupational status, %						<0.0001	<0.0001
Employee, manual worker	13.69	12.36	12.17	11.56	11.67		
Intermediate profession	13.08	14.52	14.11	13.23	9.62		
Managerial or intellectual profession	16.36	17.22	14.37	12.85	9.96		
Retired	44.20	44.49	48.06	49.92	57.91		
Self-employed, farmer	2.09	1.75	1.41	1.44	1.25		
Unemployed or never employed	10.58	9.65	9.89	10.99	9.58		
Place of residence, %						<0.0001	<0.0001
Rural community	28.30	24.26	22.40	21.60	18.33		
Urban unit with a population <20,000 inhabitants	17.50	16.01	15.32	15.10	14.94		
Urban unit with a population between 20,000 and 200,000	18.75	19.09	19.20	20.08	20.15		
Urban unit with a population >200,000 inhabitants	35.45	40.65	43.08	43.23	46.58		
Body Mass Index >25 kg/m², %	34.65	39.32	37.07	32.70	27.19	<0.0001	<0.0001
Physical activity, %						0.10	<0.0001
High	37.62	31.71	33.92	35.48	38.75		
Moderate	34.20	37.91	36.50	38.78	32.93		
Low	17.57	19.43	18.56	15.17	14.64		
Missing data	10.61	10.95	11.03	10.57	13.69		
Use of hormonal treatment for menopause, %						<0.0001	<0.0001
Yes	8.81	10.18	11.70	11.36	12.53		
No	84.19	82.34	82.95	83.78	83.25		
Missing data	6.99	7.48	5.36	4.86	4.22		
Parity, %						0.10	0.005
No children	16.15	13.82	14.24	13.82	14.32		
One child	18.88	16.07	17.93	17.39	17.55		
2 children	38.87	41.89	38.40	39.73	41.74		
More than 2 children	26.10	28.22	29.43	29.05	26.40		
Family history of cancer, %	50.40	52.55	52.51	53.80	52.02	0.15	0.17

NMF: Non-Negative Matrix Factorization

¹: P-value for Chi-square comparisons or linear regressions as appropriate across quintiles

Supplementary Table S5: Nutritional characteristics of the participants across quintiles of NMF Component 2, NutriNet-Santé Study, 2014 (N=13,149)

NMF Component 2	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5	P-value for trend	P ¹
N	2629	2630	2630	2630	2630		
Energy intake without alcohol (kcal/day)	1734.32 (558.76)	1778.15 (547.38)	1847.42 (531.51)	1978.06 (551.13)	2163.98 (589.24)	<0.0001	<0.0001
Ethanol, grams/day	5.61 (7.77)	7.15 (9.42)	7.21 (9.43)	7.82 (10.51)	7.68 (10.45)	<0.0001	<0.0001
sPNNS-GS2 score	3.92 (2.93)	3.10 (3.13)	3.21 (3.30)	3.23 (3.25)	3.42 (3.27)	<0.0001	<0.0001
provegetarian score	36.95 (6.09)	35.28 (5.63)	35.45 (5.54)	35.57 (5.52)	36.35 (5.51)	<0.0001	<0.0001
Special diet, %							
Omnivorous	93.53	97.30	97.11	97.15	97.41	<0.0001	<0.0001
Pesco-Vegetarian	2.55	1.33	1.44	2.09	1.86		
Vegetarian	3.12	1.06	1.14	0.53	0.57		
Vegan	0.80	0.30	0.30	0.23	0.15		
PANDiet score (/100)	66.23 (7.78)	65.28 (7.45)	65.81 (7.46)	66.08 (7.93)	65.78 (8.24)	<0.0001	0.0001
Carbohydrates (% of alcohol free energy intake)	38.68 (7.60)	37.66 (7.02)	38.07 (7.23)	38.68 (6.95)	40.95 (7.51)	<0.0001	<0.0001
Lipids (% of alcohol-free energy intake)	42.69 (7.47)	42.76 (6.90)	42.35 (7.17)	41.74 (6.87)	40.02 (7.25)	<0.0001	<0.0001
Protein (% of alcohol-free energy intake)	18.22 (3.81)	19.19 (3.69)	19.20 (3.64)	19.16 (3.59)	18.57 (3.63)	<0.0001	<0.0001
Plant / total protein ratio	0.37 (0.16)	0.32 (0.13)	0.32 (0.12)	0.32 (0.12)	0.34 (0.12)	<0.0001	<0.0001
Proportion of organic food in the diet	0.41 (0.24)	0.26 (0.20)	0.21 (0.18)	0.18 (0.17)	0.14 (0.15)	<0.0001	<0.0001
Proportion of individuals with organic food in the diet ≥ 50%, %	38.99	13.84	7.83	5.78	3.04	<0.0001	<0.0001
Proportion of ultra-processed food in the diet	0.15 (0.08)	0.15 (0.07)	0.15 (0.07)	0.15 (0.07)	0.14 (0.07)	<0.0001	<0.0001
Proportion of processed food in the diet	0.09 (0.05)	0.10 (0.05)	0.09 (0.05)	0.09 (0.05)	0.09 (0.05)	<0.0001	<0.0001
Proportion of unprocessed food in the diet	0.74 (0.09)	0.73 (0.09)	0.74 (0.08)	0.74 (0.08)	0.76 (0.08)	<0.0001	<0.0001

NMF: Non-Negative Matrix Factorization; PANDiet score: Probability of Adequate Nutrient Intake score ; sPNNS-GS2: Simplified Programme National Nutrition Santé Guideline Score 2

¹P-value for Chi-square comparisons or linear regressions as appropriate across quintiles.

Supplementary Table S 6: Characteristics of quintiles for NMF Component 3, NutriNet-Santé Study, 2014 (N=13,149)

NMF Component 3	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5	P-value for trend	P ¹
N	2629	2630	2630	2630	2630		
Age, years, mean (SD)	60.35 (7.76)	60.46 (7.51)	60.48 (7.42)	60.36 (7.17)	60.76 (7.08)	0.14	0.26
Monthly income per household unit, %						0.27	<0.0001
<€1200	10.88	10.15	8.75	8.37	8.33		
€1200-1800	23.32	21.98	21.06	19.62	22.17		
€1800-2700	26.40	27.60	28.40	29.05	28.97		
>€2700	30.96	32.43	35.44	36.50	32.70		
Unwilling to answer	8.44	7.83	6.35	6.46	7.83		
Smoking habits, %						0.05	<0.0001
Current smoker	11.91	9.16	8.06	8.29	7.57		
Former smoker	37.73	44.03	42.59	43.38	43.73		
Never smoker	50.36	46.81	49.35	48.33	48.71		
Educational level, %						<0.0001	<0.0001
Less than high-school diploma	31.99	28.44	24.75	23.95	24.52		
High school diploma	19.32	16.92	17.57	17.87	16.20		
Post Graduate	48.69	54.64	57.68	58.17	59.28		
Occupational status, %						0.06	<0.0001
Employee, manual worker	15.37	12.55	10.61	10.95	11.98		
Intermediate profession	11.60	13.46	14.07	13.35	12.09		
Managerial or intellectual profession	11.87	14.07	15.67	15.36	13.80		
Retired	48.80	48.52	48.29	48.63	50.34		
Self-employed, farmer	1.22	1.83	1.56	1.63	1.71		
Unemployed or never employed	11.15	9.59	9.81	10.08	10.08		
Place of residence, %						<0.0001	<0.0001
Rural community	19.89	20.27	21.29	24.18	29.24		
Urban unit with a population <20,000 inhabitants	19.21	19.51	19.66	19.77	19.13		
Urban unit with a population between 20,000 and 200,000	14.23	13.61	16.65	16.12	18.25		
Urban unit with a population >200,000 inhabitants	46.67	46.62	42.40	39.92	33.38		
Body Mass Index >25kg/m², %	42.60	41.37	35.32	30.27	21.37	<0.0001	<0.0001
Physical activity, %						<0.0001	<0.0001
High	30.77	31.86	34.30	38.02	42.51		
Moderate	34.84	37.30	37.26	37.11	33.80		
Low	21.91	18.52	17.72	15.17	12.05		
Missing data	12.48	12.32	10.72	9.70	11.63		
Use of hormonal treatment for menopause, %						0.02	0.01
Yes	10.22	10.14	11.58	12.27	10.37		
No	82.71	84.28	83.02	82.07	84.43		
Missing data	7.07	5.58	5.39	5.66	5.20		
Parity, %						<0.0001	0.004
No children	16.41	15.23	14.28	13.60	12.84		
One child	18.09	18.53	17.74	16.14	17.32		
2 children	39.02	39.65	39.54	40.60	41.82		
More than 2 children	26.48	26.59	28.45	29.66	28.03		
Family history of cancer, %	52.64	50.57	54.14	53.31	50.61	0.67	0.03

NMF: Non-Negative Matrix Factorization

¹P-value for Chi-square comparisons or linear regressions as appropriate across quintiles.

Supplementary Table S7: Nutritional characteristics of the participants across quintiles of NMF Component 3, NutriNet-Santé Study, 2014 (N=13,149)

NMF Component 3	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5	P-value for trend	P ¹
N	2629	2630	2630	2630	2630		
Energy intake without alcohol (kcal/day)	1824.46 (577.97)	1856.00 (582.40)	1888.53 (568.44)	1906.08 (559.76)	2026.90 (576.70)	<0.0001	<0.0001
Ethanol, grams/day	7.06 (10.55)	6.86 (9.69)	7.15 (9.15)	7.15 (9.24)	7.25 (9.30)	<0.0001	0.64
sPNNS-GS2 score	2.83 (3.22)	3.24 (3.13)	3.34 (3.20)	3.59 (3.20)	3.89 (3.12)	<0.0001	<0.0001
provegetarian Score	34.16 (5.38)	34.87 (5.36)	35.64 (5.38)	36.49 (5.52)	38.45 (5.86)	<0.0001	<0.0001
Special diet, %						<0.0001	<0.0001
Omnivorous	97.53	97.45	97.30	96.96	93.27		
Pesco-Vegetarian	1.41	1.33	1.37	1.63	3.54		
Vegetarian	0.91	0.91	1.03	1.10	2.47		
Vegan	0.15	0.30	0.30	0.30	0.72		
PANDiet score(/100)	64.66 (7.91)	65.35 (7.61)	65.48 (7.56)	66.49 (7.69)	67.19 (7.89)	<0.0001	<0.0001
Carbohydrates (% of alcohol free energy intake)	38.66 (7.66)	38.91 (7.23)	38.59 (7.33)	38.97 (7.21)	38.91 (7.33)	0.48	0.23
Lipids (% of alcohol-free energy intake)	41.37 (7.33)	41.43 (7.06)	42.03 (7.11)	41.99 (7.06)	42.73 (7.38)	<0.0001	<0.0001
Protein (% of alcohol-free energy intake)	19.56 (3.88)	19.24 (3.69)	18.97 (3.57)	18.62 (3.56)	17.95 (3.56)	<0.0001	<0.0001
Plant / total protein ratio	0.30 (0.12)	0.31 (0.12)	0.32 (0.12)	0.34 (0.13)	0.39 (0.16)	<0.0001	<0.0001
Proportion of organic food in the diet	0.10 (0.14)	0.18 (0.18)	0.24 (0.19)	0.28 (0.19)	0.40 (0.22)	<0.0001	<0.0001
Proportion of individuals with organic food in the diet ≥ 50%, %	2.62	7.07	11.06	15.25	33.46	<0.0001	<0.0001
Proportion of ultra-processed food in the diet	0.16 (0.09)	0.15 (0.07)	0.15 (0.07)	0.14 (0.07)	0.13 (0.06)	<0.0001	<0.0001
Proportion of processed food in the diet	0.10 (0.05)	0.09 (0.05)	0.09 (0.05)	0.09 (0.04)	0.09 (0.05)	0.0001	<0.0001
Proportion of unprocessed food in the diet	0.72 (0.10)	0.74 (0.08)	0.74 (0.08)	0.75 (0.08)	0.76 (0.08)	<0.0001	<0.0001

NMF: Non-Negative Matrix Factorization; PANDiet score: Probability of Adequate Nutrient Intake score ; sPNNS-GS2: Simplified Programme National Nutrition Santé Guideline Score 2

¹P-value for Chi-square comparisons or linear regressions as appropriate across quintiles.

Supplementary Table S8: Characteristics of quintiles for NMF Component 4, NutriNet-Santé Study, 2014 (N=13,149)

NMF Component 4	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5	P-value for trend	P ¹
N	2629	2630	2630	2630	2630		
Age, years, mean (SD)	61.06 (7.09)	60.26 (7.34)	60.49 (7.41)	60.46 (7.54)	60.16 (7.54)	<0.0001	0.0001
Monthly income per household unit, %						<0.0001	<0.0001
<€1200	11.60	8.86	9.51	8.82	7.68		
€1200-1800	23.70	23.84	20.76	20.53	19.32		
€1800-2700	27.77	27.26	28.78	29.16	27.45		
>€2700	28.79	33.38	33.31	34.64	37.91		
Unwilling to answer	8.14	6.65	7.64	6.84	7.64		
Smoking habits, %						0.65	<0.0001
Current smoker	10.76	9.85	8.56	8.06	7.76		
Former smoker	39.33	41.10	42.47	43.57	44.98		
Never smoker	49.90	49.05	48.97	48.37	47.26		
Educational level, %						<0.0001	<0.0001
Less than high-school diploma	34.46	25.74	25.67	26.88	20.91		
High school diploma	18.03	18.78	17.68	17.68	15.70		
Post Graduate	47.51	55.48	56.65	55.44	63.38		
Occupational status, %						0.002	<0.0001
Employee, manual worker	13.43	12.40	12.28	12.62	10.72		
Intermediate profession	9.97	12.36	13.38	14.03	14.83		
Managerial or intellectual profession	10.46	14.56	14.56	14.07	17.11		
Retired	53.63	48.59	48.40	48.17	45.78		
Self-employed, farmer	1.52	1.29	1.90	1.67	1.56		
Unemployed or never employed	10.99	10.80	9.47	9.43	10.0		
Place of residence, %						<0.0001	<0.0001
Rural community	25.33	23.76	23.84	21.60	20.34		
Urban unit with a population <20,000 inhabitants	16.58	16.62	15.67	14.98	15.02		
Urban unit with a population between 20,000 and 200,000	19.21	18.71	20.19	20.19	18.97		
Urban unit with a population >200,000 inhabitants	38.87	40.91	40.30	43.23	45.67		
Body Mass Index >25 kg/m², %	42.15	37.57	33.54	33.31	24.37	<0.0001	<0.0001
Physical activity, %						0.23	0.0004
High	36.40	34.18	37.03	33.88	35.97		
Moderate	32.41	36.88	35.89	37.53	37.60		
Low	18.94	17.91	16.43	16.73	15.36		
Missing data	12.25	11.03	10.65	11.86	11.06		
Use of hormonal treatment for menopause, %						0.004	<0.0001
Yes	8.78	10.18	10.82	11.13	13.67		
No	86.28	83.67	83.71	83.21	79.64		
Missing data	4.94	6.15	5.47	5.66	6.68		
Parity, %						0.02	0.037
No children	15.46	14.70	14.01	13.06	15.12		
One child	19.00	17.81	18.00	17.47	15.53		
2 children	38.68	39.19	39.92	41.82	41.02		
More than 2 children	26.86	28.29	28.07	27.65	28.33		
Family history of cancer, %	53.52	52.81	52.59	51.33	51.03	0.04	0.33

NMF: Non-Negative Matrix Factorization; PANDiet score: Probability of Adequate Nutrient Intake score ; sPNNS-GS2: Simplified Programme National Nutrition Santé Guideline Score 2

¹P-value for Chi-square comparisons or linear regressions as appropriate across quintiles.

Supplementary Table S9: Nutritional characteristics of the participants across quintiles of NMF Component 4, NutriNet-Santé Study, 2014 (N=13,149)

NMF Component 4	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5	P-value for trend	P ¹
N	2629	2630	2630	2630	2630		
Energy intake without alcohol (kcal/day)	1838.97 (575.89)	1891.76 (573.98)	1945.00 (592.50)	1916.54 (575.73)	1909.70 (562.48)	<0.0001	<0.0001
Ethanol, grams/day	7.45 (10.76)	7.08 (9.43)	6.86 (9.34)	7.15 (9.53)	6.94 (8.82)	0.24	0.20
sPNNS-GS2 score	3.22 (3.24)	3.37 (3.21)	3.46 (3.18)	3.34 (3.14)	3.48 (3.18)	0.04	0.02
provegetarian Score	35.35 (5.79)	36.21 (5.91)	36.33 (5.84)	35.74 (5.51)	35.98 (5.36)	<0.0001	<0.0001
Special diet, %							
Omnivorous	96.61	96.46	95.48	97.07	96.88	0.12	0.20
Pesco-Vegetarian	1.64	1.86	2.32	1.52	1.94		
Vegetarian	1.41	1.29	1.71	1.06	0.95		
Vegan	0.34	0.38	0.49	0.34	0.23		
PANDiet score (/100)	65.57 (7.85)	66.01 (7.67)	65.87 (7.79)	65.75 (7.83)	65.97 (7.79)	0.17	0.25
Carbohydrates (% of alcohol free energy intake)	38.43 (7.72)	38.51 (7.07)	38.98 (7.21)	38.89 (7.34)	39.23 (7.39)	0.0004	0.0002
Lipids (% of alcohol-free energy intake)	41.90 (7.52)	42.44 (7.12)	41.99 (7.06)	41.72 (7.11)	41.50 (7.18)	0.0001	<0.0001
Protein (% of alcohol-free energy intake)	19.29 (3.87)	18.65 (3.73)	18.60 (3.73)	18.97 (3.54)	18.84 (3.55)	<0.0001	<0.0001
Plant / total protein ratio	0.32 (0.14)	0.34 (0.14)	0.35 (0.14)	0.33 (0.12)	0.33 (0.12)	<0.0001	<0.0001
Proportion of organic food in the diet	0.23 (0.22)	0.28 (0.23)	0.29 (0.23)	0.22 (0.19)	0.18 (0.16)	<0.0001	<0.0001
Proportion of individuals with organic food in the diet ≥ 50%, %	15.44	20.46	19.43	9.70	4.45	<0.0001	<0.0001
Proportion of ultra-processed food in the diet	0.16 (0.08)	0.15 (0.07)	0.15 (0.07)	0.14 (0.07)	0.13 (0.06)	<0.0001	<0.0001
Proportion of processed food in the diet	0.10 (0.05)	0.09 (0.05)	0.09 (0.04)	0.09 (0.05)	0.08 (0.04)	<0.0001	<0.0001
Proportion of unprocessed food in the diet	0.73 (0.09)	0.73 (0.09)	0.74 (0.08)	0.75 (0.08)	0.76 (0.07)	<0.0001	<0.0001

NMF: Non-Negative Matrix Factorization

¹P-value for Chi-square comparisons or linear regressions as appropriate across quintiles.

Supplementary Table S10: Estimated pesticide exposure by quintiles for NMF Components 1 and 2, NutriNet-Santé Study, 2014, N=13,149

NMF Component 1 Variable	Q1 N=2629		Q2 N=2630		Q3 N=2630		Q4 N=2630		Q5 N=2630	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Acetamiprid	0.0378	0.0642	0.0513	0.0671	0.0575	0.0733	0.0670	0.0783	0.0851	0.0956
Antraquinone	0.0004	0.0009	0.0005	0.0011	0.0005	0.0011	0.0006	0.0020	0.0006	0.0020
Azadirachtin	0.0005	0.0007	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004
Azoxystrobin	0.0169	0.0180	0.0306	0.0204	0.0435	0.0328	0.0551	0.0400	0.0793	0.0679
Boscalid	0.0695	0.0751	0.1010	0.0780	0.1263	0.0931	0.1501	0.0966	0.2083	0.1457
Carbendazim	0.0393	0.0479	0.0486	0.0502	0.0541	0.0542	0.0623	0.0577	0.0775	0.0710
Chlorpropham	0.0360	0.0520	0.0543	0.0526	0.0614	0.0571	0.0695	0.0567	0.0831	0.0762
Chlorpyrifos	0.0319	0.0380	0.0477	0.0414	0.0635	0.0427	0.0847	0.0456	0.1488	0.0818
Cypermethrin	0.0618	0.0919	0.0758	0.0966	0.0834	0.1046	0.0971	0.1118	0.1222	0.1357
Cyprodinil	0.0439	0.0606	0.0614	0.0596	0.0785	0.0994	0.0926	0.0724	0.1341	0.1122
Difenoconazole	0.0102	0.0124	0.0149	0.0125	0.0184	0.0155	0.0221	0.0171	0.0294	0.0224
Dimethoate Ometoate	0.0065	0.0103	0.0086	0.0108	0.0100	0.0124	0.0118	0.0129	0.0162	0.0174
Fenhexamid	0.0494	0.0932	0.0802	0.1075	0.0988	0.1326	0.1241	0.1420	0.1797	0.1939
Glyphosate	0.0021	0.0042	0.0030	0.0043	0.0035	0.0039	0.0041	0.0047	0.0049	0.0060
Imazalil	0.0671	0.0490	0.2727	0.0740	0.5523	0.1135	0.9877	0.1862	2.3555	1.4285
Imidacloprid	0.0394	0.0458	0.0526	0.0482	0.0688	0.0569	0.1009	0.0709	0.1343	0.0975
Iprodione	0.0751	0.1369	0.1148	0.1482	0.1485	0.1505	0.1814	0.1544	0.2754	0.2394
Lambda-Cyhalothrin	0.0058	0.0082	0.0086	0.0087	0.0109	0.0092	0.0130	0.0089	0.0196	0.0144
Malathion	0.0001	0.0002	0.0002	0.0005	0.0003	0.0003	0.0004	0.0004	0.0006	0.0004
Methamidophos	0.0001	0.0002	0.0002	0.0003	0.0002	0.0003	0.0003	0.0004	0.0003	0.0003
Profenofos	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0000	0.0001	0.0001
Pyrethrins	0.0020	0.0019	0.0019	0.0017	0.0019	0.0015	0.0020	0.0016	0.0021	0.0019
Spinosad	0.2176	0.2415	0.1628	0.1736	0.1609	0.1682	0.1583	0.1595	0.1574	0.1718
Tebuconazole	0.0182	0.0333	0.0271	0.0368	0.0356	0.0399	0.0435	0.0389	0.0681	0.0637
Thiabendazole	0.0322	0.0240	0.1039	0.0339	0.1978	0.0532	0.3552	0.0878	0.7540	0.4314

NMF Component 2 Variable	Q1 N=2629		Q2 N=2630		Q3 N=2630		Q4 N=2630		Q5 N=2630	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Acetamiprid	0.0356	0.0614	0.0476	0.0722	0.0571	0.0740	0.0677	0.0814	0.0907	0.0875
Antraquinone	0.0004	0.0009	0.0005	0.0011	0.0006	0.0012	0.0006	0.0020	0.0006	0.0020
Azadirachtin	0.0005	0.0006	0.0003	0.0004	0.0003	0.0004	0.0004	0.0004	0.0004	0.0005
Azoxystrobin	0.0174	0.0305	0.0285	0.0251	0.0405	0.0315	0.0542	0.0353	0.0848	0.0614
Boscalid	0.0367	0.0298	0.0713	0.0263	0.1078	0.0333	0.1546	0.0472	0.2848	0.1410
Carbendazim	0.0370	0.0454	0.0459	0.0531	0.0544	0.0554	0.0635	0.0602	0.0811	0.0651
Chlorpropham	0.0209	0.0270	0.0430	0.0340	0.0611	0.0457	0.0812	0.0631	0.0980	0.0855
Chlorpyrifos	0.0492	0.0648	0.0577	0.0494	0.0701	0.0542	0.0829	0.0588	0.1167	0.0787
Cypermethrin	0.0629	0.0891	0.0742	0.1048	0.0848	0.1079	0.0976	0.1181	0.1208	0.1236
Cyprodinil	0.0213	0.0161	0.0399	0.0146	0.0615	0.0200	0.0911	0.0302	0.1965	0.1370
Difenoconazole	0.0075	0.0077	0.0126	0.0088	0.0175	0.0115	0.0228	0.0141	0.0346	0.0257
Dimethoate Ometoate	0.0060	0.0089	0.0077	0.0103	0.0093	0.0107	0.0113	0.0120	0.0188	0.0189
Fenhexamid	0.0218	0.0228	0.0455	0.0325	0.0727	0.0513	0.1178	0.0897	0.2744	0.2295
Glyphosate	0.0017	0.0026	0.0028	0.0044	0.0036	0.0042	0.0043	0.0047	0.0053	0.0064
Imazalil	0.6330	1.3367	0.6091	0.6643	0.7472	0.7274	0.8998	0.8185	1.3462	1.2753
Imidacloprid	0.0686	0.0787	0.0671	0.0671	0.0742	0.0700	0.0818	0.0709	0.1043	0.0810
Iprodione	0.0305	0.0318	0.0691	0.0305	0.1134	0.0428	0.1767	0.0672	0.4054	0.2678
Lambda- Cyhalothrin	0.0035	0.0035	0.0063	0.0032	0.0093	0.0040	0.0132	0.0052	0.0257	0.0161
Malathion	0.0002	0.0003	0.0002	0.0002	0.0003	0.0005	0.0004	0.0004	0.0005	0.0006
Methamidophos	0.0001	0.0003	0.0002	0.0002	0.0002	0.0003	0.0003	0.0004	0.0003	0.0004
Profenofos	0.0000	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0001
Pyrethrins	0.0020	0.0017	0.0018	0.0014	0.0019	0.0016	0.0021	0.0020	0.0021	0.0019
Spinosad	0.2259	0.2289	0.1665	0.1786	0.1511	0.1575	0.1509	0.1660	0.1624	0.1839
Tebuconazole	0.0095	0.0085	0.0181	0.0088	0.0273	0.0124	0.0407	0.0194	0.0968	0.0749
Thiabendazole	0.2161	0.4113	0.2139	0.2130	0.2605	0.2423	0.3092	0.2562	0.4436	0.3908

NMF: Non-Negative Matrix Factorization.

Supplementary Table S11: Estimated pesticide exposure by quintiles for NMF Components 3 and 4, NutriNet-Santé Study, 2014, N=13,149

NMF Component 3	Q1	N=2629	Q2	N=2630	Q3	N=2630	Q4	N=2630	Q5	N=2630
Variable	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Acetamiprid	0.0197	0.0163	0.0419	0.0305	0.0609	0.0480	0.0811	0.0768	0.0951	0.1322
Anthraquinone	0.0005	0.0019	0.0005	0.0012	0.0006	0.0012	0.0006	0.0019	0.0005	0.0012
Azadirachtin	0.0002	0.0002	0.0003	0.0003	0.0003	0.0003	0.0004	0.0004	0.0008	0.0007
Azoxystrobin	0.0535	0.0495	0.0481	0.0484	0.0445	0.0435	0.0433	0.0413	0.0360	0.0418
Boscalid	0.1472	0.1184	0.1339	0.1106	0.1304	0.1033	0.1295	0.1124	0.1143	0.1092
Carbendazim	0.0261	0.0180	0.0427	0.0248	0.0573	0.0375	0.0725	0.0570	0.0834	0.0963
Chlorpropham	0.0806	0.0764	0.0683	0.0599	0.0620	0.0563	0.0537	0.0536	0.0396	0.0506
Chlorpyrifos	0.0600	0.0587	0.0700	0.0548	0.0768	0.0571	0.0844	0.0674	0.0855	0.0856
Cypermethrin	0.0252	0.0171	0.0600	0.0389	0.0897	0.0664	0.1202	0.1067	0.1451	0.1874
Cyprodinil	0.0925	0.1137	0.0863	0.0885	0.0820	0.0806	0.0789	0.0789	0.0708	0.0769
Difenoconazole	0.0180	0.0187	0.0182	0.0175	0.0191	0.0148	0.0202	0.0159	0.0195	0.0206
Dimethoate Ometoate	0.0049	0.0080	0.0082	0.0093	0.0107	0.0097	0.0137	0.0138	0.0157	0.0198
Fenhexamid	0.1215	0.1720	0.1159	0.1556	0.1039	0.1321	0.1022	0.1347	0.0887	0.1234
Glyphosate	0.0039	0.0058	0.0036	0.0043	0.0037	0.0046	0.0035	0.0050	0.0030	0.0038
Imazalil	0.9341	1.1924	0.9155	1.0615	0.8451	0.9700	0.8259	1.0113	0.7149	0.9357
Imidacloprid	0.0598	0.0686	0.0690	0.0632	0.0793	0.0691	0.0909	0.0755	0.0970	0.0895
Iprodione	0.1638	0.1520	0.1703	0.1887	0.1623	0.1790	0.1579	0.1965	0.1409	0.1946
Lambda-Cyhalothrin	0.0117	0.0093	0.0121	0.0111	0.0118	0.0107	0.0117	0.0118	0.0106	0.0126
Malathion	0.0004	0.0004	0.0003	0.0004	0.0003	0.0003	0.0003	0.0003	0.0003	0.0006
Methamidophos	0.0003	0.0003	0.0003	0.0004	0.0002	0.0003	0.0002	0.0003	0.0002	0.0003
Profenofos	0.0001	0.0001	0.0000	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Pyrethrins	0.0016	0.0017	0.0016	0.0013	0.0018	0.0016	0.0020	0.0015	0.0028	0.0022
Spinosad	0.0182	0.0117	0.0604	0.0177	0.1171	0.0222	0.2039	0.0363	0.4571	0.2250
Tebuconazole	0.0388	0.0402	0.0417	0.0490	0.0395	0.0462	0.0383	0.0515	0.0342	0.0473
Thiabendazole	0.3220	0.3558	0.3083	0.3255	0.2874	0.2980	0.2845	0.3487	0.2411	0.2845

NMF Component 4	Q1	N=2629	Q2	N=2630	Q3	N=2630	Q4	N=2630	Q5	N=2630
Variable	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Acetamiprid	0.0127	0.0127	0.0152	0.0101	0.0295	0.0171	0.0661	0.0228	0.1753	0.1045
Anthraquinone	0.0003	0.0006	0.0005	0.0010	0.0006	0.0013	0.0006	0.0012	0.0008	0.0026
Azadirachtin	0.0004	0.0005	0.0004	0.0005	0.0004	0.0005	0.0004	0.0005	0.0004	0.0004
Azoxystrobin	0.0438	0.0528	0.0372	0.0364	0.0432	0.0420	0.0475	0.0417	0.0538	0.0504
Boscalid	0.1185	0.1231	0.1081	0.0816	0.1281	0.1032	0.1375	0.1102	0.1629	0.1251
Carbendazim	0.0169	0.0131	0.0231	0.0111	0.0374	0.0151	0.0623	0.0174	0.1424	0.0753
Chlorpropham	0.0577	0.0650	0.0541	0.0541	0.0587	0.0681	0.0642	0.0579	0.0695	0.0607
Chlorpyrifos	0.0454	0.0562	0.0449	0.0359	0.0615	0.0448	0.0831	0.0524	0.1417	0.0797
Cypermethrin	0.0161	0.0135	0.0245	0.0116	0.0474	0.0189	0.0978	0.0261	0.2544	0.1475
Cyprodinil	0.0823	0.1269	0.0655	0.0565	0.0782	0.0714	0.0847	0.0776	0.0996	0.0928
Difenoconazole	0.0135	0.0191	0.0134	0.0117	0.0175	0.0169	0.0200	0.0150	0.0307	0.0186
Dimethoate Ometoate	0.0035	0.0054	0.0038	0.0044	0.0066	0.0072	0.0119	0.0098	0.0273	0.0176
Fenhexamid	0.1199	0.1878	0.0755	0.0942	0.0952	0.1226	0.1156	0.1459	0.1261	0.1519
Glyphosate	0.0030	0.0044	0.0032	0.0042	0.0035	0.0050	0.0039	0.0054	0.0042	0.0045
Imazalil	0.8251	1.3056	0.6978	0.7691	0.7886	0.8718	0.8893	0.9883	1.0347	1.1498
Imidacloprid	0.0357	0.0423	0.0590	0.0586	0.0779	0.0720	0.0868	0.0728	0.1365	0.0822
Iprodione	0.1558	0.2232	0.1223	0.1188	0.1506	0.1581	0.1669	0.1721	0.1996	0.2144
Lambda-Cyhalothrin	0.0101	0.0124	0.0089	0.0074	0.0112	0.0096	0.0124	0.0106	0.0154	0.0137
Malathion	0.0003	0.0004	0.0003	0.0005	0.0003	0.0004	0.0003	0.0004	0.0004	0.0004
Methamidophos	0.0002	0.0003	0.0002	0.0003	0.0002	0.0003	0.0003	0.0004	0.0003	0.0004
Profenofos	0.0000	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0001	0.0001
Pyrethrins	0.0019	0.0018	0.0020	0.0017	0.0019	0.0016	0.0020	0.0016	0.0020	0.0018
Spinosad	0.1630	0.2428	0.1343	0.1672	0.1393	0.1509	0.1626	0.1488	0.2577	0.1803
Tebuconazole	0.0346	0.0503	0.0294	0.0289	0.0377	0.0416	0.0412	0.0492	0.0495	0.0576
Thiabendazole	0.2577	0.3656	0.2478	0.2952	0.2799	0.2853	0.3047	0.3047	0.3532	0.3542

NMF: Non-Negative Matrix Factorization.

Supplementary Table S12: Spearman Correlations between dietary intakes for 33 food groups and NMF components (continuous), NutriNet-Santé Study, 2014, N=13,149

NMF Components	Conventional food groups				Organic food groups			
	1	2	3	4	1	2	3	4
<u>Plant-based</u>								
vegetables	0.06	0.23	0.44	*0.01	-0.19	-0.22	0.69	-0.10
soup	0.07	0.11	0.14	0.02	-0.11	-0.17	0.35	-0.07
fruits	0.38	0.60	0.15	0.02	-0.10	-0.06	0.37	-0.08
fruit juice	0.28	*-0.01	0.03	0.06	*0.00	-0.10	0.18	-0.01
nuts	0.05	0.07	0.13	0.05	-0.09	-0.09	0.21	-0.04
potatoes	*0.02	0.08	*0.02	-0.05	-0.13	-0.18	0.29	-0.10
bread	0.05	0.04	-0.09	*0.00	-0.07	-0.07	0.08	-0.03
cereals	0.02	0.03	0.02	0.04	-0.14	-0.14	0.21	-0.06
whole products	-0.03	-0.02	0.14	0.02	-0.13	-0.14	0.25	-0.05
oil	*0.01	0.07	0.19	*0.00	-0.15	-0.13	0.32	-0.09
grains	*-0.02	*0.00	0.16	-0.02	-0.03	-0.02	0.18	-0.04
soy milk	-0.03	-0.04	0.09	*-0.01	-0.06	-0.06	0.10	-0.02
legumes	-0.02	*0.00	0.10	*-0.01	-0.09	-0.08	0.16	-0.04
soy	-0.05	-0.03	0.11	*-0.01	-0.06	-0.04	0.12	-0.02
<u>Animal-based</u>								
fish	0.05	0.10	0.04	0.03	-0.09	-0.11	0.16	-0.05
meat	0.05	0.09	-0.09	-0.02	-0.10	-0.13	0.16	-0.08
processed meat	0.02	0.04	-0.07	*0.00	-0.13	-0.14	0.15	-0.08
poultry	*0.02	0.05	-0.06	*0.01	-0.11	-0.10	0.14	-0.05
eggs	*0.01	*0.02	0.04	*-0.01	-0.09	-0.10	0.17	-0.05
milk	0.05	0.02	-0.08	-0.06	-0.03	-0.03	*-0.01	-0.05
dairy products	0.12	0.12	-0.05	0.03	-0.08	-0.10	0.15	-0.06
cheese	0.03	0.05	*0.00	0.02	-0.13	-0.15	0.20	-0.07
milky desserts	0.02	*0.00	-0.06	*-0.01	-0.05	-0.07	0.06	-0.04
butter	0.02	0.04	-0.06	*-0.02	-0.13	-0.12	0.12	-0.07
<u>Other</u>								
cookies	*0.01	*0.01	-0.05	*0.00	-0.07	-0.08	0.08	-0.04
non alcoholic drinks	0.03	0.02	0.23	0.49	-0.17	-0.18	0.28	*-0.02
soda	0.02	0.03	-0.06	-0.02	-0.02	-0.03	0.04	-0.02
sweetened foods	0.05	0.07	0.02	0.02	-0.14	-0.19	0.29	-0.09
fast food	0.03	*0.02	-0.02	0.02	-0.13	-0.16	0.21	-0.08
dressing	0.04	0.06	*-0.02	*0.00	-0.11	-0.14	0.19	-0.08
alcohol	*-0.01	0.05	*0.00	*-0.01	-0.11	-0.11	0.15	-0.06
snacks	0.02	0.03	0.06	*0.01	-0.10	-0.11	0.18	-0.05
fat	*0.00	*0.02	0.03	*-0.01	-0.11	-0.11	0.18	-0.06
water	0.04	0.06	*0.01	-0.03				

*P-value for correlation >0.05 / NMF: Non-negative Matrix Factorization / Bold values denote correlation coefficients > 0.20.

Pesticide residue data was available only for plant-based products.

References

1. Seung D, Lee L. Algorithms for non-negative matrix factorization. *Advances in neural information processing systems*. 2001;13:556–562