

# Trends in dietary habits and food consumption in Catalonia, Spain (1992–2003)

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## Abstract

**Objective:** To analyse trends in food habits and food consumption from 1992 to 2003.

**Design:** Two consecutive cross-sectional nutrition surveys were carried out on random samples of the Catalan population (Evaluation of Nutritional Status in Catalonia (ENCAT) 1992–93 and ENCAT 2002–03). Dietary intake was assessed by means of two 24-hour recalls on non-consecutive days and a food frequency questionnaire was used to ascertain tendencies in the frequency of food consumption.

**Setting:** Catalonia region, Northeastern Spain.

**Subjects:** Analysis is based on a total of 4701 individuals: 2641 from ENCAT 1992–93 (1210 men and 1431 women) and 2060 from ENCAT 2002–03 (954 men and 1106 women), aged 10–75 years.

**Results:** The trends from 1992 to 2003 showed an increase in eating between meals and outside the home. There was also an upsurge in consumers for fast food, especially among young adults. Notable decreases in fruit consumption (from 301 to 224 g day<sup>-1</sup>) as well as in vegetables, potatoes, meat (red meat and chicken), fish (whitefish and seafood) and offals were observed. In contrast, there was an increase in dairy product consumption, in general (from 255 to 312 g day<sup>-1</sup>), as well as low fat and skim milk derivatives. Fruit juice, nuts and olive oil consumption also increased, the latter being consumed daily by 96% of the population. Little variation was observed for the rest of the food groups in the period studied. Overall, Catalonia is characterised by a model of consumption that is quite favourable, inherent to Mediterranean countries but with important differences according to age.

**Conclusion:** Based on the food consumption trends observed in Catalonia, an increase in the consumption of fruits and vegetables, as well as wholegrain cereals and fish, should be promoted, along with a reduction in the consumption of meat and sausages.

## Keywords

Food consumption

Food habits

Diet

Nutritional survey

Food survey

Trends

Spain

24-hour recall

Food frequency questionnaire

Nutritional surveillance

Nutritional monitoring

Individual survey

The main causes of mortality in developed countries are closely related to diet, alcohol consumption, smoking and low levels of physical activity. Interventions in public health aim to reduce the average health risk for the general population as well as to achieve an optimal state of health and wellbeing. This objective necessitates the development of food and nutrition policies oriented towards the health of the entire community, thus eliminating or decreasing the identified risk factors<sup>1</sup>. As such, public health systems should incorporate a component of nutrition monitoring, an essential tool for the detection of nutrition problems, policy formation and for the planning and evaluation of

action programs in both established care settings as well as in emergency situations<sup>2–4</sup>.

Nutrition monitoring in the community involves the collection and analysis of precise quantitative measures derived from representative samples of the population for the purpose of detecting trends<sup>5,6</sup>. For this reason, the first step would be to conduct an initial baseline survey so as to assess the nutritional status of the population and thus identify and quantify the magnitude of the major nutrition-related problems, as well as to ascertain the causes, at risk groups, related life style determinants, etc. In this way problems can be prioritised, solutions sought,

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and short- and long-term objectives established for the planning and implementation of interventions that aim to improve the nutritional status of the population. Repeating the survey within a period of a few years would allow for the assessment of the target population's nutritional status at that moment as well as to analyse the changes occurring as a result of given interventions (nutrition education programmes, etc.) conducted in the preceding years. Moreover, it would facilitate the evaluation of trends in food consumption, eating habits and the prevalence of health-related risk factors (sedentary lifestyles, smoking, etc.) or pathologies such as obesity, apart from assessing whether objectives and recommendations established for the population in the period covered by the studies were achieved.

In order to carry out valid comparisons, it is essential that the studies use the same methodology, which applies to the population evaluated as well as to the methods utilised for food surveys, anthropometric measures, data processing and analysis, etc. Contrariwise, the validity of data would be undermined as the results obtained could reflect either authentic changes or a consequence of the different methods utilised<sup>2,7</sup>.

Repeated cross-sectional studies have been used for monitoring trends in dietary habits in several countries such as the USA, Finland, United Kingdom, Denmark, etc.<sup>8–11</sup>. In Spain, the only food consumption survey evaluating nutritional status of the population conducted at the national level is the EnKid Study 1998–2000<sup>12</sup>, which was realised in the individuals aged 2–24 years, with no existing data being available for the adult population at the national level. Various Autonomous Communities have carried out population-based nutrition studies at the regional level<sup>13</sup>, with Catalonia being the pioneer in implementing a nutrition monitoring system that includes the periodic administration of nutrition surveys<sup>14–19</sup>.

Catalonia is a region of Europe located in Northeastern Spain bordered to the north by France and to the east by the Mediterranean Sea. It has a population of more than 7 million inhabitants, having its own language called Catalan as well as its particular history and culture. In 1979 when the Autonomous Community Statute was approved, Catalonia acquired its own government and the ability to organise itself within the framework of the Spanish State and the EC healthcare system<sup>14</sup>.

In 1986, with the objective of identifying food consumption habits of the population, the Health Department of the Catalan Government conducted the first Nutrition Survey in a sample of 820 persons that utilised a 24-hour recall and food frequency questionnaire<sup>20</sup>. This evaluation showed an insufficient consumption of salads and other vegetables, fruit and pulses for all age groups as well as excessive intakes of foods rich in animal fats (meat, sausages, dairy products) and high in sugar (cakes, sweets, soft drinks), especially in those younger than

24 years of age. Following this evaluation, several nutrition education campaigns were implemented targeting the general population.

In 1992–93 the second nutrition survey (Evaluation of Nutritional Status in Catalonia (ENCAT) 1992–93) was conducted, being more comprehensive in scope than the first, and with a larger representative sample size. It included a sample of 2754 individuals aged 6–75 years in which food consumption, anthropometric and biochemical indicators were analysed<sup>21–23</sup>. The 1992–93 Catalan Nutrition Survey demonstrated eating patterns consistent with the characteristics of the Mediterranean Diet. The results of the second Catalan Nutrition Survey showed improvements in food consumption habits and trends towards meeting the World Health Organisation (WHO)-2000 nutrition objectives<sup>16</sup> with reduced intakes for calories and dietary fats and an increased fibre intake<sup>21</sup>. Following this study, interventions continued to be implemented that promoted adherence to the Mediterranean Diet and that highlighted the following: maintaining and increasing (especially in the youngest cohorts) fruit and vegetable consumption; utilising olive oil as the preferred added dietary fat; decreasing meat and meat product consumption; maintaining fish consumption and the use of low-fat dairy products. Promotion of physical activity was also highlighted<sup>21</sup>.

The latest Catalan Nutrition Survey was realised in 2002–03 (ENCAT 2002–03)<sup>24</sup>, whose objectives, methodology and parameters to analyse were very similar to the previous Survey (ENCAT 1992–93). It included a representative sample of 2160 individuals aged 10–80 years. As such, this allowed for the evaluation of the population's current nutritional status as well as for the identification of trends in specific indicators over the 10-year period of evolution<sup>24</sup>.

The purpose of this article is to analyse the trends (1992–2003) in food consumption and eating habits of the Catalan population aged 10 to 75 years.

## Material and methods

Data from two population-based cross-sectional nutrition surveys, ENCAT 1992–93 and ENCAT 2002–03, were used in the analysis. Both surveys were carried out in random samples of the Catalan population. A detailed description of both surveys' methodology has been published elsewhere<sup>21,24</sup>.

## Sample

Samples of both surveys were stratified according to household size and randomised into subgroups, with Catalan municipalities being the primary sample units and individuals within these municipalities comprising the final sample units. Samples were selected by considering the proportion of the number of inhabitants and the

specific weight of each municipality in the sample and were obtained from the census registers of the selected municipalities<sup>21,24</sup>. Response rate for both surveys were similar, 69% and 65%, respectively. The total population comprised 4701 individuals aged 10–75 years, pooled from the two surveys (2164 men and 2537 women): 2641 were derived from ENCAT 1992–93 (1210 males and 1431 females) and 2060 from ENCAT 2002–03 (954 males and 1106 females).

### Methods

Data were collected at the individual's home via personal interviews carried out by dietitians who had previously undergone a rigorous selection and training process. In both surveys, all participants were administered a general questionnaire that compiled information about socio-economic variables (profession, level of education, etc.) as well as the following: food habits, chronic disease control, smoking, physical activity, and opinions and knowledge about nutrition. This was in conjunction with the realisation of two dietary assessment questionnaires. Furthermore, several anthropometric measurements were taken (body weight, height, circumferences, etc.) under standardised conditions<sup>21,24</sup>.

The dietary assessment consisted of combining two 24-hour recalls and a food frequency questionnaire. The 24-hour recalls were carried out twice during the 1992–93 study period, the first in a warm season (May–July) and the second in a cold season (November–December), in order to avoid the influence of seasonal variations. In ENCAT 2002–03, during the March 2002–June 2003 period, all individuals completed one 24-hour recall, and 62% of the sample completed a second 24-hour recall 8–30 days later, conducted on a different weekday from that of the first interview. In both surveys, interviews were conducted on all days of the week. In order to estimate volumes and portion sizes, the household measures found in the subjects' own homes were used. In the case of subjects with disabilities or memory defects, the primary caretaker was interviewed. Children under 13 years were assisted by a parent. Food data coding was carried out by the interviewers<sup>21,24</sup>.

In ENCAT 1992–93 the food frequency questionnaire was qualitative and included 77 food items. For each food item, the interviewer asked about the type of consumption frequency (daily, weekly, monthly or never)<sup>21</sup>. In ENCAT 2002–03 a quantitative 80-item food frequency questionnaire, similar to that used in the previous survey, was used, although the present analysis only considers qualitative characteristics<sup>24</sup>.

### Analysis

Food habits trends on the number of meals eaten, frequency of eating at home, location of meals eaten outside the home, changes in type of food consumption

frequency as well as the evolution of the mean intake of food groups were evaluated. These patterns were analysed according to gender and age group.

For the evaluation of trends in food consumption, the two 24-hour recalls obtained from the ENCAT 1992–93 survey were recoded according to the 635 codes used in the ENCAT 2002–03 survey, based on the Spanish food composition tables of CESNID<sup>25</sup>. Mixed dishes were separated into their ingredients using standardised recipes. The same 31 food group/subgroup categories were used in both studies.

Statistical analysis was carried out using the programme SPSS v12. Differences in food consumption by age group and gender were analysed. Student's *t*-test was used for comparison of the means between the two groups, and one-way analysis of variance was used for comparison between more than two groups. For non-parametric variables, the Mann–Whitney and Kruskal–Wallis tests were conducted. The  $\chi^2$  statistics were used for comparison of proportions.

### Results

Table 1 shows the sample distributions of both surveys by gender and age group, which were similar to one another as well as being representative of the Catalan population in the years when the surveys were carried out (1992–93 and 2002–03)<sup>21,24</sup>. The mean age of the subjects was 39.2 years (SD 38.0) in ENCAT 1992–93 and 40.0 years (SD 39.4) in ENCAT 2002–03.

The sample population's food habit trends showed an increase in the daily number of meals consumed, rising from an average of 3.8 in ENCAT 1992–93 to 4.1 in ENCAT 2002–03 ( $P < 0.001$ ). The percentage of the population who ate five times a day was 20% (16% in ENCAT 1992–93), with 10% eating more than five times a day (6% in ENCAT 1992–93). The percentages of the population who reported consuming the main meals (breakfast, lunch and dinner) were maintained at 66%, 99% and 99%, respectively, in both surveys. In contrast, the percentages of other meals/snacks consumed considerably increased, from 17% to 59% for mid-morning snacks, from 33% to 58% for mid-afternoon meals, from 8% to 21% for bed-time snacks and from 9% to 36% for between-meal snacking. In contrast, the only decrease observed was for foods and/or beverages consumed as soon as one got up, going from 45% to 41%.

Changes were also detected regarding the place (at home or outside) where the main meals (breakfast, lunch, dinner) were consumed. On working days, there was a decrease in the percentage of the population who had lunch at home (from 83% to 72%), while those who had breakfast (76%) and dinner (92%) at home remained the same. On non-working days, there was also a decrease in the percentage who had breakfast (from 88%

**Table 1** Sample distribution by sex and age group in both surveys

Sex	Age group (years)	Sample ENCAT 1992–93		Sample ENCAT 2002–03	
		<i>n</i>	%	<i>n</i>	%
Males	10–17	167	13.8	114	11.9
	18–24	242	20.0	127	13.3
	25–44	371	30.7	326	34.2
	45–64	320	26.4	265	27.8
	65–75	110	9.1	122	12.8
	Total	1210	100.0	954	100.0
Females	10–17	148	10.3	89	8.0
	18–24	299	20.9	182	16.5
	25–44	458	32.0	376	34.0
	45–64	372	26.0	337	30.5
	65–75	154	10.8	122	11.0
	Total	1431	100.0	1106	100.0
Total	10–17	315	11.9	203	9.9
	18–24	541	20.5	309	15.0
	25–44	829	31.4	702	34.1
	45–64	692	26.2	602	29.2
	65–75	264	10.0	244	11.8
	Total	2641	100.0	2060	100.0

ENCAT – Evaluation of Nutritional Status in Catalonia.

**Table 2** Frequency (%) of eating lunch or dinner outside home by age group in ENCAT 1992–93 and 2002–03

Age group	Frequency	At family or friend's house		Bar		Fast food		Restaurant		Worksite cafeteria	
		1992–93	2002–03	1992–93	2002–03	1992–93	2002–03	1992–93	2002–03	1992–93	2002–03
10–17 years	Never	15.4	15.3	72.4	80.2	42.6	38.5	17.7	27.8	95.5	92.0
	≤once a month	44.6	33.8	12.6	13.1	36.9	35.0	11.7	50.2	1.8	0.0
	>1/month to 1/week	31.6	38.5	9.9	6.1	16.8	24.5	24.6	21.1	0.6	2.5
	>once a week	8.4	12.4	5.1	0.6	3.6	1.9	1.5	1.0	2.1	5.4
18–24 years	Never	10.9	8.8	52.9	52.2	38.9	27.4	9.2	19.0	77.9	82.6
	≤once a month	31.9	23.6	12.0	15.9	31.7	29.7	38.4	37.4	4.1	0.4
	>1/month to 1/week	39.5	39.1	21.8	20.1	26.0	33.7	42.8	35.1	4.4	4.8
	>once a week	17.7	28.5	13.3	11.7	3.5	9.2	9.6	8.6	13.5	12.1
25–44 years	Never	12.2	11.2	69.5	61.1	62.9	51.2	11.2	16.8	85.6	87.5
	≤once a month	33.7	25.8	10.5	13.9	24.4	22.9	46.4	37.0	1.3	0.2
	>1/month to 1/week	40.1	44.9	11.4	14.6	10.7	20.0	32.6	32.9	2.1	3.5
	>once a week	14.1	18.1	8.7	10.5	2.0	5.9	9.8	13.3	11.1	8.8
45–64 years	Never	26.2	18.8	85.2	75.8	93.0	82.3	26.0	18.7	91.5	87.9
	≤once a month	52.4	49.8	6.8	11.7	5.8	12.7	53.7	49.0	1.7	1.4
	>1/month to 1/week	18.5	28.4	2.9	5.7	1.1	4.0	13.6	21.4	1.4	4.3
	>once a week	3.0	3.0	5.1	6.7	0.0	1.0	6.7	10.9	5.5	6.4
65–75 years	Never	28.5	31.9	92.7	93.4	99.0	92.9	39.3	43.0	98.6	97.5
	≤once a month	51.5	47.5	3.6	5.2	1.0	4.7	49.6	42.4	1.4	0.0
	>1/month to 1/week	14.7	14.0	2.4	0.3	0.0	1.4	9.5	12.4	0.0	0.0
	>once a week	5.3	6.6	1.2	1.1	0.0	1.1	1.6	2.2	0.0	2.5
Total	Never	18.5	15.7	75.2	69.5	71.0	59.8	19.8	21.8	89.1	88.5
	≤once a month	42.3	35.5	8.9	12.5	18.2	20.2	48.7	42.3	1.9	0.5
	>1/month to 1/week	29.5	35.2	9.0	10.4	9.3	15.9	24.6	26.5	1.7	3.4
	>once a week	9.7	13.5	6.9	7.5	1.5	4.1	6.9	9.4	7.3	7.6

to 85%), lunch (from 80% to 71%) and dinner (from 68% to 60%) at home.

Table 2 presents the frequency (%) trends of eating lunch or dinner outside the home by age group. The table shows the decrease in the percentages of the population who never had lunch or dinner at a relative's or friend's house, a bar or fast food establishments. Consequently, it shows an increase in the percentages of the population who had lunch or dinner outside their home, being more pronounced in the adult population aged 18–44 years.

The percentage of the population who had lunch or dinner more than once a week at a relative's or friend's home increased from 9.7% to 13.5%, and more so in the group aged 18–24 years with percentages increasing from 17.7% to 28.5%. Moreover, fast food has become more popular especially among the population aged 18–24 years, in which the percentage of individuals who frequented fast food establishments more than once a week increased from 3.5% to 9.2%, and also among the group aged 25–44 years (from 2.0% to 5.9%). An increase in the frequency of eating

at restaurants was observed among the over 25 population. Few changes were noted in the frequency of eating lunch or dinner at the workplace cafeteria.

Table 3 shows the trends in the type of food consumption frequency. It presents, by food frequency questionnaire item and by survey (ENCAT 1992–93 and ENCAT 2002–03), the population distribution according to whether the food consumption frequency was daily, weekly, monthly or the food was not consumed at all. Tables 4 and 5 present food consumption trends 1992–2003 according to data from the 24-hour recalls. These tables compare mean consumption in  $\text{g day}^{-1}$  of each food group studied by age group, gender and survey. Differences in mean consumption (ENCAT 2002–03 – ENCAT 1992–93) in grams per day is also presented, along with the level of significance. The following is a summary highlighting the key results from Tables 3–5 by food group.

### **Milk and dairy products**

The consumption of milk and dairy products increased in both genders and all age groups, with an average increase of  $57 \text{ g day}^{-1}$  (from 255 to  $312 \text{ g day}^{-1}$ ;  $P < 0.001$ ). Consumption differences by age and gender remained the same. The age group that increased consumption the least ( $34 \text{ g day}^{-1}$ ) was the youngest one, while the highest increase was observed in males aged 18–24 years and over 64 years, and in females aged 18–64 years. Such increases were due to the higher consumption of yoghurts and other fermented milks (from 29 to  $60 \text{ g day}^{-1}$ ;  $P < 0.001$ ). Consumption of these products was rather homogeneous in all age groups, being lower in males aged 45–75 years (Tables 4 and 5). Whole milk and dairy products continue being the most consumed type of milk in Catalonia, even though consumption of low fat or skimmed milk doubled (from 46 to  $94 \text{ g day}^{-1}$ ) and that of low fat and fat-free yoghurts also increased (from 7 to  $19 \text{ g day}^{-1}$ ). This increase was observed in both genders and for all age groups. Regarding the frequency of consumption, there was a decrease in the daily consumers of full-fat milk and dairy products, with the corresponding increase in the percentage of low fat or fat-free dairy product intake (Table 3). Cheese consumption increased from about 4 to  $9 \text{ g day}^{-1}$  depending on the age group, except for the oldest female group in which it remained equal.

### **Cereals**

The consumption of cereals showed an average increase of  $8 \text{ g day}^{-1}$  in females, due to higher intakes in the group aged 18–44 years. No significant differences were observed among the male group. The frequency of consumption showed a slight increase in the percentage of wholegrain bread consumers (from 12.7% to 14.2% in daily consumers) and in unsweetened breakfast cereals (from 1.7% to 4.2% in daily consumers). An increase in the percentage of weekly consumers of pasta and rice was also observed.

### **Baked goods**

Consumption trends of bakery products showed a slight non-significant increase (from 34 to  $40 \text{ g day}^{-1}$ ). The effect of decreasing consumption with age was maintained, being lower in females ( $36 \text{ g day}^{-1}$ ) than in males ( $44 \text{ g day}^{-1}$ ). Consumption remained unchanged among female adolescents at  $56 \text{ g day}^{-1}$ , while it increased to  $72 \text{ g day}^{-1}$  among male adolescents. Despite the fact that the food frequency questionnaire items for these products did not exactly coincide in both surveys, a decrease in the percentage of daily consumption of baked goods was observed, while the percentage of non-consumers increased.

### **Potatoes**

Despite the fact that ENCAT 1992–93 had only one item that represented all potato types and that ENCAT 2002–03 had three (boiled-baked-steamed; French fried; chips), the frequency of consumption showed a marked decrease in the percentage of consumers, especially daily consumers. This change of habits was confirmed by the decrease in consumption data, which went from an average of 76 to  $62 \text{ g day}^{-1}$  ( $P < 0.001$ ). The decrease was observed in both genders. The steepest decrease ( $20 \text{ g day}^{-1}$ ) was seen in females aged 25–44 years.

### **Fish and seafood**

Fish and seafood consumption habits in the 10-year study period showed an increase in the percentage of weekly fatty fish consumers and a slight increase in the percentage of non-consumers of octopus, squid and cuttlefish. On average, overall fish and seafood consumption decreased by  $11 \text{ g day}^{-1}$  (from 73 to  $62 \text{ g day}^{-1}$ ), and it is worth pointing out that males aged 25–44 years in ENCAT 2002–03 consumed  $30 \text{ g day}^{-1}$  less of fish than the same group in ENCAT 1992–93 ( $P < 0.05$ ). The greatest decrease in white fish, crustacean and mollusk consumption was also observed in this age group. White fish consumption decreased on average by  $9 \text{ g day}^{-1}$ , from 40 to  $31 \text{ g day}^{-1}$  ( $P < 0.001$ ), while fatty fish consumption increased slightly ( $P < 0.001$ ), especially among females (from 12.5 to  $16.5 \text{ g day}^{-1}$ ;  $P < 0.001$ ). The steepest decrease in crustacean and mollusk consumption was particularly prominent in males ( $-8 \text{ g day}^{-1}$ ;  $P < 0.05$ ).

### **Meats**

Red meat consumption decreased on average by  $10 \text{ g day}^{-1}$  ( $P < 0.001$ ). Consumption remained unchanged in adolescent males and females aged 10–24 and 65–75 years. Average sausage and ham consumption remained similar at around  $30 \text{ g day}^{-1}$ , with variations noted for age, and with a notable decrease in those age groups that had the highest consumption in ENCAT 1992–93. Hence, sausage and ham consumption in adolescent females in ENCAT 2002–03 was  $20 \text{ g day}^{-1}$  less than that of adolescent females in ENCAT 1992–93 ( $P < 0.01$ ), and males



**Table 3** Trends 1992–2003 in the type of food consumption frequency in the Catalan population aged 10–75 years

	ENCAT 1992–93				ENCAT 2002–03				Trend 1992–2003
	Daily %	Weekly %	Monthly %	Never %	Daily %	Weekly %	Monthly %	Never %	
<b>Milk and dairy products</b>									
Whole milk	54.2	7.9	2.5	35.4	41.1	5.7	1.2	52.0	--
Low-fat milk	6.1	2.0	1.4	90.5	25.5	4.2	0.7	69.7	+++
Skim milk	21.0	3.7	1.8	73.5	18.7	2.6	0.6	78.2	=
Flan, custards and other dairy desserts	3.6	28.7	28.2	39.5	5.4	34.1	15.5	45.0	+
Whole milk yoghurt (plain and flavoured)	11.1	37.3	12.5	39.2	14.2	40.2	4.7	41.0	+
Skim milk yoghurts	4.8	11.1	4.2	79.9	10.5	18.8	1.7	69.0	++
Cream, light cream	0.5	11.8	31.6	56.1	0.8	18.2	15.7	65.3	+
Fresh cheese (mató, burgos, etc.)	4.8	27.9	17.8	49.5	3.6	36.7	13.9	45.7	=
Semicured cheese (bola, manchego)	11.1	54.5	10.6	23.8	10.2	60.6	6.6	22.5	=
Cured cheese	3.8	21.9	10.2	64.1	4.1	26.3	9.2	60.4	=
<b>Cereals</b>									
White bread	80.5	11.0	2.0	6.6	80.6	11.0	1.0	7.3	=
Wholegrain bread	12.7	10.8	9.7	66.8	14.2	11.0	3.5	71.3	+
Pasta (macarroni, spaghetti)	2.7	81.6	11.4	4.3	1.3	89.8	6.5	2.5	+
Rice	1.8	83.6	12.5	2.1	0.6	87.9	9.2	2.4	+
Cereals (breakfast), sweetened	4.0	5.7	6.9	83.4	4.8	8.5	3.4	83.3	+
Cereals (breakfast), unsweetened	1.7	2.2	2.9	93.2	4.2	5.9	1.4	88.6	+
Cereals muesli	0.9	1.6	2.1	93.2					
<b>Baked goods</b>									
Baked goods (croissants, donuts, etc.)	17.3	40.4	20.7	21.6	11.4	38.4	13.8	36.4	-
Cakes, pies					1.3	11.6	30.5	56.6	
Cookies	18.2	31.6	16.1	34.1	15.4	37.7	11.7	35.2	-
<b>Potatoes</b>									
Potatoes (boiled, baked, steamed, etc.)					3.3	82.5	7.5	6.7	
French fried potatoes	15.9	78.9	3.5	1.7	0.9	48.8	24.5	25.8	---
Potato chips					1.5	35.3	23.4	39.9	
<b>Fish and shellfish</b>									
Blue fish, river	0.1	9.1	27.5	63.3	0.0	7.0	16.9	76.1	-
White fish, sea (hake, monkfish, sole, etc.)	2.1	75.3	15.8	6.8	1.0	77.6	15.3	6.1	-
Blue fish, sea (tuna, sardine, etc.)	1.5	53.2	1.9	43.4	0.8	65.7	20.9	12.6	+++
Octopus, squid, cuttlefish	0.6	39.7	46.2	13.6	0.3	31.1	46.4	22.3	-
Seafood: mollusks (mussels, clams, etc.)	0.3	30.9	52.1	16.7	0.0	25.6	42.9	31.5	-
Seafood: crustaceans (shrimp, lobster, etc.)					0.2	28.4	49.6	21.8	
<b>Meats</b>									
Beef	5.1	75.5	10.7	8.7	1.1	76.5	12.4	10.0	-
Pork (except sausages)	1.6	60.2	17.8	20.5	0.7	65.2	17.1	17.0	-
Ham (cooked or cured)	16.8	67.7	8.3	7.2	8.3	75.3	8.2	8.2	-
Sausages (longaniza, chorizo)	12.5	49.8	14.1	23.7	8.5	56.3	9.8	25.4	-
Liver	0.2	9.4	27.4	63.0	0.1	3.3	13.7	82.9	---
Other offals (kidney, brain, etc.)	0.1	2.7	19.3	77.9	0.0	1.3	4.6	94.1	---
Poultry (chicken, etc.)	2.7	84.5	9.0	3.8	0.8	89.4	6.6	3.2	-
Rabbit and game meat	0.2	7.6	21.0	71.2	0.1	28.4	33.6	38.0	+++
<b>Eggs</b>									
Eggs	5.9	85.7	5.6	2.8	1.4	90.2	5.6	2.8	-
<b>Pulses</b>									
Pulses	1.9	70.9	18.8	8.5	0.5	78.7	15.8	5.0	=
<b>Nuts</b>									
Nuts (almond, hazelnut, etc.)	5.8	31.3	38.4	24.6	8.6	37.1	25.8	28.5	+
<b>Fruits</b>									
Apples	29.0	39.4	14.8	16.8	15.4	51.7	12.4	20.5	-
Pears	20.9	40.1	17.4	21.6	7.7	47.5	11.9	32.9	---
Oranges, mandarins, kiwis	39.2	39.6	8.8	12.4	34.0	49.3	6.6	10.2	-
Bananas	14.2	37.9	19.7	28.3	8.1	50.2	15.5	26.2	-
Strawberries, cherries, etc.					14.5	60.8	9.2	15.4	
Melon, watermelon					20.4	57.8	7.3	14.5	-
Other fruits	44.0	36.5	9.2	10.3	4.9	25.6	5.4	64.1	---
Marmalade, fruit conserve	7.3	21.1	27.8	43.8	6.1	18.0	16.3	59.6	-
Olives	20.3	42.8	13.1	23.8	11.7	53.7	12.8	21.8	-
<b>Vegetables</b>									
Lettuce or green salads	56.2	34.2	3.6	6.0	38.3	53.4	2.5	5.9	-
Cooked vegetables (spinach, green beans, etc.)	21.7	64.5	7.0	6.8	13.4	76.7	4.1	5.8	-
Raw tomato	48.7	37.4	4.2	9.7	28.9	54.0	2.2	15.0	---
Fried tomato	4.9	58.1	15.6	21.4	1.5	65.3	8.9	24.3	-
Carrots	26.4	40.7	12.5	20.4	15.1	50.2	9.4	25.2	-

**Table 3** *Continued*

	ENCAT 1992–93				ENCAT 2002–03				Trend 1992–2003
	Daily %	Weekly %	Monthly %	Never %	Daily %	Weekly %	Monthly %	Never %	
<b>Edible fats</b>									
Olive oil	91.6	3.2	0.8	4.5	95.5	2.9	0.1	1.5	+
Sunflower seed oil	25.2	9.5	4.4	61.0	12.3	11.7	3.4	72.5	–
Mayonnaise	1.9	38.7	32.3	27.1	0.7	31.9	23.2	44.1	–
Butter	9.6	28.2	12.7	49.4	3.7	14.4	7.5	74.5	– –
Lard	0.4	2.1	7.5	90.0	0.1	0.9	2.2	96.8	–
<b>Sugar and sweets</b>									
Sugar	63.0	9.6	3.0	24.3	63.2	9.6	1.1	26.1	=
Honey	5.8	11.2	26.3	56.7	6.3	10.5	14.4	68.8	–
Caramels and candy	10.0	18.2	16.6	55.2	8.3	18.7	9.3	63.7	–
Chocolate	7.8	29.6	24.6	38.0	10.1	34.8	18.4	36.8	+
<b>Beverages</b>									
Tap water	56.8	3.1	1.5	38.5	46.3	4.4	0.7	48.6	– –
Mineral water, non-carbonated	45.3	6.7	5.6	42.4	64.8	6.6	1.5	27.1	++
Mineral water, carbonated	5.7	5.4	7.6	81.3	4.6	5.8	5.0	84.7	=
Coffee	62.5	9.9	2.8	24.8	64.4	8.1	1.5	26.0	=
Tea	4.6	7.3	10.1	78.0	5.5	7.4	5.6	81.5	=
Soft drinks, non-carbonated	6.2	16.5	10.9	66.4	3.4	14.2	7.3	75.1	–
Soft drinks, carbonated	17.7	34.9	12.8	34.6	14.1	40.6	10.8	34.5	=
Commercial fruit juice	20.2	28.5	15.2	36.2	13.3	26.8	10.6	49.2	–
<b>Others</b>									
Ketchup, mustard	1.9	21.5	17.9	58.8	1.0	18.7	14.8	65.5	–

+++ high increase; ++ medium increase; + low increase; =no changes; –low decrease; – – medium decrease; – – – high decrease.  
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aged 18–24 years 8 g day<sup>-1</sup> less ( $P < 0.05$ ). Offal consumption, already low in ENCAT 1992–93, decreased especially among females. Poultry (chicken) consumption decreased on average by 11 g day<sup>-1</sup> ( $P < 0.001$ ), 6 g day<sup>-1</sup> in males (from 53 to 47 g day<sup>-1</sup>) and 14 g day<sup>-1</sup> in females (from 54 to 40 g day<sup>-1</sup>;  $P < 0.001$ ). All these changes in meat product consumption were confirmed by the data obtained from the food frequency questionnaire, where a decrease in the percentage of daily consumers of red meat (beef, pork, etc.), ham and cured meat and chicken was observed, as well as an increase in the percentage of non-consumers of offal. It is worth mentioning that rabbit and game meat consumers increased from 28.5% to 62%.

### Eggs

Egg consumption decreased slightly among under 45-year-olds, which was confirmed by the food frequency data where a decrease in daily consumers was observed (from 5.9% to 1.4%).

### Pulses

Consumption of pulses showed slight variations, decreasing in the 18–44 age groups and increasing in the oldest groups, with an overall mean consumption of 15 g day<sup>-1</sup>. Regarding frequency of consumption, an increase in the percentage of consumers and weekly consumers was observed.

### Nuts

Nut consumption increased, especially among those over 45-years-old. The frequency of consumption showed an increase in daily and weekly consumers (from 5.8% to 8.6% and from 31.3% to 37.1%, respectively).

### Fruits

Fruit consumption decreased considerably in both sexes and in all age groups, from a mean consumption of 301 to 224 g day<sup>-1</sup>. This decrease was also confirmed by the food frequency questionnaire, where an increase in the percentage of non-consumers was observed, together with a decrease in daily consumers. Citrus fruits were the most consumed in both surveys.

### Vegetables

Vegetable consumption also decreased slightly (an average of 17 g day<sup>-1</sup>), but more considerably in the groups aged 25–44 years (28 g day<sup>-1</sup>) and over 64 years (33 g day<sup>-1</sup>). The frequency of consumption showed a decrease in the percentage of daily consumers of salads, raw tomato and cooked vegetables, and an increase in the percentage of weekly consumers.

### Edible fats

Edible fat consumption decreased slightly, with olive oil remaining stable and being the most consumed fat by the

**Table 4** Trends in food consumption in the Catalan male population aged 10 to 75 years from 1992 to 2003

	ENCAT 1992–93						ENCAT 2002–03						Difference (ENCAT 2002–03 minus ENCAT 1992–93)					
	Age groups in years						Age groups in years						Age groups in years					
	10–17 <i>n</i> = 167	18–24 <i>n</i> = 242	25–44 <i>n</i> = 372	45–64 <i>n</i> = 320	65–75 <i>n</i> = 110	Total <i>n</i> = 1211	10–17 <i>n</i> = 114	18–24 <i>n</i> = 127	25–44 <i>n</i> = 326	45–64 <i>n</i> = 265	65–75 <i>n</i> = 122	Total <i>n</i> = 954	10–17	18–24	25–44	45–64	65–75	Total
Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Dif. <i>P</i>	Dif. <i>P</i>	Dif. <i>P</i>	Dif. <i>P</i>	Dif. <i>P</i>	Dif. <i>P</i>	
Milk	260.9	204.8	175.4	162.3	156.7	183.0	269.8	242.3	178.1	173.0	190.2	197.7	8.9	37.5a	2.8	10.7b	33.5a	14.7b
Yoghurt and fermented milks	49.5	35.6	26.5	19.0	12.3	26.4	64.0	59.5	63.1	45.0	46.4	55.6	14.5	24.0a	36.6c	26.1c	34.0c	29.2c
Cheese	20.1	29.8	21.0	15.5	12.3	19.5	25.9	33.6	28.5	19.4	17.6	24.9	5.8	3.8	7.4a	3.9	5.3a	5.4c
Other dairy products	26.7	26.0	20.4	13.7	7.8	18.4	33.8	31.3	28.7	19.9	7.9	24.5	7.0	5.4	8.3a	6.2a	0.2	6.1a
Total dairy products	357.2	296.1	243.3	210.5	189.2	247.4	393.4	366.8	298.4	257.4	262.1	302.8	36.2	70.7c	55.1c	46.8c	72.9c	55.4c
Cereals	208.0	210.5	174.0	144.1	131.8	169.2	205.9	188.7	179.2	148.5	134.2	169.4	-2.1	-21.8	5.3	4.4	2.4	0.1
Cakes and pies	59.8	58.8	40.8	21.7	22.5	37.9	72.1	57.9	45.1	34.7	20.4	44.0	12.3	-0.8	4.3	13.0	-2.1	6.1
Potatoes	90.6	92.5	76.7	89.1	83.0	84.6	76.6	71.9	71.4	72.6	58.5	70.8	-14.0	-20.6a	-5.3	-16.5	-24.5a	-13.9c
White fish	28.8	28.2	39.8	46.4	48.1	39.8	20.9	19.2	27.5	41.7	43.1	31.6	-7.9	-9.0	-12.3b	-4.6	-5.0	-8.3a
Blue fish	8.0	12.2	20.4	17.1	19.8	16.9	13.2	15.6	18.2	19.8	15.1	17.3	5.2	3.4	-2.2	2.8	-4.7	0.4a
Crustaceans and mollusks	11.6	13.7	30.7	25.5	18.1	23.1	11.1	9.5	15.0	19.2	14.3	14.9	-0.5	-4.2a	-15.7a	-6.3	-3.8	-8.2a
Total fish and seafood	48.4	54.1	90.9	88.9	86.0	79.8	45.2	44.3	60.7	80.7	72.5	63.7	-3.2	-9.8	-30.2a	-8.2	-13.5	-16.0
Meats	102.4	119.7	101.3	87.7	59.9	94.8	101.5	109.9	90.7	76.0	44.7	84.6	-0.9	-9.7	-10.6b	-11.7	-15.2b	-10.2c
Sausages and ham	49.8	54.3	47.9	29.1	25.6	41.0	51.9	46.2	44.6	34.7	23.1	40.2	2.2	-8.2a	-3.3	5.6a	-2.5	-0.8
Offals	0.8	1.5	3.1	4.8	6.6	3.5	0.2	0.5	2.1	4.3	2.1	2.3	-0.6	-1.0	-0.9	-0.5	-4.5	-1.2
Poultry	54.3	53.8	52.8	53.0	54.0	53.4	42.0	37.4	52.5	52.2	35.0	46.9	-12.3	-16.4a	-0.3	-0.8	-19.0b	-6.4
Eggs	26.8	31.4	33.1	29.2	18.7	29.2	23.2	32.8	28.0	30.5	22.5	28.1	-3.6	1.4	-5.1b	1.3	3.8	-1.1b
Pulses	13.4	15.6	16.6	17.6	16.9	16.4	15.1	14.1	14.0	19.1	17.0	15.9	1.8	-1.6	-2.7a	1.6	0.1	-0.5a
Nuts	4.3	2.7	6.3	3.3	3.0	4.3	2.5	4.2	4.8	4.9	4.6	4.4	-1.8	1.5	-1.5	1.6c	1.6	0.1c
Fruits	197.6	253.3	240.7	365.2	363.2	287.4	139.1	146.5	186.3	277.9	317.9	217.6	-58.5a	-106.8c	-54.4c	-87.4b	-45.3	-69.8c
Vegetables	116.6	164.3	198.5	220.5	224.3	193.9	115.0	148.3	170.4	213.6	189.0	175.2	-1.7	-16.0	-28.2b	-6.9	-35.4a	-18.7a
Olive oil	25.6	34.3	35.5	33.7	29.8	33.0	30.0	32.1	33.7	33.1	29.9	32.4	4.4	-2.2	-1.8	-0.6a	0.1	-0.6
Total edible fats	38.3	47.8	48.2	44.7	37.8	44.7	40.2	41.7	42.7	41.6	35.8	41.1	1.9	-6.2a	-5.5	-3.1	-2.0	-3.6
Sugar and sweets	27.2	22.8	20.2	16.2	16.0	19.7	23.2	20.1	19.9	14.8	12.2	17.9	-3.9	-2.6	-0.3	-1.4	-3.8a	-1.8a
Water	658.9	692.5	533.0	518.4	464.6	556.4	851.2	819.4	839.2	687.7	577.9	762.5	192.3c	126.8b	306.2c	169.3c	113.3a	206.1c
Coffee and tea	7.9	52.2	87.3	81.1	62.6	68.5	4.6	42.8	82.4	95.2	67.7	69.5	-3.3a	-9.4a	-4.9a	14.0b	5.2	1.0
Soft drinks	106.6	157.9	109.2	41.3	39.4	88.2	154.0	195.1	169.4	48.2	31.2	119.7	47.4a	37.2	60.2a	6.9a	-8.2	3.4
Others beverages	59.2	39.8	50.6	74.3	91.2	61.8	50.8	47.4	53.2	57.7	63.2	54.7	-8.4a	7.6	2.6a	-16.7a	-28.0a	-7.2c
Commercial juices and nectars	32.3	46.8	20.6	7.7	4.5	20.0	60.9	53.8	44.4	22.9	20.7	38.6	28.5	7.0	23.8b	15.3a	16.2a	18.7c
Total non-alcoholic beverages	865.0	989.2	800.7	722.8	662.2	794.9	1121.5	1158.5	1188.6	911.7	760.7	1044.9	256.6c	169.2c	387.9c	188.9c	98.5b	250.0c
Alcoholic beverages	3.3	142.3	264.6	175.1	122.8	175.3	0.7	77.9	150.7	198.0	142.9	135.2	-2.6	-64.4a	-113.9c	22.9	20.1	-40.0b

Consumption in g or ml per person per day.

Significance: a =  $P < 0.05$ ; b =  $P < 0.01$ ; c =  $P < 0.001$ .

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**Table 5** Trends in food consumption in the Catalan female population aged 10–75 years from 1992 to 2003

	ENCAT 1992–93						ENCAT 2002–03						Difference (ENCAT 2002–03 minus ENCAT 1992–93)					
	Age groups in years						Age groups in years						Age groups in years					
	10–17 <i>n</i> = 148	18–24 <i>n</i> = 299	25–44 <i>n</i> = 458	45–64 <i>n</i> = 372	65–75 <i>n</i> = 154	Total <i>n</i> = 1431	10–17 <i>n</i> = 89	18–24 <i>n</i> = 182	25–44 <i>n</i> = 376	45–64 <i>n</i> = 337	65–75 <i>n</i> = 122	Total <i>n</i> = 1106	10–17	18–24	25–44	45–64	65–75	Total
Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Dif. <i>P</i>	Dif. <i>P</i>	Dif. <i>P</i>	Dif. <i>P</i>	Dif. <i>P</i>	Dif. <i>P</i>	
Milk	238.2	189.8	195.8	188.8	207.6	199.0	228.5	219.9	214.3	219.4	217.5	218.3	–9.7	30.1a	18.4	30.6c	9.9	19.3c
Yoghurt and fermented milks	43.5	32.7	26.4	29.8	40.9	32.2	69.7	58.7	68.0	60.9	65.1	64.1	26.2c	26.0c	41.5c	31.1c	24.2b	31.9c
Cheese	17.0	21.0	19.0	18.0	16.1	18.3	26.4	25.3	23.7	20.3	15.2	22.2	9.4	4.2a	4.7a	2.3	–0.9	3.9b
Other dairy products	22.3	15.8	13.3	8.7	6.5	12.1	24.6	17.4	18.0	12.5	8.0	15.6	2.3	1.5	4.7	3.8	1.5	3.6
Total dairy products	321.0	259.4	254.5	245.2	271.1	261.6	349.3	321.2	323.9	313.1	305.8	320.2	28.3	61.8c	69.4c	67.9c	34.6	58.6c
Cereals	157.8	129.3	101.0	97.5	98.7	108.8	157.2	142.0	119.6	99.3	93.7	117.3	–0.6	12.7b	18.6c	1.8	–5.1	8.4
Cakes and pies	56.1	42.1	31.4	20.5	18.4	30.0	56.2	46.6	38.8	28.2	22.3	36.4	0.2	4.5	7.4	7.7	3.9	6.4
Potatoes	75.8	62.7	71.8	62.0	62.4	66.7	69.9	55.2	50.0	52.5	55.3	53.8	–5.9	–7.5	–21.8c	–9.5a	–7.1	–12.8c
White fish	25.8	32.1	34.6	47.8	50.6	39.7	17.7	20.9	30.8	35.6	35.4	30.1	–8.1	–11.3a	–3.8	–12.2a	–15.3	–9.6b
Blue fish	4.5	11.2	13.2	17.5	8.8	12.5	10.1	17.5	16.8	18.6	13.1	16.5	5.6	6.3a	3.7b	1.1a	4.2b	4.0c
Crustaceans and mollusks	12.6	12.7	14.6	15.6	9.6	13.6	10.5	10.2	10.6	21.8	9.8	13.9	–2.1	–2.5	–3.9	6.2	0.2	0.3
Total fish and seafood	42.9	56.0	62.3	80.9	69.0	65.8	38.3	48.6	58.3	75.9	58.3	60.5	–4.6	–7.4	–4.0	–4.9	–10.8	–5.3
Meats	79.2	79.5	80.0	64.6	51.3	70.9	77.1	79.4	64.7	50.6	50.9	62.3	–2.1	–0.1	–15.3c	–14.0c	–0.5	–8.6c
Sausages and ham	53.0	36.4	23.8	20.4	17.5	26.3	33.3	34.7	28.1	21.7	16.3	26.4	–19.7b	–1.7	4.3	1.3	–1.2	0.1
Offals	3.2	2.1	2.0	2.2	2.9	2.4	0.0	0.7	1.0	0.7	1.8	0.9	–3.2a	–1.4	–1.0	–1.5a	–1.1	–1.5c
Poultry	50.2	55.4	55.7	51.5	56.9	54.2	39.2	31.2	45.4	39.3	36.6	39.7	–11.0	–24.2c	–10.2a	–12.2b	–20.3a	–14.5c
Eggs	24.8	23.8	25.4	20.5	16.7	22.3	20.9	22.4	22.4	22.1	17.6	21.6	–4.0	–1.4	–3.0b	1.6	0.9	–0.7c
Pulses	13.7	12.8	13.9	12.3	11.8	12.9	12.7	10.3	13.4	15.9	16.4	13.9	–1.0	–2.5	–0.4b	3.7	4.6	1.0
Nuts	2.8	2.1	2.7	3.1	1.5	2.5	2.6	2.8	4.4	3.9	1.9	3.6	–0.2	0.8	1.7	0.8b	0.4	1.0c
Fruits	191.0	220.4	299.4	378.7	384.9	314.0	144.0	138.2	200.4	306.5	309.9	230.0	–46.9a	–82.2c	–99.0c	–72.2b	–75.0b	–84.0c
Vegetables	141.6	163.7	218.3	231.1	215.4	206.6	130.6	150.6	189.9	229.4	184.5	190.1	–11.0	–13.1	–28.4c	–1.7	–30.9b	–16.5c
Olive oil	29.2	25.4	29.3	27.2	23.6	27.2	27.4	28.5	27.6	29.4	24.5	27.9	–1.8	3.1	–1.7	2.2b	0.9	0.7c
Total edible fats	40.2	35.5	39.1	35.0	30.1	36.1	33.7	35.9	34.1	35.1	30.8	34.3	–6.5	0.4	–5.0	0.1	0.7	–1.8
Sugar and sweets	23.1	17.4	16.4	12.7	12.9	15.6	19.9	20.3	16.2	12.9	8.7	15.3	–3.2	2.9	–0.2	0.2	–4.2	–0.2
Water	632.5	726.8	602.2	547.8	439.4	580.4	807.1	779.4	756.9	691.9	626.8	730.5	174.6c	52.6a	154.7c	144.1c	187.4c	150.1c
Coffee and tea	12.0	61.0	93.2	81.2	59.4	72.4	9.3	59.8	88.8	96.4	62.1	77.0	–2.6	–1.3	–4.4b	15.1	2.8	4.6
Soft drinks	101.6	84.1	53.6	35.0	10.5	50.1	71.7	113.8	93.9	30.2	5.8	66.3	–30.0	29.7	40.3c	–4.8a	–4.7	16.2
Others beverages	43.4	42.5	50.8	70.6	76.4	58.6	55.4	40.4	53.2	62.1	66.6	55.5	12.1	–2.1	2.4a	–8.5c	–9.8	–3.1c
Commercial juices and nectars	21.7	31.5	14.1	12.3	6.3	15.4	57.7	45.8	32.3	17.7	6.6	29.3	36.0a	14.3	18.2c	5.4	0.3	13.9c
Total non-alcoholic beverages	811.1	946.0	814.0	746.9	591.9	776.8	1001.2	1039.2	1025.2	898.2	767.9	958.5	190.1c	93.2b	211.2c	151.3c	176.0c	181.6c
Alcoholic beverages	0.9	41.2	53.0	43.1	24.3	39.1	8.0	31.3	45.4	64.3	34.8	44.7	7.1	–9.8	–7.6a	21.3	10.5	5.6

Consumption in g or ml per person per day.

Significance: a =  $P < 0.05$ ; b =  $P < 0.01$ ; c =  $P < 0.001$ .

ENCAT – Evaluation of Nutritional Status in Catalonia.

population, with 96% as daily consumers and a mean consumption of  $30\text{ g day}^{-1}$ . The trend observed in the frequency of consumption showed an increase in the percentage of olive oil consumers and a decrease in those consuming sunflower oil and animal fats. It is worth noticing the increase in non-consumers of butter, from 50% to 75%.

### **Sugars and sweets**

Sugar and sweet consumption decreased slightly especially among the youngest and oldest age groups. The frequency of consumption showed an increase in non-consumers of caramels, candies and honey, with an increase in daily and weekly consumers of chocolate.

### **Beverages**

Water consumption habits in the period 1992–2003 have changed. A considerable increase in the percentage of daily consumers of non-carbonated mineral water was observed (from 45% to 65%) at the expense of a decrease in tap water consumers (from 57% to 46%). Water consumption declined with age, with an average intake of 750 ml. The increase in the quantity of water consumed could not be corroborated due in part to the fact that data for water consumption were not properly collected for certain subjects in ENCAT 1992–93. Coffee and tea consumption decreased in under 45-year-olds and increased from then on. Soft drink consumption increased by almost  $50\text{ ml day}^{-1}$  in the 25–44-year-old group. Commercial fruit juice and nectar consumption increased in all age groups, especially among females aged 10–17 years (from 22 to  $58\text{ g day}^{-1}$ ), even though the food frequency questionnaire showed a decrease in the percentage of consumers.

Alcoholic beverage consumption decreased, especially among males aged 18–44 years. Since different items in the questionnaires were used for assessing intake of alcoholic beverages, changes in the frequency of consumption were not included in the table.

### **Discussion**

The results of this analysis based on data provided by the last two Catalan Nutrition Surveys show slight alterations in food habits as well as in food consumption. Both studies comprise the Nutrition Surveillance System of the Catalan population conducted by the Catalan government. They were realised applying similar methodologies on representative samples of the population, and as such, provide valid comparisons between the two.

Daily food intake has classically been categorised as main meals or 'structured meals' (breakfast, lunch and dinner), and as snacks (generally smaller and unstructured eating events between meals)<sup>26,27</sup>. The effect of

snacking on dietary intakes and their relationship with health (obesity, adequate calorie levels in older adults, etc.) has been examined but results are contradictory<sup>26–31</sup>. This article has analysed only those changes in the number of usual meals consumed by the general population based on specific questions included in the general questionnaire. In the last decade, we have observed that the percentage of the Catalan population habitually consuming three main meals has been maintained, accompanied by a significant increase in other kinds of intakes. In Catalonia, the timetables in which meals are usually consumed, with lunch being between 14:00 and 15:00 and dinner between 21:00 and 22:00, contribute to the fact that there is a greater proportion of the population having midmorning and midafternoon snacks ('merienda'). The last survey showed that almost 60% of the population had midmorning and/or midafternoon snacks. In fact, the Spanish Society of Community Nutrition (SENC)<sup>32</sup> recommends eating five times a day, and considers the midmorning and midafternoon snacks as part of the regular daily intakes. The percentage of individuals who habitually consume snacks at other times of the day (after dinner or in between the recommended eating times) has also increased considerably, although the composition and repercussion of these intakes on dietary quality of the Catalan population have not been analysed to date. In the USA, NHANES serial studies have included an analysis of trends in the frequency of eating/day during 1971–2002, which has been kept constant with an average of 5.1 daily eating episodes (quite superior to the Catalan average of 4.1). However, there was also a significant increase in the total quantity of foods and beverages consumed in the US data<sup>33</sup>.

The increase in the population eating meals outside the home has also been observed in other populations, such as the UK<sup>34</sup> or the USA. In the latter, the data from the NHIS-1987 and 1992 NHANES 1999–2000 surveys concluded that from 1999 to 2000 not only did more Americans eat out but they also ate out more frequently than in 1987 and 1999<sup>35</sup>. Eating more frequently at fast food establishments has been correlated to a diet high in energy and energy density and low in essential micronutrient density, which may contribute to weight gain. In general, it has been proposed that higher eating-out frequency is typically related to adverse nutritional outcomes<sup>34–37</sup>.

It is worth highlighting from the results previously cited the decrease in consumption of fruits, vegetables, potatoes, meat (red meat and chicken), fish (whitefish and seafood) and offals, along with an increase in the consumption of milk and dairy products, fruit juices, nuts and olive oil. These trends are somewhat variable according to age group and sex.

The food frequency questionnaires in both studies referred to typical consumption in the previous year, and at the time of the interview emphasis was placed on the frequency of consumption of seasonally available foods

within the context of the entire year. Still and all, it is possible, given the fact that food frequency consumption was evaluated during the warm season for ENCAT 1992–93 whereas for ENCAT 2002–03 it was conducted all year long, that consumption for certain items such as fruits, salads and soft drinks, corresponding to warm weather foods, may have been overestimated in ENCAT 1992–93.

Similarly, part of the decrease observed in fruit consumption may be due to the effects of seasonal variation<sup>38</sup> as the 24-hour recalls for ENCAT 1992–93 were conducted during the warm season for the entire sample. This is the time when more and/or greater quantities of fruit are consumed, as the usual portion size of fruits in season (melon, watermelon) weigh more than fruits consumed at other times of the year<sup>21</sup>. On the other hand, part of the reduced fruit consumption may be related to the increased consumption detected in ENCAT 2002–03 of fruit juices as well as of dairy products, the latter often substituting fruit as a dessert.

Along with the rising consumption of milk, yoghurts and fermented milks seen in all age groups, a notable increase in low fat and skimmed milk varieties of these foods has also been observed, which has had a positive impact on the nutritional status of the population. This change in the type of dairy product consumed could be, in part, a reflection of complying with the recommendations issued by the Health Department after the results of the ENCAT 1992–93 nutrition survey. The important influence of the dairy industry is also noteworthy, which is constantly offering new products to the consumer, of which the great majority are functional foods (enriched with calcium, omega-3, fiber, vitamins A, D and probiotics, among others). These tendencies have contributed to the increased consumption of this food group detected in ENCAT 2002–03, and continue without a doubt to this day.

Potato consumption has been decreasing over the last few decades, which has been demonstrated in previous studies for all of Spain and not just for Catalonia<sup>39–40</sup>.

Several factors may have influenced the observed reduction in meat consumption. On the one hand, it may reflect compliance with the Department of Health's recommendations to reduce meat consumption, which were issued after the ENCAT 1992–93 survey demonstrated excessive intakes of these foods. On the other hand, crises in food processing regarding the use of clenbuterol steroids in animal production or the repercussion of Bovine Spongiforme Encephalopathy may have also had a role in the observed decrease in the consumption of offals and red meat<sup>41</sup>.

Although overall fish consumption has declined, especially in males, it should be noted that this has occurred mostly due to reductions in whitefish and sea-food intake. Fatty fish consumption has actually increased slightly, possibly as a result of nutrition education campaigns realised during the period under study. This fact is

also corroborated by data in both surveys showing an increase in the percentage of the population who considered fatty fish as very healthy (from 18% in ENCAT 1992–93 to 40% in ENCAT 2002–03).

The emphasis of educational campaigns on the health benefits of the Mediterranean Diet<sup>42</sup> may have been responsible for the increase in two of its most characteristic ingredients – olive oil and nuts. Olive oil in Catalonia has become the edible fat of choice for cooking, frying and seasoning foods. It is also the main ingredient for the traditional Catalan '*pan con tomate*', bread with tomato that's typical of Catalonia and that is used in sandwiches as well as accompanying meals (instead of bread with butter or margarine). This constitutes a very positive and remarkable culinary trait that makes Catalonia stand out from the rest of the Spanish regions.

It is difficult to establish comparisons with other European countries or regions. In the first place, there are a limited number who have surveillance systems for monitoring the nutritional status of the population, which involves the periodic realisation of individual food surveys to evaluate consumption trends and the impact of food and nutrition policies developed in response to results obtained in previous surveys. In addition, methodologies differing from the ones utilised in this study are employed that involve the following: type of study, study population, sampling, method for assessing intake, etc. Furthermore, there are incongruous time periods, that is to say, the surveys were conducted in differing years and evaluate distinct time periods, which makes comparability difficult. For these reasons, quantitative comparisons of results published in studies from other countries that evaluate food consumption trends are difficult. However, qualitative evaluations of food group consumption may be carried out, expressed in terms of positive, negative or no change in trends, in other words increased, decreased or maintained food consumption.

As such, Swedish data derived from the Monica Northern Sweden study analysed consumption trends from 1986 to 1999 in a total sample of 6069 adults derived from four cross-sectional surveys conducted in 1986, 1990, 1994 and 1999. Using a semiquantitative food-frequency questionnaire, they also demonstrated trends similar to those obtained in this study, such as the decreased consumption of full-fat milk and increased use of low-fat milk, as well as a reduction in potato consumption and increased pasta intakes. Moreover, they also detected diminished full-fat butter and margarine use and increased consumption of reduced fat spreads and vegetable oils<sup>43</sup>. In Catalonia the percentage of individuals consuming butter decreased to 25%, and only 4% of the population consumes it on a daily basis, whereas 96% consume olive oil daily.

In Denmark, Haraldsdottir *et al.* evaluated consumption trends from 2001 to 2004 based on data derived from the latest surveys of the Danish Nutrition Council, which

utilised a short food frequency questionnaire in a sample of 1093 men and women (15–92-year-old), and manifested an overall worsening of food consumption habits. As seen in Catalonia, they also observed a decrease in potato consumption and increased low-fat milk use, as well as decreased bread consumption and a levelling off of a previously increasing trend in fruit and vegetable consumption noted in prior surveys (1995–2001). Levelling off was also detected in the percentage of the population who did not use any kind of fat spread on their bread<sup>44</sup>.

Hulshof *et al.* in The Netherlands analysed the influence of socio-economic factors on diet intake and food consumption trends from 1987/88 to 1997/98 in three consecutive Dutch National Consumption Surveys in a total of 12965 adults using 2-day dietary records as diet questionnaire instruments. Trends showed decreased consumption of fruit and vegetables, which was also detected in our study, as well as declining intakes of sugar and sweets, and increased consumption of ready-to-eat cereals. Among men, the consumption of potatoes also declined and among women the consumption of cheese<sup>45</sup>.

In Italy Turrini *et al.* evaluated food consumption trends from 1980/84 to 1994/96 based on data derived from two nationwide food intake surveys conducted by the Istituto Nazionale di Ricerca per gli Alimenti e la Nutrizione (INRAN). Despite the fact that there are methodological differences in study design, they also demonstrated a reduction in full-fat dairy and increased use of low-fat milk products, decreased consumption of cereals, potatoes, offals, eggs, vegetables in general (with the exception of salads which increased), fruits and all oils and fats. Increases in consumption of fish, fruit juice and soft drinks as well as baked goods were also observed<sup>46</sup>.

Varying trends have been noted in the countries bordering Spain. In Portugal, patterns were analysed for the period from 1987 to 1999 using a qualitative reduced questionnaire that referred to intake from the previous day via close-ended questions on certain foods in a large population-based sample ( $n = 130,616$ ). There results showed a considerable change, shifting from the traditional southern European diet to a more Westernised, protein-rich diet with increased percentages of meat, milk and potatoes/rice/pasta consumers and decreased consumers of fish and soup<sup>47</sup>. In France, 10-year trends (1985/87–1995/97) were evaluated based on data from the WHO Monica study in the French region of Bas Rhin-Eastern in 1664 adults (35–64 years), utilising a 3-day record and a food frequency questionnaire. They showed a decreased consumption in the main sources of fat and cholesterol: meat, sausages and ham, eggs, butter, whole milk and high-fat cheese; and an increase in the consumption of poultry, fish and low-fat dairy products. Fruit and vegetable consumption slightly declined in women<sup>48</sup>.

Overall, general trends highlight a reduction in food sources of animal fats, especially the preference observed

for low fat or fat-free dairy products in place of whole-milk derivatives, as well as diminished intakes of butter as a source of edible fat. By and large, fruit and vegetable intakes do not comply with the recommendations to consume 5 a day and various trends show a levelling off or decrease in consumption as compared to previous surveys.

In summary, our data indicate that from 1992 through 2003 in Catalonia, the habit of eating in between recommended mealtimes has increased as well as the frequency of eating outside the home, with a notable rise in meals eaten in fast food establishments, particularly in young adults. With regards to food consumption, a significant decline in the consumption of fruits and vegetables, potatoes, meat (red meat and chicken), fish (whitefish and seafood) and offals has been observed, as well as an increase in the consumption of dairy products in general, and especially those low in fat or that are fat-free. Moreover, higher intakes of fruit juice, nuts and olive oil were also detected. In general, Catalonia exhibits a model of consumption that is quite favourable, inherent to Mediterranean countries but with important differences according to age. The youngest age groups are those who have deviated the most from this model of healthy eating.

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