

# Sociodemographic and lifestyle characteristics of yogurt consumers in Italy: Results from the INRAN-SCAI 2005-06 survey

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## Abstract.

**BACKGROUND:** Yogurt is a food product with intrinsic health properties. Health messaging and promotion has emphasized its nutritional qualities and its role in weight management. Some evidences highlighted that yogurt consumption has been more commonly adopted by people with healthier diet and lifestyle.

**OBJECTIVE:** To explore if yogurt intake of Italian adults and older adults is associated with sociodemographic and lifestyle factors.

**METHODS:** A cross-sectional survey was carried out on a sample of households randomly selected after geographical stratification of the national territory. 2798 subjects aged 18–97 years were considered for this study. Yogurt intake was assessed using a 3-day dietary record. Sociodemographics, smoking and alcohol habits, physical activity, dieting, out-of-home eating, interest for nutrition information, were obtained from self-administered questionnaires.

**RESULTS:** 636 subjects (22.7%) consumed yogurt, with an average intake of 90.4 g/day. Higher intake was reported by subjects with higher levels of education, those who practiced  $\geq 2$  hours/week of sporting activities, those with a good knowledge of the food-health relationship and accustomed to reading food labels. Yogurt consumers demonstrated healthier behaviours compared with non-consumers.

**CONCLUSIONS:** Further analyses on the dietary and nutritional profile of yogurt consumers are needed in order to examine more in-depth the role of yogurt in the Italian diet.

Keywords: Yogurt consumption, Italy, sociodemographic factors, lifestyle

## 1. Introduction

Yogurt is the most commonly consumed fermented milk product, with some intrinsic health properties. It is an excellent source of high quality protein, calcium, phosphorus, magnesium, zinc, vitamin B<sub>12</sub>, riboflavin and niacin [1].

In Italy and most of the EU member states the national legislation on yogurt is in line with the standard for fermented milks adopted by the FAO/WHO Codex Alimentarius, which allows the terms “yogurts” and “fermented milks” only to products containing live bacteria. Main bacteria used to produce yogurt are probiotic ingredients, with

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demonstrated health benefits in humans, such as alleviation of lactose intolerance and reduction of the incidence of gastrointestinal infections [2].

Since 1950s, when the dairy industry began to produce and commercialize yogurt, this product has been more and more consumed in Europe. The demand for yogurt consumption increased particularly in the period 2004–2008 in all the European Union countries (EU 27), and Italy experienced an even greater increase in those years [3].

Although the per-capita yogurt intake in Italy was well below the one observed in most other European countries, such as France, Spain, Germany, but also Hungary and Poland [4], it showed an increasing trend, from 4.3 g/day for total population in 1980s (5), to 16.0 g/day (adults) and 10.5 g/day (older adults) in 1990s (6), up to 22.0 g/day for adults, and 15.6 g/day for older adults seen in the most recent food consumption survey carried out in 2005–06 [7].

Among the reasons for the increase in yogurt consumption in Italy and in other countries, of considerable importance are several product innovations introduced in the last 20 years, aimed at satisfying the needs of different types of consumers. A wide range of products are now available: creamy and flavoured to satisfy hedonistic consumers, low-fat and low-calorie for those who need to control body weight, yogurts for children, drinking yogurts, organic yogurts produced with environmentally friendly processes. Moreover, from late 1980's to mid 2000's main yogurt manufacturers operating in Italy have largely invested in the development and marketing of functional yogurts, that is yogurts enriched with probiotic ingredients, vitamins, minerals and fibre, with demonstrated beneficial effects, "in a way that is relevant to either an improved state of health and well-being and/or reduction of risk of disease" [2]. Functional yogurts have been the driving factor of the Italian yogurt market, so as to achieve a considerable market share in 2007 [8]. As manufacturers successfully differentiated the market of conventional yogurts, and successfully focused on functional yogurt segment, the image of yogurt as a healthy product was strengthened by health messaging and promotion.

Many studies have analysed yogurt consumers through different approaches. Consumers' perceptions of conventional and functional yogurts has been the subject of several researches [9–14], resulting mainly related to health, nutrition, sensory characteristics and pleasure.

Several studies focused on the Italian yogurt market [15–17]. In particular, Bonanno [18] analysed the demand for both conventional and functional yogurts to assess the role of health-related demographic characteristics.

Pala et al. [19] found a healthier lifestyle among yogurt consumers, and Cormierl [20] observed that yogurt consumption is associated with a health-related dietary pattern.

The present study aimed to contribute to a better understanding of the characteristics of yogurt consumers in Italy, respect to non-consumers, in terms of sociodemographic and lifestyle factors, and food-related behaviours, employing yogurt consumption data from the INRAN-SCAI 2005–06 dietary survey.

## 2. Methods

### 2.1. Dietary and lifestyle assessment

The study is focused on the most recent yogurt consumption data extracted from the national survey carried out from October 2005 to December 2006 (INRAN-SCAI 2005–06) in Italy. Detailed information about this study can be found elsewhere [7]. Briefly, a total of 3323 individuals participated in the food survey, carried out by a team of thirty trained field workers. Data were collected using a 3-day dietary record. All foods and drinks consumed were recorded by each participant on a semi-structured diary using household measures and estimated portion sizes. Each item consumed, for each meal occasion, was expressed in grams (g) of net raw ingredients and food items were classified in 15 food categories and 51 subcategories [7, 21]. Overall, the analysed records represent 9969 days, weekdays represented 78% of all survey days, and survey days were proportionally distributed among seasons. The present analyses focused on items belonging to the food subgroup "Yogurt and fermented milk", referred to as "yogurt" in the following text. This included all type of yogurt: skimmed, partially skimmed, whole, flavoured, containing other ingredients (fruit, cereals, nuts, chocolate, etc.), fortified types and also drinkable yogurt. A subsample of 2798 subjects, aged 18 to 97 years, was selected for the present study. Overall, 636 subjects were considered as yogurt consumers, as they consumed at least one average serving (125 g) of yogurt over the 3-day survey period (equivalent of  $\geq 41.7$  g/day). Consumers were further split into two groups, "low consumers" defined as those consuming " $\geq 125$  g/ <250g" of

yogurt over the 3-day survey period, and “moderate consumers” defined as those consuming “ $\geq 250\text{g}$ ” over the 3-day survey period. Weight and height were self-reported. Overweight was defined as Body Mass Index (BMI expressed as  $\text{kg}/\text{m}^2$ ) between 25 and 30, and obesity as  $\text{BMI} \geq 30$ . A self-administered questionnaire was used to collect information on marital status, education and type of employment, smoking and alcohol habits, dieting, out-of-home eating, time spent for physical activity, interest in nutritional information and knowledge on food-health relationship.

## 2.2. Statistical analysis

Analyses of consumers vs. non consumers, and low vs. moderate consumers, across the selected characteristics were performed using contingency tables and Chi-square test. Differences in the mean servings of yogurt consumed per day between the various sociodemographic and lifestyle groups, for total, low and moderate consumers, were analysed and tests for comparison between means were performed using the Kruskal-Wallis test. Finally, in order to take into account potential confounders in the analysis, descriptive factors were used as independent variables in a logistic regression model, backward stepwise method (using  $p < 0.05$  as the threshold for removing a variable from the models), with yogurt consumption (consumers vs. non-consumers) as the dependent variable.

Analyses were performed using SAS software version 9.2 (SAS Institute Inc., Cary, NC, USA). For all the tests a  $p$  value  $< 0.05$  was considered to be statistically significant.

## 3. Results

### 3.1. Yogurt consumers vs. non-consumers

Overall, 22.7% ( $n = 636$ ) of the subjects were yogurt consumers according to the definition specified, and reported an average daily intake of 90.4 g/day, with some significant differences across the subgroups (Table 1). Subjects with a high level of education reported a higher intake (102.2 g/day) compared to those with lower levels. Those practicing  $\geq 2$  hours/week of sporting activities ate more yogurt (98.9 g/day) than those who practiced  $< 2$  hours/week (80.9 g/day) or no sport at all (87.2 g/day). Subjects having a good (perceived) knowledge on food-health relationship consumed more yogurt (97.6 g/day) than those with a sufficient (86.8 g/day) or poor (79.8 g/day) knowledge. Subjects accustomed to reading food labels presented a higher intake (96.5 g/day) than those who were not (81.3 g/day) (Table 1).

The distribution of yogurt consumers across most of the selected demographic and lifestyle factors significantly differed respect to non-consumers. The percentages of females, adults aged 18–64 years, and people from Northern regions were higher among consumers (Table 2). Higher rates of subjects with  $\text{BMI} < 25$ , non-smokers, following a reduced intake diet, and practicing  $\geq 2$  hours/week of sport activities were found among yogurt consumers. Among consumers there were higher rates of people expressing interest in receiving nutritional information, using TV/radio programmes, books and magazines as sources of information on nutrition and health, and accustomed to reading food labels (Table 2).

Table 3 presents the results of the logistic regression analysis. Only those factors retained after backward elimination were reported. After adjusting for potential confounding factors, we observed that females were twice as likely to consume yogurt as males, and 18–64-year-olds were 55% more likely to consume yogurt than those aged 65 and over. The likelihood of consumption strongly increased in people in Northern and Central regions of Italy, compared with the South and Islands.

Those who did not practice physical activity, and those who practiced physical activity for  $< 2$  h/week were 40% and 35% respectively less likely to consume yogurt than those who practiced  $\geq 2$  h/week. Smokers were 30% less likely to consume yogurt than non-smokers. Those subjects who did not eat out regularly at coffee shops or fast food restaurants were 83% more likely to consume yogurt than those who reported to eat out on a regular basis. Subjects interested in receiving nutritional information were 71% more likely to consume yogurt than those not interested.

### 3.2. Low vs. moderate yogurt consumers

Low consumers registered an intake of 57.0 g/day, whereas moderate consumers had an intake of 150.2 g/day, with little variation across the subgroups (Table 1).

Table 1  
Yogurt intake (g/day) by sociodemographic and lifestyle factors

	Yogurt consumers											
	All			≥ 125 g/<250 g in the 3 days				≥250 g in the 3 days				
	<i>n</i> <sup>a</sup>	Mean	SD	<i>p</i> <sup>*</sup>	<i>n</i> <sup>a</sup>	Mean	SD	<i>p</i> <sup>*</sup>	<i>n</i> <sup>a</sup>	Mean	SD	<i>p</i> <sup>*</sup>
<b>TOTAL</b>	636	90.4	60.1		408	57.0	19.4		228	150.2	62	
<b>Gender</b>												
Females	439	88.2	58.2	<i>n.s.</i>	292	57.4	19.5	<i>n.s.</i>	147	149.2	61.3	<i>n.s.</i>
Males	197	95.5	64.2		116	55.9	19.1		81	152.1	63.6	
<b>Age class</b>												
18 –64 yrs	547	91.2	62.7	<i>n.s.</i>	352	56.8	19.2	<i>n.s.</i>	195	153.4	66	<i>n.s.</i>
≥65 yrs	89	85.8	40.9		56	58.6	20.3		33	131.6	20.9	
<b>Geographical area</b>												
North-west	216	94.5	64.2	<i>n.s.</i>	135	58.4	19.7	<i>n.s.</i>	81	154.8	67.3	<i>n.s.</i>
North-east	178	87.7	57.3		116	56.0	18.9		62	147	58.2	
Centre	124	94.6	58.9		69	55.3	19.6		55	143.9	54.5	
South and Islands	118	82.6	57.6		88	57.6	19.4		30	155.9	69.0	
<b>BMI class</b>												
Normoweight/underweight	438	91.3	61.4	<i>n.s.</i>	280	57.2	19.5	<i>n.s.</i>	158	151.8	63.7	<i>n.s.</i>
Overweight/obese	197	88.0	57.1		128	56.6	19.1		69	146.3	58.5	
<b>Marital status</b>												
Married	338	89.5	56.1	<i>n.s.</i>	214	57.3	19.4	<i>n.s.</i>	124	145.1	55.2	<i>n.s.</i>
Widowed	56	82.8	44.7		36	53.5	18.0		20	135.6	25.2	
Single/divorced/separated	235	90.8	65.9		158	57.4	19.7		77	159.5	73.8	
<b>Education</b>												
Low	218	79.4	52.0	0.004	156	55.5	18.9	<i>n.s.</i>	62	139.4	60.1	0.009
Medium	267	91.4	54.7		164	58.3	19.8		103	144.0	51.2	
High	134	102.2	73.9		81	57.7	19.9		53	170.3	74.6	
<b>Occupation</b>												
Housewife/student/other	131	84.4	56.3	<i>n.s.</i>	88	56.5	18.3	<i>n.s.</i>	43	141.5	64.5	<i>n.s.</i>
Unemployed /Retired	132	83.9	46.3		88	57.4	20.2		44	136.8	37.2	
Employed	367	93.4	63.7		231	56.9	19.5		136	155.4	64.9	
<b>Smoking</b>												
Yes	109	88.1	62.3	<i>n.s.</i>	71	56.0	18.8	<i>n.s.</i>	38	148.3	70.5	<i>n.s.</i>
No	513	89.8	58.5		332	57.3	19.6		181	149.4	59.1	
<b>Alcohol consumption</b>												
Few glasses/week	200	93.8	64.6	<i>n.s.</i>	121	57.4	19.3	<i>n.s.</i>	79	149.6	69.7	<i>n.s.</i>
1-2 glasses/day	109	89.4	54.8		70	56.3	19.4		39	148.8	47.2	
No alcohol consumption	319	86.9	56.9		215	56.8	19.4		104	149.2	58.4	
<b>Sports time</b>												
No sport activities	349	87.2	55	0.046	228	56.8	19.4	<i>n.s.</i>	121	144.5	54.8	<i>n.s.</i>
<2 hours/week	96	80.9	52.5		68	54.6	18.8		28	144.7	53.5	
≥2 hours/week	183	98.9	68.2		110	59.2	19.8		73	158.7	71.6	
<b>Lifestyle (self-perceived)</b>												
Stressed	164	97.3	69.4	<i>n.s.</i>	99	58.6	19.8	<i>n.s.</i>	65	156.2	76.4	<i>n.s.</i>
Not stressed	466	86.7	54.6		309	56.5	19.2		157	146.1	53.0	
<b>Dieting (reduced intake)</b>												
Yes	128	95.0	65.6	<i>n.s.</i>	79	56.1	19.6	<i>n.s.</i>	49	157.8	65.1	<i>n.s.</i>
No	501	88.2	57.2		328	57.3	19.4		173	146.9	59.4	

(Continued)

Table 1  
(Continued)

	Yogurt consumers											
	All				≥125 g/<250 g in the 3 days				≥250 g in the 3 days			
	<i>n</i> <sup>a</sup>	Mean	SD	<i>p</i> <sup>*</sup>	<i>n</i> <sup>a</sup>	Mean	SD	<i>p</i> <sup>*</sup>	<i>n</i> <sup>a</sup>	Mean	SD	<i>p</i> <sup>*</sup>
<b>Eat out at</b>												
<b>canteen/restaurant</b>												
Never/rarely	212	84.6	56.8	<i>n.s.</i>	147	56.7	19.0	<i>n.s.</i>	65	147.6	63.3	<i>n.s.</i>
Sometimes	325	91.3	58.2		203	57.2	19.8		122	147.8	56.9	
Often	93	94.8	66.4		58	57.0	19.4		35	157.4	69.4	
<b>Eat out at cafe/bar/fast food</b>												
Never/rarely	420	89.3	60.0	<i>n.s.</i>	272	56.7	19.2	<i>n.s.</i>	148	149.2	63.2	0.05
Sometimes	159	87.7	56.9		105	57.3	19.8		54	146.7	59.3	
Often	44	100.7	59.4		26	60.1	20.5		18	159.2	46.3	
<b>Knowledge on food-health relation</b>												
Poor/ don't know	112	79.8	59.2	0.012	80	52.8	17.2	<i>n.s.</i>	32	147.3	72.3	<i>n.s.</i>
Sufficient	280	86.8	49.5		183	58.0	19.9		97	141.2	42.4	
Good/very good	226	97.6	68.5		138	58.4	19.8		88	159.1	72.5	
<b>Do you read food labels when you purchase foods?</b>												
Never/rarely	289	81.3	50.9	0.002	196	53.4	17.7	0.001	93	140.2	47.8	<i>n.s.</i>
Often/always	325	96.5	64.3		202	60.7	20.4		123	155.3	68.4	
<b>Do you read the ingredient list?</b>												
Never/rarely	310	85.2	54.0	<i>n.s.</i>	205	55.6	18.6	<i>n.s.</i>	105	143.0	53.7	<i>n.s.</i>
Often/always	261	95.5	67.1		169	59.2	20.4		92	162.3	71.7	
<b>Do you read the nutrient list?</b>												
Never/rarely	371	88.9	58.6	<i>n.s.</i>	240	56.8	19.1	<i>n.s.</i>	131	147.7	60.8	<i>n.s.</i>
Often/always	200	92.4	64.1		134	58.6	20.3		66	161.0	67.6	
<b>I am interested in receiving nutritional information</b>												
Agree	515	91.9	62.1	<i>n.s.</i>	327	57.1	19.5	<i>n.s.</i>	188	152.6	64.2	<i>n.s.</i>
Disagree/neutral	101	77.5	39.1		72	57.0	19.5		29	128.2	27.4	

<sup>a</sup>Values for each variable may not equal the overall *n* because of missing data. <sup>\*</sup>*p* values from two-sided Kruskal-Wallis test for comparison between means.

Some significant differences were found between low and moderate yogurt consumers, according to the selected descriptive factors. Among moderate consumers there was a higher rate of subjects from the Centre of Italy (24.1% vs. 16.9%), a lower rate from the South (13.2% vs. 21.6%), and a reduced proportion with low education level (28.4% vs. 38.9%) (Table 2).

Yogurt was prevalently consumed at home, during breakfast for moderate consumers (71.8 g/day), and the afternoon snack for low consumers (18.6 g/day) (Table 4).

#### 4. Discussion

This work explored if an association existed between yogurt intake and sociodemographic and health-related lifestyle factors, in those years when the yogurt sector in Italy experienced a great expansion. The present results

Table 2  
Distributions of sociodemographic and lifestyle factors in yogurt consumers and non-consumers (column %)

	Non consumers		Consumers							TOTAL		
			All		≥125 g/<250 g/3-day		≥250 g/3-day					
	<i>n</i> <sup>a</sup>	%	<i>n</i> <sup>a</sup>	%	<i>p</i> <sup>*</sup>	<i>n</i> <sup>a</sup>	%	<i>n</i> <sup>a</sup>	%	<i>p</i> <sup>**</sup>	<i>n</i> <sup>a</sup>	%
<b>TOTAL</b>	2162	100.0	636	100.0		408	100.0	228	100.0		2798	100.0
<b>Gender</b>												
Females	1107	51.2	439	69.0	<0.0001	292	71.6	147	64.5	<i>n.s.</i>	1546	55.3
Males	1055	48.8	197	31.0		116	28.4	81	35.5		1252	44.7
<b>Age class</b>												
18–64 yrs	1738	80.4	547	86.0	0.001	352	86.3	195	85.5	<i>n.s.</i>	2285	81.7
≥65 yrs	424	19.6	89	14.0		56	13.7	33	14.5		513	18.3
<b>Geographical area</b>												
North-west	514	23.8	216	34.0	<0.0001	135	33.1	81	35.5	0.020	730	26.1
North-east	372	17.2	178	28.0		116	28.4	62	27.2		550	19.7
Centre	407	18.8	124	19.5		69	16.9	55	24.1		531	19.0
South and Islands	869	40.2	118	18.6		88	21.6	30	13.2		987	35.3
<b>BMI class</b>												
Normo/underweight	1254	58.0	438	69.0	<0.0001	280	68.6	158	69.6	<i>n.s.</i>	1692	60.5
Overweight/obese	908	42.0	197	31.0		128	31.4	69	30.4		1105	39.5
<b>Marital status</b>												
Married	1289	60.5	338	53.7	0.002	214	52.5	124	56.1	<i>n.s.</i>	1627	59.0
Widowed	203	9.5	56	8.9		36	8.8	20	9.0		259	9.4
Single/divorced	638	30.0	235	37.4		158	38.7	77	34.8		873	31.6
<b>Education</b>												
Low	828	40.9	218	35.2	0.037	156	38.9	62	28.4	0.033	1046	39.6
Medium	785	38.8	267	43.1		164	40.9	103	47.2		1052	39.8
High	410	20.3	134	21.6		81	20.2	53	24.3		544	20.6
<b>Occupation</b>												
Housewife/student/other	408	19.1	131	20.8	0.021	88	21.6	43	19.3	<i>n.s.</i>	539	19.5
Unemployed/Retired	564	26.4	132	21.0		88	21.6	44	19.7		696	25.2
Employed	1164	54.5	367	58.3		231	56.8	136	61.0		1531	55.4
<b>Smoking</b>												
Yes	518	24.9	109	17.5	<0.0001	71	17.6	38	17.4	<i>n.s.</i>	627	23.2
No	1559	75.1	513	82.5		332	82.4	181	82.6		2072	76.8
<b>Alcohol consumption</b>												
Few glasses/week	698	32.9	200	31.8	<i>n.s.</i>	121	29.8	79	35.6	<i>n.s.</i>	898	32.7
≥1 glasses/day	419	19.8	109	17.4		70	17.2	39	17.6		528	19.2
No alcohol	1004	47.3	319	50.8		215	53.0	104	46.8		1323	48.1
<b>Sports time</b>												
No sport activities	1453	68.0	349	55.6	<0.0001	228	56.2	121	54.5	<i>n.s.</i>	1802	65.2
<2 hours/week	320	15.0	96	15.3		68	16.7	28	12.6		416	15.0
≥2 hours/week	364	17.0	183	29.1		110	27.1	73	32.9		547	19.8
<b>Lifestyle (self-perceived)</b>												
Stressed	498	23.4	164	26.0	<i>n.s.</i>	99	24.3	65	29.3	<i>n.s.</i>	662	24.0
Not stressed	1634	76.6	466	74.0		309	75.7	157	70.7		2100	76.0
<b>Dieting (reduced intake)</b>												
Yes	310	14.6	128	20.3	0.0004	79	19.4	49	22.1	<i>n.s.</i>	438	15.9
No	1814	85.4	501	79.7		328	80.6	173	77.9		2315	84.1

(Continued)

Table 2  
(Continued)

	Non consumers		Consumers							TOTAL		
	n <sup>a</sup>	%	All			≥ 125 g/<250 g/3-day		≥250 g/3-day		n <sup>a</sup>	%	
			n <sup>a</sup>	%	p*	n <sup>a</sup>	%	n <sup>a</sup>	%			p**
<b>Eat out at canteen/restaurant</b>												
Never/rarely	857	40.2	212	33.7	0.013	147	36.0	65	29.3	n.s.	1069	38.7
Sometimes	996	46.7	325	51.6		203	49.8	122	55.0		1321	47.8
Often	280	13.1	93	14.8		58	14.2	35	15.8		373	13.5
<b>Eat out at cafe/bar/fast food</b>												
Never/rarely	1444	68.6	420	67.4	0.040	272	67.5	148	67.3	n.s.	1864	68.3
Sometimes	459	21.8	159	25.5		105	26.1	54	24.5		618	22.7
Often	202	9.6	44	7.1		26	6.5	18	8.2		246	9.0
<b>Knowledge on food-health relation</b>												
Poor/ don't know	382	18.8	112	18.1	n.s.	80	20.0	32	14.7	n.s.	494	18.7
Sufficient	935	46.1	280	45.3		183	45.6	97	44.7		1215	45.9
Good/very good	713	35.1	226	36.6		138	34.4	88	40.6		939	35.5
<b>Source of info: TV/radio</b>												
Yes	1166	54.7	400	63.8	<0.0001	261	64.1	139	63.2	n.s.	1566	56.8
No/no info received	964	45.3	227	36.2		146	35.9	81	36.8		1191	43.2
<b>Source of info: doctors</b>												
Yes	1104	51.8	343	54.7	n.s.	213	52.3	130	59.1	n.s.	1447	52.5
No/no info received	1026	48.2	284	45.3		194	47.7	90	40.9		1310	47.5
<b>Source of info: books/booklets</b>												
Yes	667	31.3	246	39.2	0.0001	151	37.1	95	43.2	n.s.	913	33.1
No/no info received	1463	68.7	381	60.8		256	62.9	125	56.8		1844	66.9
<b>Source of info: magazines</b>												
Yes	641	30.1	260	41.5	<0.0001	164	40.3	96	43.6	n.s.	901	32.7
No/no info received	1489	69.9	367	58.5		243	59.7	124	56.4		1856	67.3
<b>Do you read food labels when you purchase foods?</b>												
Never/rarely	1125	55.6	289	47.1	0.0001	196	49.2	93	43.1	n.s.	1414	53.6
Often/always	897	44.4	325	52.9		202	50.8	123	56.9		1222	46.4
<b>Do you read the ingredient list when you purchase foods?</b>												
Never/rarely	1056	60.3	310	54.3	0.006	205	54.8	105	53.3	n.s.	1366	58.9
Often/always	694	39.7	261	45.7		169	45.2	92	46.7		955	41.1
<b>Do you read the nutrient content when you purchase foods?</b>												
Never/rarely	1214	69.7	371	65.0	0.020	240	64.2	131	66.5	n.s.	1585	68.5
Often/always	528	30.3	200	35.0		134	35.8	66	33.5		728	31.5
<b>Do you read the additives content when you purchase foods?</b>												
Never/rarely	1242	71.3	397	69.8	n.s.	259	69.4	138	70.4	n.s.	1639	70.9
Often/always	501	28.7	172	30.2		114	30.6	58	29.6		673	29.1
<b>I am interested in receiving nutritional information</b>												
Agree	1432	71.1	515	83.6	<0.0001	327	82.0	188	86.6	n.s.	1947	74.0
Disagree/neutral	582	28.9	101	16.4		72	18.0	29	13.4		683	26.0

(Continued)

Table 2  
(Continued)

	Non consumers		Consumers							TOTAL		
	<i>n</i> <sup>a</sup>	%	All			≥ 125 g/<250 g/3-day		≥ 250 g/3-day		<i>n</i> <sup>a</sup>	%	
			<i>n</i> <sup>a</sup>	%	<i>p</i> <sup>*</sup>	<i>n</i> <sup>a</sup>	%	<i>n</i> <sup>a</sup>	%			<i>p</i> <sup>**</sup>
<b>The nutritional information I receive are difficult to understand</b>												
Agree	406	20.2	118	19.2	<i>n.s.</i>	75	18.8	43	19.9	<i>n.s.</i>	524	20.0
Disagree/neutral	1605	79.8	497	80.8		324	81.2	173	80.1		2102	80.0
<b>I have no time to get nutritional information</b>												
Agree	495	24.7	138	22.6	<i>n.s.</i>	90	22.7	48	22.3	<i>n.s.</i>	633	24.2
Disagree/neutral	1507	75.3	473	77.4		306	77.3	167	77.7		1980	75.8

<sup>a</sup>Values for each variable may not equal the overall *n* because of missing data. <sup>\*</sup>*p* values from the Chi-square test, non-consumers vs. consumers.

<sup>\*\*</sup>*P* values from the Chi-square test, low consumers vs. moderate consumers.

Table 3

Odds ratios (OR) and 95% Confidence Intervals from logistic regression analysis showing the association of yogurt consumption (at least 125 g in the 3 days vs. no consumption) with different predictor variables<sup>a</sup>

Subjects consuming at least 125 g in the 3 days vs. no consumption	Adjusted OR (95%CI)
<b>Gender</b>	
Females vs ≥ Males	2.00* (1.63–2.47)
<b>Age class</b>	
18–64 ys vs ≥ 65 yrs	1.55* (1.16–2.07)
<b>Geographical area</b>	
North-East vs South and Islands	3.11* (2.34–4.12)
North-West vs South and Islands	2.79* (2.14–3.65)
Centre vs South and Islands	2.02* (1.48–2.75)
<b>Sport activity</b>	
No sports vs ≥ 2 h/week	0.60* (0.47–0.76)
<2 hours/week vs ≥ 2 h/week	0.65* (0.48–0.89)
<b>Smoking</b>	
Yes vs No	0.72* (0.56–0.93)
<b>Eating out at bar/coffee shop/fast food</b>	
Never/rarely vs Often	1.48* (1.02–2.17)
sometimes vs Often	1.83* (1.22–2.75)
<b>Magazines as source of info on food-health relation</b>	
Yes vs. No/No information received	1.25* (1.02–1.53)
<b>I am interested in receiving nutritional information</b>	
Agree vs Disagree/Neutral	1.71* (1.32–2.19)

<sup>a</sup>Variables are mutually adjusted. <sup>\*</sup>*p* value <0.05.

show that higher yogurt intake was reported by subjects with higher level of education, by those who practiced two or more hours of sporting activities per week, and by subjects with a good knowledge of the food-health relationship and accustomed to reading food labels. Moreover, yogurt consumers in Italy demonstrated healthier behaviours compared with non-consumers. Non-smokers, those who spent more time doing physical activity, and those interested in nutritional information were more likely to consume yogurt.

A research on the Italian yogurt market [8] reported that in 2006 the trend was moving towards further segmentation to target specific consumer groups, such as children, women, traditional consumers, and health-conscious consumers, who take care of their diet and who have modern lifestyles. It also reported an increase in purchase volume of yogurt



Table 4  
Yogurt intake (g/day) by meal and place of consumption

	Total sample (n = 2798)		Yogurt consumers					
			All consumers (n = 636)		≥125 g/ <250 g in the 3 days (n = 408)		≥250 g in the 3 days (n = 228)	
	Mean	SD	Mean <sup>a</sup>	SD	Mean <sup>a</sup>	SD	Mean <sup>a</sup>	SD
<b>Meal of yogurt consumption</b>								
Breakfast	7.9	30.1	34.7	55.27	14.0	24.8	71.8	72.7
Morning snack	4.1	19.1	18.2	36.77	13.6	24.8	26.4	50.7
Lunch	1.7	11.5	7.4	23.24	5.1	16.4	11.6	31.6
Afternoon snack	4.7	18.1	20.6	33.42	18.6	25.6	24.7	43.9
Dinner	1.1	9.4	5.0	19.18	3.0	12.4	8.6	27.1
Evening snack	1.0	9.1	4.4	18.74	2.7	11.3	7.5	27.2
<b>Place of yogurt consumption</b>								
At home	17.5	43.6	77.0	61.58	48.16	25.41	128.7	72.6
At work (not canteen)	2.4	14.5	10.7	29.04	7.24	19.50	16.8	40.2
Other place	0.6	7.3	2.7	15.18	1.61	9.49	4.7	21.8

<sup>a</sup>For each meal and place, means are calculated on a number of consumers which may be ≤ the total n of each consumers group consumption.

in 2006 compared to the previous decade, albeit lower than in other European countries [8], partially confirming the present results. The study of Pala et al. [19] found, in addition to other principal results, a healthier lifestyle among yogurt consumers: subjects in the highest tertile of yogurt consumption were significantly less likely to be overweight or obese, did significantly more sporting activities, and were significantly less likely to be current smokers, while the category of subjects in the lowest yogurt consumption tertile contained the highest proportions of people with low education and consistent alcohol drinking habits. Other studies have examined the relationship between health beliefs and dietary practices. Larson et al. [22] found that among American female adolescents, health attitudes were significantly and positively related to milk intake. Allen and Goddard [23] examined individual preferences for milk and yogurt, and found that general nutrition knowledge can predict purchasing and consumption intentions for milk and yogurt products.

According to many researches conducted in recent years, there is some interesting evidence that yogurt might be related to certain health benefits. Regular consumption of yogurt might help to meet the dietary recommendations for some key nutrients [1], reduce the risk of cardiovascular disease and type II diabetes [24–26], lower risk of incident hypertension, smaller long-term increment of systolic blood pressure and smaller long-term gain in weight and waist circumference [27–29], and might be protective against colorectal cancer [19]. Anyway, scientists are cautious in stating that yogurt produces these desirable effects, and agree that further research is needed to determine if the observed associations are causal.

The consumption data used in the present analysis have some known limitations, related to methodological issues that have been already discussed in detail by Leclercq et al. [7] and Sette et al. [30]. Food and nutrient intakes assessed using a 3-day dietary record has been demonstrated to be a reliable and valid method for estimating population food and nutrient intake [31]. Food consumption data are often used to characterize average and high levels of consumption within the population. In the case of food categories with a large number of non-consumers, as was the case in the present analysis, the median (P50) is likely to be zero and the mean values can be very low over the total sample. In these cases 'consumers only' mean values can be very different from the total ones.

The low participation rate in this study could have affected the representativeness of the study sample as participants may be more motivated than subjects who are not interested in participating. However, the study was designed with the aim of representativeness of the total population at a national level and in the four main geographical areas in Italy, taking energy intake as the referring parameter [7].

A further limitation of the study is the self-reported nature of the information on lifestyle and the level of interest and knowledge on nutrition and food-health relationship. It is possible that this self-reported information did not reflect the actual behaviours of the selected sample, although we considered it as a rough indicator.

Studies suggest that BMI based on self-reported weight and height is not accurate for individual BMI assessment [32, 33]. However, in this study BMI was used for the purpose of better understanding the lifestyle of respondents, and not to infer specific health risks that might be under/overestimated by self-reporting.

## 5. Conclusion

Although yogurt did not belong to the traditional Italian dietary pattern, the consumption of this product has tended to increase in recent decades in Italy, and the results provided here represent a rough indication that its consumption might be linked to the attention of people towards healthy lifestyle and behaviours.

A more in-depth analysis on the dietary and nutritional profile of yogurt consumers is needed in order to complete the analysis presented here and extend our understanding on the role and place of yogurt in the Italian diet.

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