

Supplementary Table 1 Sociodemographic characteristics, lifestyle, and prevalence of functional gastro-intestinal disorders according to the energy-weighted proportion of ultra-processed food in the diet of adults from the study population ($n = 33,343$)

		Proportion of ultra-processed food in the diet (in % total energy intake)								P-trend*
		Quartile 1		Quartile 2		Quartile 3		Quartile 4		
		<22.9%		22.9-31.9%		31.9-41.6%		>41.6%		
		<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	
Age (years)	Mean (SD)	8457	25.0	8458	25.0	8458	25.0	8457	25.0	<0.0001
Sex	Men	2282	27.4	2087	25.0	1868	22.4	1644	19.7	<0.0001
	Women	6053	72.6	6249	75.0	6468	77.6	6692	80.3	
Income per household unit (€/month)	<1200	931	11.2	1035	12.4	1222	14.7	1703	20.4	<0.0001
	1200-2300	3373	40.5	3544	42.5	3686	44.2	3834	46.0	
	>2300	4031	48.4	3757	45.1	3428	41.1	2799	33.6	
Marital status	Single/divorced/widowed	2064	24.8	1975	23.7	2131	25.6	2543	30.5	<0.0001
	Married/cohabiting	6271	75.2	6361	76.3	6205	74.4	5793	69.5	
Educational level	No diploma or primary school	292	3.5	231	2.8	231	2.8	171	2.1	<0.0001
	Secondary school	2861	34.3	2685	32.2	2544	30.5	2460	29.5	
	Higher educational level	5182	62.2	5420	65.0	5561	66.7	5705	68.4	
Residence	Rural area	1821	21.8	1879	22.5	1879	22.5	1688	20.2	0.02
	Urban area	6514	78.2	6457	77.5	6457	77.5	6648	79.8	
Smoking status	Never smoked	3966	47.6	4094	49.1	4316	51.8	4504	54.0	0.23
	Former smoker	3440	41.3	3300	39.6	2850	34.2	2483	29.8	
	Current smoker	929	11.1	942	11.3	1170	14.0	1349	16.2	
BMI (kg/m ²)	<25	5660	67.9	5779	69.3	5798	69.6	5837	70.0	0.42
	25-30	1983	23.8	1941	23.3	1858	22.3	1715	20.6	
	≥30	692	8.3	616	7.4	680	8.2	784	9.4	
IPAQ	Low	1528	18.3	1705	20.5	1944	23.3	2201	26.4	<0.0001
	Moderate	3385	40.6	3549	42.6	3614	43.4	3713	44.5	
	High	3422	41.1	3082	37.0	2778	33.3	2422	29.1	
FGIDs	IBS	726	8.7	835	10.0	911	10.9	1044	12.5	<0.0001
	FC	444	5.3	437	5.2	440	5.3	464	5.6	0.49
	FDh	113	1.4	84	1.0	83	1.0	88	1.1	0.07
	FDy	263	3.2	328	3.9	323	3.9	389	4.7	<0.0001

FGIDs, functional gastro-intestinal disorders; IBS, irritable bowel syndrome; FC, functional constipation; FDh, functional diarrhea; FDy, functional dyspepsia; SD, standard deviation.

*P-values for trend are obtained with Cochran-Mantel-Haenszel Chi-square test or linear regression with linear contrast according to the categorical or continuous nature of the variable.

Supplementary Table 2 Nutrient intake according to the energy-weighted proportion of ultra-processed food in the diet of adults from the study population (*n* = 33,343)

Nutrient	Proportion of ultra-processed food in the diet (in % total energy intake)								P-trend*
	Quartile 1		Quartile 2		Quartile 3		Quartile 4		
	<22.9%		22.9-31.9%		31.9-41.6%		>41.6%		
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	
mPNNS-GS	8.27	1.68	7.95	1.65	7.63	1.63	7.07	1.59	<0.0001
EI (kcal/d)	1823.48	488.15	1870.15	495.11	1881.21	484.93	1880.77	498.46	<0.0001
Mean energy density (kcal/100g)	72.73	18.91	74.84	18.94	77.04	19.55	82.02	21.76	<0.0001
Carbohydrates (% EI)	41.05	7.92	41.39	7.16	41.50	6.83	42.01	6.73	0.04
Protein (% EI)	18.07	4.16	17.23	3.64	16.71	3.38	15.95	3.28	<0.0001
Lipids (% EI)	37.62	7.12	38.18	6.24	38.88	6.09	39.81	5.92	<0.0001
Alcohol (% EI)	3.26	4.31	3.19	4.17	2.92	3.92	2.23	3.44	<0.0001
Alcohol (g/d)	8.93	12.58	8.98	12.53	8.26	11.94	6.28	10.42	<0.0001
Complex carbohydrates (g/d)	103.85	43.18	103.85	39.56	102.53	36.49	100.7	34.88	<0.0001
Simple carbohydrates (g/d)	82.83	32.32	88.81	32.09	91.45	32.54	95.52	35.93	<0.0001
Fibers (g/d)	21.31	7.93	20.36	7.22	19.29	6.70	17.50	6.57	<0.0001
SFA (g/d)	30.52	12.73	32.81	12.72	34.2	12.81	35.40	13.11	<0.0001
MUFA (g/d)	29.02	11.40	29.75	10.78	30.33	10.61	31.03	10.87	<0.0001
n-3 fatty acids (g/d)	1.55	1.03	1.45	0.86	1.37	0.81	1.21	0.70	<0.0001
n-6 fatty acids (g/d)	8.97	5.00	9.14	4.40	9.23	4.23	9.52	4.34	<0.0001
Cholesterol (g/d)	314.75	152.15	318.04	143.73	320.06	149.23	309.13	142.35	0.001
Animal protein (g/d)	54.54	20.34	53.71	19.01	52.79	19.02	50.41	18.58	<0.0001
Plant protein (g/d)	26.13	9.70	25.39	8.63	24.63	8.00	23.52	7.98	<0.0001
Sodium (g/d)	2915.33	1134.80	2989.24	1069.30	2968.43	1035.30	2842.88	995.96	0.04
Potassium (mg/d)	3133.83	886.09	3041.85	821.43	2928.22	784.11	2724.06	758.04	<0.0001
Calcium (mg/d)	927.65	321.87	928.13	309.68	918.47	303.73	900.18	305.03	<0.0001
Iron (mg/d)	13.65	5.31	13.69	5.14	13.47	5.00	12.75	4.91	<0.0001
Beta-carotene (µg/d)	3892.42	2834.50	3668.32	2800.80	3314.99	2372.90	2813.50	2342.80	<0.0001
Vitamin B6 (mg/d)	1.75	0.56	1.73	0.55	1.71	0.59	1.63	0.61	<0.0001
Vitamin B9 (µg/d)	341.07	122.26	332.77	112.82	322.61	110.86	299.79	109.43	<0.0001
Vitamin B12 (µg/d)	5.79	6.45	5.41	5.45	5.25	5.29	4.64	4.02	<0.0001
Vitamin C (mg/d)	123.89	74.46	117.24	64.53	111.83	65.42	100.30	62.29	<0.0001
Vitamin D (µg/d)	2.99	2.73	2.83	2.54	2.76	2.43	2.52	2.22	<0.0001
Vitamin E (mg/d)	11.33	5.12	11.44	4.75	11.44	4.71	11.54	4.89	0.03

SD, standard deviation; EI, energy intake; SFA, saturated fatty acids; MUFA, monounsaturated fatty acids.

*P-values for trend are obtained with multivariable linear regression with linear contrast adjusted for gender, age, EI.

Supplementary Table 3 : Association between proportion of ultra-processed food in the diet and IBS subtypes in adults from the NutriNet-Santé cohort (n = 33,343)

Proportion of ultra-processed food in the diet (in weight)												
	Continuous			Quartiles*								
	aOR [†]	95% CI	P [‡]	Q1	Q2	Q3	Q4	aOR	95% CI	aOR	95% CI	P-trend [§]
IBS-C												
Model 1	1,10	[1,01-1,20]	0,02	Ref.	1,02	[0,81-1,29]	1,27	[1,02-1,59]	1,31	[1,05-1,64]		0,005
Model 2	1,12	[1,03-1,23]	0,01	Ref.	1,02	[0,80-1,28]	1,28	[1,02-1,60]	1,35	[1,07-1,70]		0,002
Model 3	1,13	[1,04-1,24]	0,01	Ref.	1,02	[0,81-1,29]	1,29	[1,03-1,62]	1,38	[1,09-1,74]		0,002
IBS-D												
Model 1	1,11	[1,04-1,18]	0,002	Ref.	1,17	[0,98-1,40]	1,23	[1,03-1,47]	1,34	[1,12-1,60]		0,001
Model 2	1,10	[1,03-1,18]	0,003	Ref.	1,15	[0,97-1,38]	1,21	[1,01-1,45]	1,31	[1,10-1,57]		0,003
Model 3	1,11	[1,04-1,19]	0,002	Ref.	1,16	[0,97-1,39]	1,22	[1,02-1,47]	1,34	[1,12-1,61]		0,002
IBS-M												
Model 1	-	-	-	Ref.	0,98	[0,84-1,14]	1,02	[0,88-1,19]	1,04	[0,89-1,21]		0,53
Model 2	-	-	-	Ref.	1,00	[0,85-1,16]	1,05	[0,90-1,23]	1,09	[0,93-1,27]		0,22
Model 3	-	-	-	Ref.	0,99	[0,85-1,15]	1,04	[0,89-1,21]	1,06	[0,91-1,25]		0,35
IBS-U												
Model 1	-	-	-	Ref.	1,26	[0,88-1,78]	1,44	[1,02-2,03]	1,25	[0,87-1,79]		0,16
Model 2	-	-	-	Ref.	1,26	[0,89-1,79]	1,47	[1,04-2,08]	1,32	[0,92-1,91]		0,09
Model 3	-	-	-	Ref.	1,27	[0,89-1,81]	1,49	[1,05-2,11]	1,35	[0,93-1,96]		0,08

aOR, adjusted odds-ratio; 95% CI, 95% confidence interval; IBS, irritable bowel syndrome; IBS-C, IBS with constipation; IBS-D, IBS with diarrhea; IBS-M, mixed IBS; IBS-U, undifferentiated IBS.

*Cut-offs for quartiles of UPFp were 9.7%, 14.5%, and 20.6%.

[†]aOR for an increase of 10% of UPFp. Multivariable logistic regression models with continuous variable for UPFp performed only when p-trend<0.05.

[‡]P-values obtained with multivariable logistic regression using UPFp as a continuous variable.

[§]P-values for trend obtained with multivariable logistic regression using quartiles as continuous variables.

Model 1: Adjusted for gender and age.

Model 2: Adjusted for model 1 + income level, education level, marital status, residence, BMI, physical activity, smoking status, energy intake, season of food records, time between food record and FGIDs questionnaire.

Model 3: Adjusted for model 2 + mPNNS-GS.