

Compliance with dietary guidelines in the Spanish population. Results from the Catalan Nutrition Survey

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The aim of the present study was to analyse the different food and nutrition profiles of the section of the Spanish population having either a low or a high intake of energy, fat, saturated fatty acids (SFA) and fibre in order to analyse the compliance with dietary guidelines. Analyses were made from the Catalan Nutrition Survey, comprising a random sample of 1600 people aged 18 to 60. Dietary information was obtained by means of two 24 h recall, and food and energy intake was categorized according to the quartiles of fat, SFA and fibre intake. The results show the food consumption patterns that distinguish low versus high fat, SFA and fibre eaters in the Spanish population, and facilitate the establishment of food-based dietary guidelines in Spain and other Mediterranean countries.

Food consumption: Nutrition survey: Dietary guidelines: Spain

Spain can be considered a typical Mediterranean country that enjoys the so-called 'Mediterranean Diet'. The term 'Mediterranean Diet' has become popular in recent years, and has entered the language not only of the general public but also of scientific publications, with consistently positive, albeit rather vague, connotations. However, the term is used loosely and for varying purposes, and uncertainties remain about the dietary pattern it applies to, where in the Mediterranean region such a diet is to be found, and precisely what it is expected to do for health (Ferro-Luzzi & Sette, 1989; Keys, 1995; Nestle, 1995). More recently, the major characteristics of this dietary pattern have been defined (Helsing & Trichopoulou, 1989; Serra-Majem & Helsing, 1993) as have its time trends and its potential use as a dietary guide for non-Mediterranean countries (James *et al.* 1989; Nestle, 1995; Willett *et al.* 1995).

Like the other southern European countries, Spain has no formal nutrition policy, but the Ministries of Agriculture and Health conduct many related activities (MAPA, 1991). The major sources of information about food availability and dietary intake in Spain are: Food Balance Sheets, Household Budget Surveys conducted by the National Institute of Statistics every 10 years, Household Consumption Surveys conducted yearly by the Ministry of Agriculture from 1987, and individual dietary surveys at regional level: (Canary Islands (1983–1985), Catalonia (1986), Basque Country

(1989), Murcia (1990), Madrid (1992–1993), Catalonia (1992–1993), Valencia (1993–1994), Andalusia (1996–1997), Canary Islands (1997–1998) and Spain, infant and adolescents (1998–ongoing). Despite these many sources of information, there is no coordinated food consumption monitoring system at the national level. Furthermore, the periodic evaluations of Spain's health objectives do not probe nutrition indicators, except for obesity, which is estimated using self-reported weight and height (Regidor *et al.* 1993; Serra-Majem *et al.* 1993).

With the exception of Malta, no European Mediterranean country has a national nutrition policy. Most countries have developed nutrition objectives and dietary guidelines as well as some system for monitoring nutritional information, but no structured nutritional policies exist. Several reasons explain this gap. Nutrition receives scant attention from the public health sector, perhaps because it is less relevant as a risk factor for chronic disease in the Mediterranean than in northern Europe. The role of the European Union in agricultural policies also affects development of nutrition policies. Another reason is the less interventionist attitude toward health policy in the Mediterranean. Finally, there is great emphasis placed on consumer demand in formulating nutritional policy in Mediterranean countries (Serra-Majem *et al.* 1997). In Spain, the 17 autonomous regions are responsible for development of health plans consistent with

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the World Health Organization Regional Office for Europe (WHO-Europe) 'Health for All for the Year 2000' initiative and with the Spanish health law. To date, ten regions have reinforced their health plans with a law or decree, and only four have not yet approved one. All the regions have been empowered by central government to control health promotion and health protection, except those concerning international health, but only six have been empowered to control health care planning and administration (Catalonia was empowered earlier, in 1982, five years before the Basque Country, Valencia and Andalusia) (MSC, 1994). Nearly all of the regional health plans have included an analysis of the situation, health objectives, and describe specific programmes and activities to be developed. Some regional health plans do not include nutritional objectives, even though nutritional information from household budget surveys can be desegregated at the regional level. In addition, recent nutritional surveys have been conducted or are ongoing in several regions, and surveys were also conducted in the Canary Islands and in Catalonia 10 years ago (Doreste, 1987; Aranceta *et al.* 1990, 1994; Violan *et al.* 1991; Vioque & Quiles, 1995; Serra-Majem *et al.*, 1996). However, since 1995, no nutritional and dietary guidelines have been defined for the Spanish State.

Present-day scientific and epidemiological knowledge points to a clearly defined relation between consumption of fat and various high-profile chronic diseases, which has led a group of FAO/WHO experts to recommend that a maximum fat intake of 30% energy be set as the population goal. Very low-fat diets can cause problems in satisfying energy and nutrient needs. This group, therefore, suggested that the lower limit for fat intake should be set at

15% energy, a sufficient level for covering needs for essential fatty acids and fat-soluble vitamins. The group, like many other bodies, recommended distributing the energy intake evenly between SFA (10%), monounsaturated fatty acids (MUFA) (10%) and polyunsaturated fatty acids (PUFA) (10%), though no scientific criteria were established, except with SFA (< 10%). In Spain, as in the other Mediterranean countries, these general WHO recommendations are difficult to implement. In our diet, the contribution of olive oil represents between 13 and 20% of consumed energy (according to regions), which makes it difficult to carry out the plan to reduce the contribution of energy from fat to 30%. In the context of the Mediterranean diet it would be possible to maintain the present level of olive oil consumption and aim at reducing the energy provided by SFA by 3–4%.

Data from the latest food surveys carried out in Spain, generally, put the energy intake from fats at between 37 and 42%. Though it involved modifying the WHO recommendations, the Spanish Association for Community Nutrition developed a set of nutritional recommendations with the assent of the Nutrition Unit of the WHO Regional Office for Europe. In Table 1, these are compared with the WHO recommendations and an estimate of the present situation in Spain. These recommendations were developed at a meeting on 24 October 1994 during a Consensus Conference held in Barcelona. The main point was to recommend a fat intake below 35% energy if olive oil is the most important fat consumed (as is the case in most of the Spanish regions). The proposal to design a dietary guide for the Spanish population in a pyramidal chromatic structure was also discussed and debated at the consensus meeting.

Table 1. Nutritional recommendations for Europe (WHO-Europe) and Spain (Spanish Association of Community Nutrition)

	Estimated present situation in Spain*	Nutritional Objectives (WHO)†	Nutritional Objectives (SENC)‡
Body weight	BMI = 25–26	BMI 20–25	BMI 20–25
Total fat (%energy)	40§	20–30	≤ 35 ≤ 30¶
SFA (%energy)	13	10	≤ 10
PUFA (%energy)	7	PUFA/SFA = 1	UF/SF ≥ 2.0 PUFA ≤ 8
Cholesterol (mg/1000 Kcal)	150	< 100	≤ 100
Sugar (%energy)	10	10	≤ 10
Complex carbohydrate (%energy)	33	45–55	> 50
Fibre (g/d)	≤ 20	30	> 25
Nutrient density	Acceptable		
Salt (g/d)	9	5	< 6
Proteins (%energy)	> 15	12–13	13
Alcohol	6%energy	Limit	Reduce ≤ 1–2 glasses of wine/day
Fluorides in water (mg/l)	< 0.3	0.7–1.2	–
Iodine prophylaxis	variable	included	fluoridated-iodinated salt

* Adapted data from different studies.

† From WHO-Europe 1987 (James, 1989).

‡ SENC = Spanish Association of Community Nutrition.

Guidelines adopted in a Consensus Conference held in Barcelona (Serra-Majem *et al.* 1995).

§ Alcohol-free energy.

|| Frequent use of olive oil.

¶ Not using olive oil frequently.

SFA = Saturated fatty acids; PUFA = Polyunsaturated fatty acids; UF/SF = Unsaturated fats/saturated fats; BMI = Body Mass Index.

The aims of the present study were to analyse the different food and nutritional profiles of the sections of the Catalan population having either a low or a high intake of energy, fat, SFA and fibre.

Material and methods

The present analysis was performed using the database of the Catalan Nutritional Survey (1992–93); the methodology of this survey has been described elsewhere (Serra-Majem *et al.* 1996) and will be summarized here. The random sample population consisted of inhabitants aged 6 to 75 living in Catalan municipalities. The sample was stratified according to the results of the household budget survey (HBS) and randomized into subgroupings with Catalan municipalities being the primary sample units, and individuals within these municipalities comprising the final sample units. The theoretical sample size was estimated to be 3000 subjects. This would provide for a specific relative precision between 7 and 10% ($\alpha = 0.05$) for those estimates between 10 and 20%.

The sample was obtained from the census registers of the 82 randomly selected municipalities. The sample distribution according to stratification by the HBS was as follows: 46 municipalities with fewer than 10 000 inhabitants, 28 municipalities with more than 10 000 but fewer than 100 000 inhabitants, and 8 municipalities consisting of more than 100 000 inhabitants. Samples were selected by considering the proportion of people in, and the specific weight of, each municipality in the sample, with the aim of avoiding, as far as possible, further requirements for sample weighting.

The dietary assessment consisted of combining two 24 h recalls and a food frequency questionnaire covering 77 food items. The 24 h recall was carried out twice during the 1992 study period, the first in a warm season (May–July) and the second in a cold season (November–December). This was to avoid the influence of seasonal variations. The surveys were always carried out at the home of the subject being interviewed. There were 36 interviewers, who were assigned an average of 78 subjects each, which allowed

the fieldwork to be completed within the 6-week timeframe anticipated for this phase of the project. The interviewers underwent a rigorous selection process and training programme, thus establishing a quality-control mechanism that lasted throughout the entire period of the dietary data collection. Twenty percent of the sample were interviewed by telephone in order to verify some aspects of the dietary information previously gathered by personal interview. The coding of food data was carried out by the same interviewers, under the supervision of two dietitians.

In order to estimate the volumes and portion sizes, the household measures found in the subjects' own homes were used. Volumes for these measures were also noted. On some occasions standard portion sizes were used. Diet histories for subjects with disabilities or memory defects were carried out via the primary caretaker. Conversion of food into nutrients was made by the French 'Répertoire générale des aliments', which comprises 572 foods specifying 32 nutrients, energy and edible portion (Feinberg *et al.* 1991). Adjustment for intra-individual variability was made by analysis of variance, using the method described by Beaton and Liu (Liu *et al.* 1978; Beaton *et al.* 1983).

For the present analysis the population aged 18 to 60 was distributed according to their quartile of fat, SFA and fibre intake, using adjusted values for intra-individual variability. The consumption of main food groups was compared between low and high consumers (first and fourth quartile) of fat, SFA and fibre intake. Comparison also included percentage of energy intake from fat, carbohydrate and protein. Averages were always standardized by age using the indirect method.

Results and discussion

Out of a total of 4000 individuals included in the random sample, 2757 (68.9%) participated in the first interview (May–July) and 2475 (61.9%) people in the second. Non-participation rates included potential subjects declining to be interviewed as well as involuntary non-participation due to census error caused by address changes, missing persons or unavoidable impediments to survey collaboration. Of

Table 2. Daily intakes of energy, fat, SFA, fibre and fruit and vegetables by Catalan subjects in 1992 (aged 18 to 60 years)

Nutrients and foods	Men (n = 712)		Women (n = 888)		Total (n = 1600)	
	Mean	(SD)	Mean	(SD)	Mean	(SD)
Energy (MJ)	10.3	1.3	7.7	1.3	8.9	1.8
Total fat (%energy)	37.5	3.4	38.4	4.0	38.0	3.8
SFA (%energy)	12.5	1.8	13.0	2.0	12.8	1.9
MUFA (%energy)	17.2	1.9	17.2	1.9	17.2	1.9
PUFA (%energy)	4.6	0.8	4.6	0.8	4.6	0.8
Protein (%energy)	18.7	2.0	20.2	3.3	19.6	2.9
Carbohydrate (%energy)	39.9	2.5	40.5	4.2	40.2	3.6
Alcohol (%energy)	4.3	4.2	1.2	1.9	2.6	3.5
Alcohol (g)	14.8	14.9	3.2	5.0	8.4	12.1
Fibre (g)	18.6	3.2	15.5	2.1	16.8	3.1
Fibre/MJ energy (g/MJ)	1.81	0.3	2.1	0.4	1.9	0.4
Fruit and vegetables (g)	455	288	500	259	480	270

Data adjusted by intra-individual variability and age standardized.

SFA = saturated fatty acids; MUFA = monounsaturated fatty acids; PUFA = polyunsaturated fatty acids.

these 2475 people, 1600 individuals were between the ages of 18 and 60 years, and were included in the present analysis. Our data have been adjusted by intra-individual variability and the age standardized; crude data from two

24 h recall questionnaires do not allow the estimation of nutrient-intake distribution among populations, and age adjustment is needed since food consumption and nutrient intake is largely influenced by age.

Table 3. Mean daily nutrient and food intakes of Catalan subjects aged 18 to 60 years in the lowest (Q₁) and highest (Q₄) quartiles of fat intake

	Men (n = 712)				Women (n = 888)			
	Low-fat consumers (Q ₁ = < 36.38 %energy)		High-fat consumers (Q ₁ = > 38.86 %energy)		Low-fat consumers (Q ₁ = < 35.82 %energy)		High-fat consumers (Q ₁ = > 41.01 %energy)	
	% Cons.	\bar{x} all	% Cons.	\bar{x} all	% Cons.	\bar{x} all	% Cons.	\bar{x} all
Energy (MJ)		9.3		10.2		7.2		8.1
Protein (%energy)		19.4		18.7		21.3		19.2
Carbohydrates (%energy)		40.2		38.0		44.3		36.9
Alcohol (%energy)		6.9		3.5		1.4		1.0
Total fat (%energy)		33.2		41.1		33.2		43.3
SFA (%energy)		10.7		13.8		10.9		14.9
MUFA (%energy)		15.1		19.1		15.1		19.3
PUFA (%energy)		4.2		5.1		4.0		5.0
Alcohol (g)		22.2		11.9		3.5		2.7
Fibre (g)		18.8		17.9		16.1		14.9
Fibre (g/MJ)		2.0		1.8		2.3		1.9
Cereals	100	210	99	183	97	144	99	137
Wholemeal bread	7	8	6	3	17	7	15	5
Other bread	97	137	96	106	88	74	87	61
Cereals (high fibre)	3	1	2	0	10	3	5	1
Cereals (low fibre)	13	3	7	1	13	3	17	3
Pasta	49	14	35	10	37	9	33	8
Rice	18	6	18	6	25	8	14	4
Scones, pastries	49	22	58	35	55	27	62	35
Potatoes	73	75	81	93	65	60	77	80
Fried potatoes	34	24	49	46	19	10	42	32
Dairy foods	93	188	98	205	97	228	99	259
Full-fat milk	68	96	76	121	63	94	80	144
Other milk	19	35	11	14	43	74	31	43
Yogurts	18	23	26	23	37	38	31	28
Cheese	46	14	58	25	40	12	67	24
Meat/fish/poultry/egg	99	297	100	336	100	227	100	255
Fresh meat	85	81	90	122	74	60	86	93
Processed meat	75	35	82	54	63	20	77	34
Poultry	53	55	45	46	59	60	45	43
Fish	75	98	63	71	69	70	59	48
Eggs	67	27	80	43	46	16	86	37
Fruit and vegetables	99	509	100	432	100	586	99	431
Total fruits	94	323	91	214	99	388	91	199
Citrus fruit	50	63	41	55	59	93	43	48
Other fruit	85	253	70	146	93	287	76	142
Fruit juices	11	19	11	16	15	23	12	17
Vegetables	97	185	98	218	95	198	98	232
Pulses (cooked)	36	34	21	18	25	21	25	20
Fats	100	27	100	44	100	20	100	38
MUFA (olive oil)	99	21	100	34	98	15	100	29
PUFA oils	82	4	89	7	68	2	91	5
Butter, lard, margarine	22	1	39	2	25	2	52	4
Confectionery	83	18	85	21	79	17	20	16
Nuts	12	3	15	5	8	2	14	3
Drinks (ml)								
Tea	1	1	2	2	6	9	7	11
Coffee	87	86	83	72	78	63	81	71
Drinking chocolate	4	6	1	2	5	4	5	6
Soft drinks	34	63	30	63	26	50	26	56

* % Cons. = % Consumers.

Data adjusted by intra-individual variability and age standardized.

SFA = saturated fatty acids; PUFA = polyunsaturated fatty acids; MUFA = monounsaturated fatty acids.

Table 4. Mean daily nutrient and food intakes of Catalan subjects aged 18 to 60 years in the lowest (Q₁) and highest (Q₄) quartiles of SFA intake

	Men (n=712)				Women (n=888)			
	Low-SFA consumers (Q ₁ = < 11.18 %energy)		High-SFA consumers (Q ₁ = > 13.75 %energy)		Low-SFA consumers (Q ₁ = < 11.65 %energy)		High-SFA consumers (Q ₁ = > 14.35 %energy)	
	% Cons.*	\bar{x} all	% Cons.	\bar{x} all	% Cons.	\bar{x} all	% Cons.	\bar{x} all
Energy (MJ)		9.6		10.8		7.1		8.1
Protein (%energy)		19.2		18.3		21.7		19.3
Carbohydrates (%energy)		40.3		39.4		43.0		37.9
Alcohol (%energy)		6.7		2.6		1.5		1.2
Total fat (%energy)		34.2		40.0		34.2		42.0
SFA (%energy)		10.2		14.7		10.4		15.6
MUFA (%energy)		15.8		18.2		15.7		18.3
PUFA (%energy)		4.5		4.6		4.5		4.5
Alcohol (g)		21.9		9.5		3.6		3.3
Fibre (g)		19.0		17.8		16.1		14.5
Fibre (g/MJ)		2.0		1.7		2.3		1.8
Cereals	100	208	100	244	95	127	99	153
Wholemeal bread	10	8	7	4	17	7	14	5
Other bread	97	140	97	125	86	69	88	64
Cereals (high fibre)	5	1	2	0	11	3	5	1
Cereals (low fibre)	12	3	13	3	16	3	14	2
Pasta	49	14	40	13	33	8	36	9
Rice	20	6	20	7	24	7	16	4
Scones, pastries	42	18	71	57	47	20	73	41
Potatoes	78	83	81	81	67	61	72	67
Fried potatoes	37	32	45	37	22	15	36	23
Dairy foods	90	155	99	301	95	205	99	287
Full-fat milk	56	72	85	196	51	60	88	17
Other milk	20	36	10	12	53	93	29	36
Yogurts	23	25	33	30	35	33	27	24
Cheese	34	9	71	33	33	10	77	30
Meat/fish/poultry/egg	99	307	100	311	99	241	100	246
Fresh meat	82	73	94	125	71	54	86	93
Processed meat	73	34	89	58	57	17	81	37
Poultry	55	61	44	44	60	64	42	39
Fish	80	111	53	46	78	87	59	44
Eggs	67	29	76	38	52	18	79	32
Fruit and vegetables	99	524	99	375	100	610	99	378
Total fruits	94	320	89	189	99	372	90	186
Citrus fruit	49	64	35	42	62	96	45	49
Other fruit	85	248	70	134	92	267	58	130
Fruit juices	10	16	16	22	12	20	11	15
Vegetables	96	205	97	186	97	237	97	193
Pulses (cooked)	31	29	22	17	20	17	23	17
Fats	100	31	100	37	100	25	100	32
MUFA (olive oil)	99	25	99	27	98	19	100	22
PUFA oils	81	5	88	5	73	3	90	4
Butter, lard, margarine	17	1	52	4	18	1	64	5
Confectionery	79	21	87	26	77	15	85	20
Nuts	14	3	12	3	9	2	11	2
Drinks (ml)								
Tea	2	1	3	4	6	8	7	9
Coffee	81	78	76	65	77	65	82	72
Drinking chocolate	2	5	6	7	4	3	7	10
Soft drinks	37	82	46	98	22	42	35	73

* % Cons. = % Consumers.

Data adjusted by intra-individual variability and age standardized.

SFA = saturated fatty acids; PUFA = polyunsaturated fatty acids; MUFA = monounsaturated fatty acids.

Table 2 shows the mean intakes of energy, fat, SFA, fibre, alcohol and fruit and vegetables in the Catalan population aged 18 to 60 years. Total fat represents 38% of total energy intake, and SFA 12.8%; both these percentages were higher

in women than in men. Protein represents almost 20% energy and alcohol 2.6% energy. The consumption of fruit and vegetables was 480 g (455 among men and 500 among women). In both sexes, the first quartile for relative fat

Table 5. Mean daily nutrient and food intakes of Catalan subjects aged 18 to 60 years in the lowest (Q₁) and highest (Q₄) quartiles of fibre intake

	Men (n = 712)				Women (n = 888)			
	Low-fibre consumers (Q ₁ = < 16.1 g/MJ)		High-fibre consumers (Q ₄ = > 2.02 g/MJ)		Low-fibre consumers (Q ₁ = < 1.81 g/MJ)		High-fibre consumers (Q ₄ = > 2.325g/MJ)	
	% Cons.*	\bar{x} all	% Cons.	\bar{x} all	% Cons.	\bar{x} all	% Cons.	\bar{x} all
Energy (MJ)		10.7		9.2		9.0		6.9
Protein (%energy)		18.8		19.4		18.9		21.2
Carbohydrates (%energy)		39.2		40.0		39.8		41.9
Alcohol (%energy)		4.7		4.6		1.2		1.1
Total fat (%energy)		38.7		35.8		40.3		36.0
SFA (%energy)		13.4		11.3		14.2		11.6
MUFA (%energy)		17.7		16.4		17.8		16.3
PUFA (%energy)		4.5		4.6		4.7		4.4
Alcohol (g)		16.9		14.6		3.6		2.6
Fibre (g)		16.3		20.9		14.3		17.2
Fibre (g/MJ)		1.5		2.3		1.6		2.5
Cereals	98	222	100	186	100	199	95	116
Wholemeal bread	2	1	14	10	7	2	30	13
Other bread	96	123	94	117	96	88	79	57
Cereals (high fibre)	1	1	4	1	2	0	15	4
Cereals (low fibre)	9	3	12	2	18	4	12	2
Pasta	40	14	42	12	47	14	24	6
Rice	23	9	16	5	28	8	15	4
Scones, pastries	68	45	44	19	84	53	47	19
Potatoes	72	77	75	75	76	77	71	64
Fried potatoes	42	40	36	26	46	33	20	10
Dairy foods	97	255	92	197	99	287	96	223
Full-fat milk	81	162	66	102	86	179	59	75
Other milk	11	16	20	34	19	35	51	82
Yogurts	28	26	23	26	31	27	39	37
Cheese	57	24	50	19	62	21	51	19
Meat/fish/poultry/egg	100	341	99	288	100	283	99	218
Fresh meat	90	116	85	83	87	92	76	68
Processed meat	83	55	72	35	85	39	62	19
Poultry	55	66	51	60	50	55	46	45
Fish	62	71	73	81	67	70	65	64
Eggs	68	34	66	32	73	26	57	22
Fruit and vegetables	97	245	100	671	98	345	100	698
Total fruits	75	98	99	417	89	182	99	415
Citrus fruit	26	31	60	84	38	45	67	106
Other fruit	46	60	93	324	73	128	93	298
Fruit juices	16	25	8	13	17	28	12	16
Vegetables	93	147	98	254	95	163	98	283
Pulses (cooked)	10	6	38	38	17	11	29	28
Fats	100	33	100	33	100	34	100	26
MUFA (olive oil)	100	26	99	26	100	25	99	19
PUFA oils	84	5	83	5	89	5	70	3
Butter, lard, margarine	34	2	27	2	52	4	31	2
Confectionery	88	26	84	20	89	25	74	14
Nuts	8	2	17	5	14	3	11	2
Drinks (ml)								
Tea	1	1	2	5	6	8	7	8
Coffee	83	78	81	67	73	59	76	73
Drinking chocolate	4	4	3	7	7	11	3	2
Soft drinks	55	140	24	44	48	101	15	25

*% Cons. = % Consumers.

Data adjusted by intra-individual variability and age standardized.

SFA = saturated fatty acids; PUFA = polyunsaturated fatty acids; MUFA = monounsaturated fatty acids.

consumption was 36% energy, and that of SFA was 10.9% energy both close to the Spanish recommendations (Serra-Majem *et al.* 1995; Serra-Majem & Aranceta, 1997). For the 4th quartile (high consumers), the cut-off point was 42.6% energy for total fat and 14.4% energy for SFA.

Table 3 shows the energy from macronutrients and food-group intake among low and high consumers of fat. Differences in consumption levels with fat intake (low versus high quartile) are evident for fried potatoes, yoghurts, butter, cheese, eggs and fresh and processed meat, which are higher among high-fat consumers in both sexes. On the other hand, intakes of pulses, poultry and fish are higher among low-fat eaters. Marked differences can be seen in the average intake of fruits (particularly non-citrus fruits), which is much greater among low-fat consumers. This is not so for vegetable consumption, which appears to be greater among the high-fat eaters. In addition, the average intakes in the high-fat group compared to the low-fat group are higher for edible fats, pastries, whole milk, cheese, fresh and processed meat and eggs, and lower for pulses, coffee, cereals (particularly bread), low-fat milk and fish. These results will allow public health authorities to improve nutrition interventions aiming at increasing or decreasing the percentage of consumers and/or the total amount consumed of the different food groups. Regarding nutrient intakes, the differences are obviously important for energy, total fat and SFA, and made low-fat consumers show a lower intake of alcohol (22.2 g) versus 11.9 g in the higher-fat group). These results do not support the idea that heavy eaters (high fat, energy intake) drink more alcohol, and they increase our understanding of alcohol consumption behaviour in the Mediterranean region.

Table 4 shows the results according to the intake of SFA. Men in the low-SFA group have an average intake of 10.2% energy, and women of 10.4% energy, and the high-SFA group averages are 14.7% energy and 15.6% energy respectively. The same differences in energy, total fat and alcohol observed in Table 3 are also observed in this table. There are two kinds of differences between the groups: the percentage of consumers and average intakes; the low-SFA group have a higher percentage of consumers of citrus and other fruits, pulses, pasta, low-fat milk, poultry and fish for men, and of citrus and other fruits, rice, low-fat milk, poultry and fish for women. The percentage of consumers in the same group is lower for fried potatoes, pastries, whole milk, yogurts, cheese, soft drinks, butter, fruit juice (only in men) and PUFA oils (particularly in women). The differences in average intakes are much greater in the lower group of SFA: vegetables, pulses (only in men), poultry and fish (the total meat group remains the same), and much smaller for soft drinks, pastries, dairy products, fresh and processed meat, and eggs.

Table 5 shows differences in food and nutrient intake according to fibre intake. Average intakes in the low-fibre group are 1.5 g/MJ for men and 1.6 for women, and in the high-fibre group are 2.3 for men and 2.5 g/MJ for women. Differences in fruit and vegetables consumption are very marked, since the average is 245 g in the lower group and 671 g in the higher group for men and 345 g and 698 g for women. The percentage of energy from fat and SFA is slightly higher among people consuming less fibre. The

most important differences in food group consumption in the high-fibre group are a markedly higher intake of fruit and vegetables (more than the double that observed in the low-fibre group) and pulses (more than three times low-fibre group consumption), and a low consumption of soft drinks, cereals, particularly pastries, fried potatoes (particularly in women), dairy products and all meats and fish. Intake of fat and other foods remains similar in both groups. Cereal group consumption does not determine fibre intake in our population, which is mainly influenced by the consumption of fruit, vegetables and pulses; in addition, the percentage of people eating wholegrain cereal products is still very low.

The results of the present analysis indicate the dietary interventions that need to be considered for the Catalan population, emphasizing those interventions that appear to have priority.

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