

Dietary habits of the population of rural Galicia (NW Spain): Towards the development of a dietary education programme

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Abstract

This study was aimed to evaluate the diet of the population of rural Galicia (NW Spain) to detect groups at risk and thereby aid the development of nutritional and dietary education policy.

Design was cross-sectional assessment of diet from representative sample of rural Galician population, using triple 24-h dietary recall questionnaires (in three visits on non-consecutive days).

Three inland municipalities (Arzúa, Melide and O Pino) and three coastal municipalities (Carnota, Muxía and Camariñas) were studied, all of which belong to the province of A Coruña.

Personel were 981 healthy subjects of either sex aged 20–64 years (482 belonging to three inland municipalities and 499 from three coastal municipalities) evaluated over one year, from spring 1994 and winter 1995.

Food patterns found were compared with the Spanish Society of Community Nutrition (SSCN) *Food Guide Pyramid* recommendations. Also studied were the influence of the dietary patterns for each sex, age group, season and geographical area.

In all the population groups evaluated, the main findings were a low intake of carbohydrate foods, vegetables, fruits and dairy products, and a high intake of foods rich in animal protein and saturated fatty acids.

According to other authors, the major health problems related to the dietary pattern found in the population studied are cardiovascular diseases. Government institutions combined with sanitation should promote healthier dietary habits by designing and leading dietary educational programmes, including simple messages to initiate a change in food habits.

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1. Introduction

Epidemiological studies are an essential tool for research into possible relationships between diet and disease, especially as regards the multiaetiological chronic diseases of developed nations, which typically have long latency periods (Willett, 1990). Epidemiological evidence of a relationship with nutritional factors (deficient

intake of cardioprotective fruits and vegetables rich in carotenoids and high intake of meats rich in saturated fats and cholesterol) has been found for cardiovascular diseases (Liu et al., 2001; Zephier et al., 1997).

In fact, a Mediterranean dietary pattern (high ratio of monounsaturated to saturated fat; high consumption of legumes, fish products, cereals, vegetables and fruit; low consumption of milk and dairy products; low consumption of meat and meat products and moderate ethanol consumption) is thought to reduce the risk of cancer, in addition to being cardioprotective (De Lorgeril,

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1998; Lupo, 1997; Serra Majem et al., 1993; Trichopoulos et al., 1995a).

Despite the lower incidence of cardiovascular diseases in Spain compared to northern European or North American countries and the fact that mortality rates from this cause have decreased in the last years, cardiovascular diseases are still the first cause of death in Spain (Bacardi Gascón & Jiménez Cruz, 1993) including the Galician population (Vega Fernández, 2002). Genetic and environmental determinants are important risk factors for the development of arteriosclerosis, responsible for most cardiovascular diseases. Dietary habits are one of the most important environmental aspects, with influence on blood cholesterol, and triglyceride levels are related to other factors involved in the development of the atheroma plaque: obesity, insulin resistance, blood pressure, lipid oxidation, inflammation and thrombosis (Ros, 2001).

Spain is a Mediterranean country and follows the Mediterranean diet, but data sources for previous studies in this country (Arija, Salas Salvadó, Fernández Ballart, Cucó, & Marti-Heneberg, 1996; Lasheras, Fernández, & Patterson, 2000; Rodríguez Artalejo et al., 1996) suggest that dietary habits over the past 10–50 years are not strictly close to the Mediterranean typical dietary pattern. Moreover, Galicia (Northwest of Spain) is a community geographically located far from other Mediterranean Spanish regions and populations have different dietetic habits (Lasheras et al., 2000; Moreiras, 1989). This fact, along with other environmental factors, could explain the high incidence of cardiovascular diseases (which are achieved to be the main mortality cause) for Galician populations in recent years (Vega Fernández, 2002).

Where a relationship has been found, it becomes desirable for any associated high-risk population groups to be identified by means of community studies of dietary habits (Bertheke Post, de Vente, Kemper, & Twisk, 2001; Briefel, 1994; De Groot, Hautvast, & van Stavereen, 1992; Neumark-Sztainer et al., 2000; Norris et al., 1997; Osler, Heitmann, & Schroll, 1997; Stephen & Wald, 1990) with a view to designing appropriate nutritional education programmes.

The format of choice for transverse studies, that aims to characterize food intake in a population, with a view to the development or evaluation of nutritional health policy, is the 24-h dietary recall questionnaire (Serra Majem & Ribas Barba, 1995). This kind of questionnaire is simple, rapidly and easily applied and inexpensive (Bingham, 1993). For evaluation of the results of a food intake survey it has of late been common practice (Brady, Lindquist, Herd, & Goran, 2000; Muñoz, Krebs-Smith, Ballard-Barbash, & Cleveland, 1997) to compare them with dietary recommendations (Aranceta-Bartrina, 1995). In this paper we report the results and analysis of a triple 24-h recall survey of the food in-

take of the rural population of Galicia (NW Spain) that was undertaken with a view to the development of a dietary education programme.

2. Methods

2.1. Target community

Galicia is a Spanish Autonomous Community located in the northwestern Iberian Peninsula and constituted by the provinces of A Coruña, Lugo, Ourense and Pontevedra (Fig. 1). Until recent decades its economy has been predominantly rural. Even in 1981, agriculture and fishing still accounted for 42% of the working population but, since then, there has been a rapid fall to the current 29% (which is still more than five times the overall mean for the European Union, 5.3%). This rapid decline in farming and fishing activity reflects a large-scale migration of the working population from rural to urban localities that has caused a pronounced rise in the average age of the rural population; in 1995, 40% of Galician farmers were aged >54 years.

In this work, we studied, as representative of the rural population of Galicia, a subpopulation comprising healthy men and non-pregnant women between the ages of 20 and 64 years residing in the inland municipalities of Arzúa, Melide and O Pino and the coastal municipalities of Carnota, Muxía and Camariñas, all of which

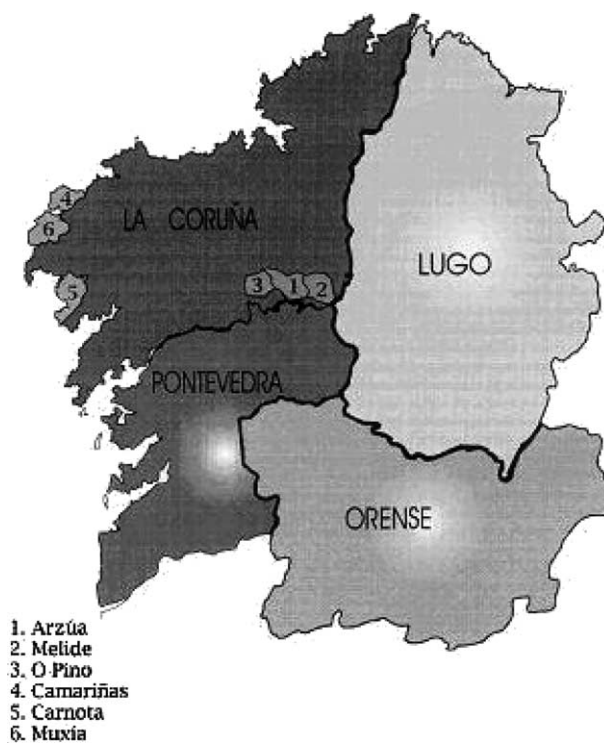


Fig. 1. Map of Galicia, showing the locations of the municipalities studied.

belong to the province of A Coruña (Fig. 1). The municipalities in question range from 51.9 to 157.7 km² in area, from 5277 to 8300 in total population, and from 44.4 to 139.9 per km² in population density. Their recent population histories conform to the pattern described above, showing a progressive fall in population and a progressive rise in average age. The economies of the inland municipalities are based on agriculture, in particular pig and cattle breeding and dairy farming, together with a small dairy industry that mainly produces cheese. The main source of income in the coastal municipalities is fishing, although in summer an increasing contribution is made by the tourist industry.

2.2. Sample and data collection

In both geographical areas (inland and coastal), a sample of the whole population was selected by simple random sampling (Cochran, 1977; Table 1) so as to contain proportionate numbers of members of the two sexes and the age groups 20–34, 35–49 and 50–64 years (the actual total sample size was 981 with a response rate of 94%). Each of the resulting residence/sex/age groups was further divided into four random subgroups of significant equal size, from each of which data were obtained in a different season. With this sample structure the expected error at the 95% confidence level is less than 5%.

The quality of the information obtained with the 24-h recall questionnaire depends mainly on the work of the interviewer on food quantification recording and dietary interrogation techniques, and these were the main aspects treated in the training course that nutritionists attended before the dietary assessment. Between the spring of 1994 and the winter of 1995, eight trained interviewers visited the subjects at home in the appointed season and applied questionnaires concerning personal data, social and economic status, life style and food frequency and intake (with the 24-h dietary recall questionnaire). Food intake was determined in three visits on non-consecutive days (one a Monday), in each of which the previous day's intake was investigated as regards the foods consumed, the time and place at which they were

consumed, the way in which they were prepared, and the quantity consumed (estimated with the aid of a photo booklet about common food recipes; Jiménez-Contreras, Lendoiro-Otero, Meniño Oliveira, Mataix Verdú, & Llopis-González, 1993). For all visited subjects, the three-day food intake data are averaged, for any of the foods classified in the seven groups recorded, in Table 2. Food frequency questionnaires were used as a quality control check for the data recorded with the 24-h dietary recall questionnaires.

Table 2

Size of helpings for each kind of food, calculated so that 1 helping contains the same amount of the main kind of chemical energy or nutrient source for all foods in a given group

Food group	Food	Helping size (g)
Carbohydrates other than sweet foods	Potatoes	200
	Bread	80
	Pasta	60
	Cereals	50
Vegetables	Fruits and inflorescences	200
	Bulbs	90
	Leaves and shoots	200
	Roots	90
Fruit	Apples and pears	160
	Citric fruit	200
	Fruit juices	160
	Others	160
Dairy products	Milk	220
	Yoghurt	220
	Cheese	30
	Others	60
Protein-rich foods	Meat	100
	Fish	120
	Eggs	130
	Dried legumes	80
Sweet foods	Sugar	20
	Honey	25
	Confectionery	40
	Sweet pastries	30
Added fats	Olive oil	30
	Seed oils	30
	Lard	50
	Others	35

Table 1

Sample of rural populations studied (numbers)

Geographical areas	Sex	Age groups			Subtotal (by area, separated by sex)
		20–34	35–49	50–64	
Inland	Men	97	80	70	247
	Women	94	73	68	235
Coastal	Men	106	90	59	255
	Women	101	74	69	244
Subtotal (by age group, separated by sex)	Men	203	170	129	502
	Women	195	147	137	479
	Both sexes	398	317	266	Total: 981

2.3. Data analysis

The studied population was divided into groups on the basis of energy requirement. For these different energy-requirement population groups, a number of helpings of the selected food groups was established, taking into account the daily recommended intake of energy and nutrients for the Spanish population (Aranceta-Bartrina, 1995). Population groups and range of helpings for all the food groups can be seen in Table 3.

The median daily intakes of the consumed foods for the defined energy-requirement population groups were calculated in grammes and converted to helping, using

Table 2, and then compared with those recommended in Table 3. The median rather than the mean was used because the data were not normally distributed for all foods according to the Kolmogorov–Smirnov test ($p > 0.05$), and because the median was less affected by outliers than the mean.

3. Results

3.1. General

Figs. 2–5 compare the observed intakes of each energy-requirement group in each geographical area with

Table 3

Recommended daily intakes of foods of the groups listed in Table 2, in numbers of helpings, for the three energy-requirement population groups

Food group	Number of helpings		
	1800–2100 kcal/day 7530–8790 kJ/day (women aged 50–64 years)	2100–2500 kcal/day 8790–10,460 kJ/day (women aged 20–49 years and men 60–64 years)	2500–3000 kcal/day 10,460–12,550 kJ/day (men aged 20–59 years)
Carbohydrate foods	4	4–5	5
Vegetables	2	2–3	3
Fruit	2	2–3	3
Dairy products	2	2–3	3
Protein-rich foods	1–2	2–3	2–3
Sweet foods ^a	1	1–1.5	1–1.5
Added fats ^a	1	1–1.5	1–1.5

^a Maximum intakes.

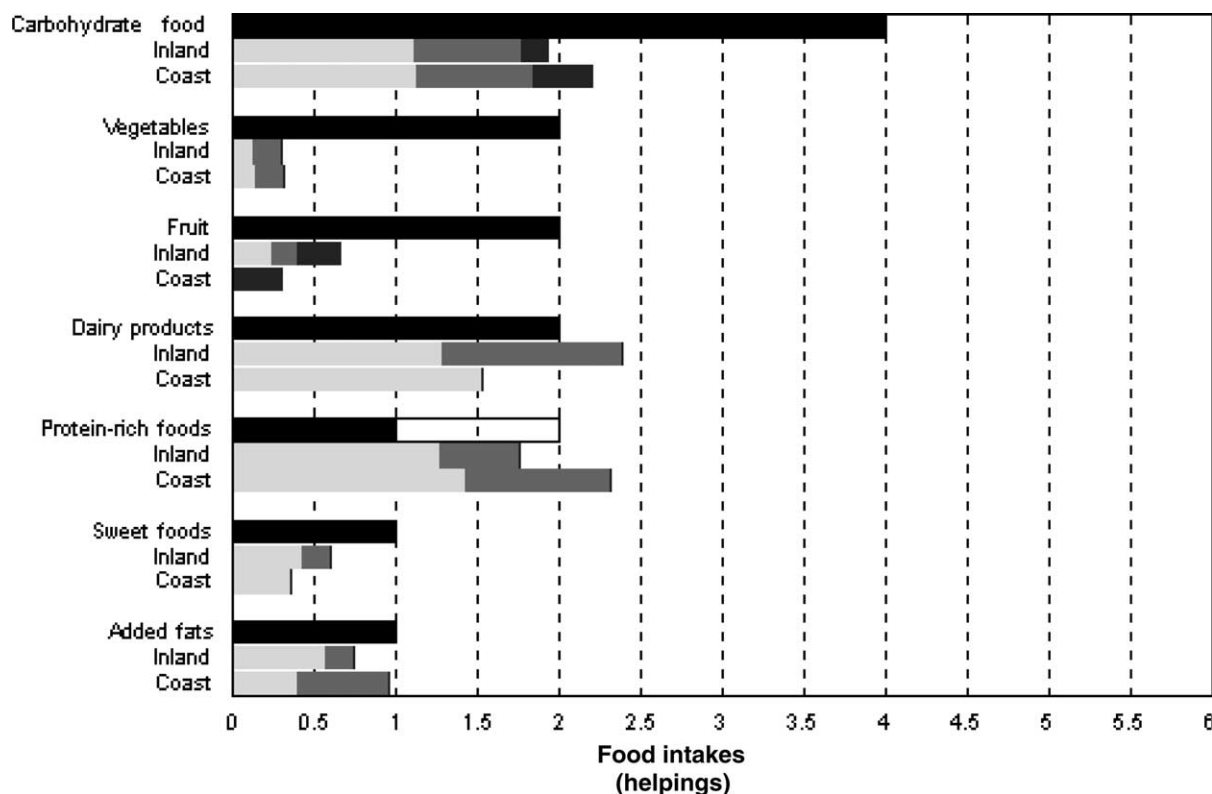


Fig. 2. Recorded food intakes by women aged 50–64 years inland ($n = 68$) and on the coast ($n = 69$), together with SSCN Food Guide Pyramid recommendations (see Section 3 and 4 and Table 4 for the colour code key).

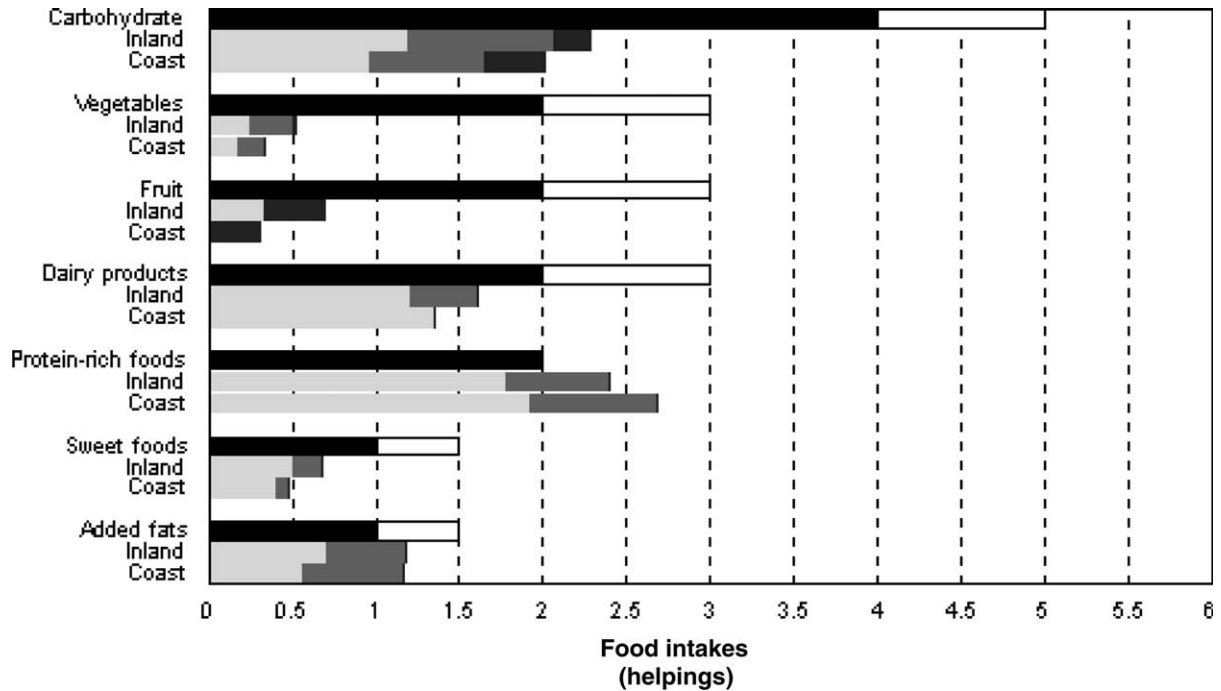


Fig. 3. As for Fig. 2, but for women aged 20–49 years ($n = 167$ inland, $n = 175$ on the coast).

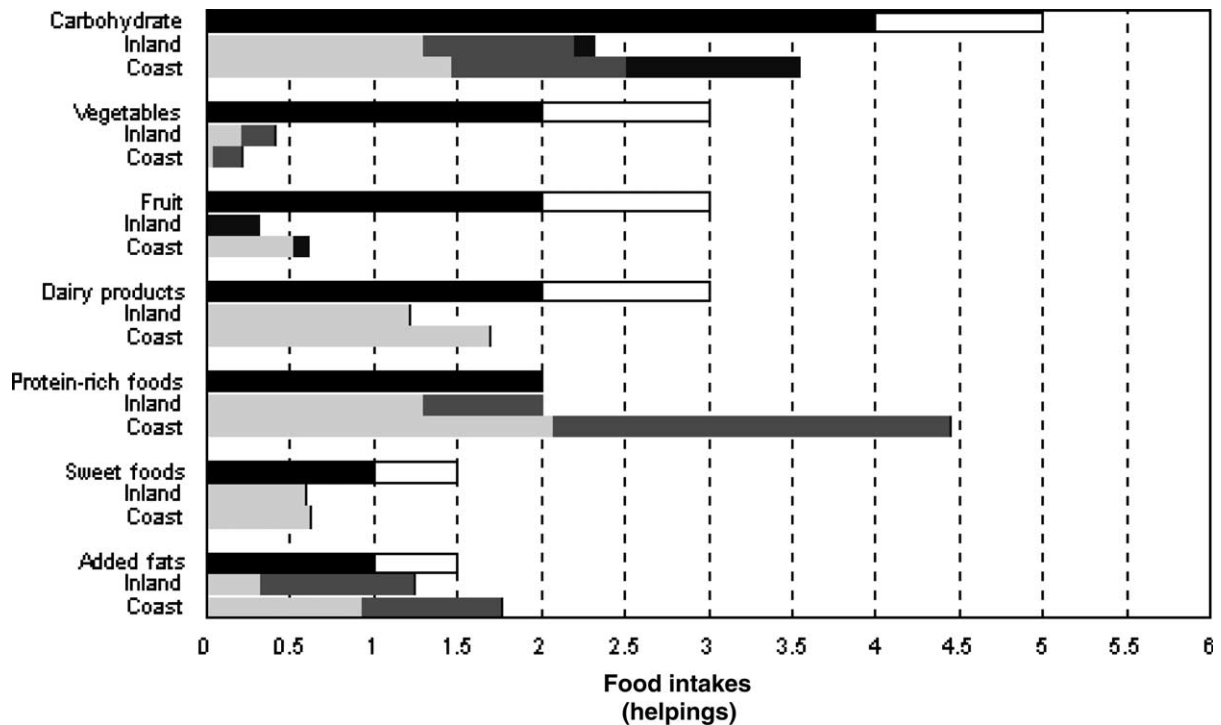


Fig. 4. As for Fig. 2, but for men aged 60–64 years ($n = 21$ inland, $n = 16$ on the coast).

those recommended (Table 3). Although women aged 20–49 years and men aged 60–64 years have the same calorie intake needs (2100–2500 kcal/day or 8790–10,460 kJ/day), they will be treated as two different groups because there were 342 women aged

20–49 years (167 inland and 175 on the coast) and only 37 men aged 60–64 years (21 inland and 16 on the coast). The key to the colour code used in these figures is presented in Table 4; where the recommendations in Table 3 allow a range of intakes, the lower limit is indi-

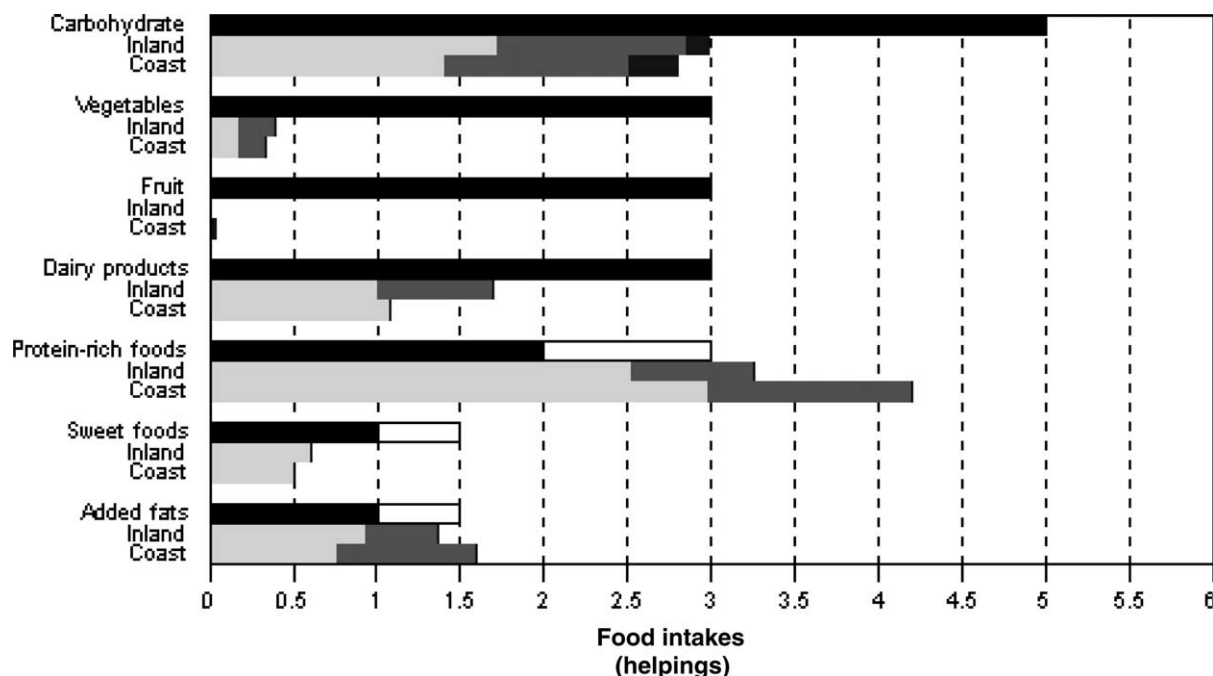


Fig. 5. As for Fig. 2, but for men aged 20–59 years ($n = 221$ inland, $n = 239$ on the coast).

cated in Figs. 2–5 by the end of the black bar, and the difference between the lower and upper limits in grey.

3.2. Carbohydrates other than sweet foods

In all four energy-requirement groups, the median intake of carbohydrates other than sweet foods (hereinafter “carbohydrates”) is much lower than the Spanish recommendations – less than 50% of the recommended value in the case of inland women aged 50–64 years. The food contributing most to carbohydrate intake is bread, although the weight of potatoes consumed is greater because an 80 g helping of bread is equivalent to a 200 g helping of potatoes (Table 2). Pasta and rice are, in all groups, the least-consumed carbohydrate foods.

3.3. Vegetables

As in the case of carbohydrates, consumption of vegetables is, in all energy-requirement groups, much lower

than is required for a balanced diet, with median intakes less than one-quarter of the Food Pyramid recommendation (less than one-sixth in the case of men aged 20–59 years). In general, among the types of vegetables listed in Table 4, the most widely eaten is the fruits and inflorescences group (e.g., tomatoes, peppers, cauliflower), followed by leaves and shoots (e.g., lettuce, asparagus). Of particular note, in the latter category, are *grellos* (*Brassica rapa* leaves), a Galician speciality. In fact, greater intake of *grellos* largely accounts for vegetable intake being 25% higher inland (where more *grellos* are grown for consumption by the grower) than on the coast.

Vegetable intake is 25% higher in spring and summer than in autumn and winter. In spring, summer and autumn, the type of vegetables with highest intake is fruits and flowers, in winter leaves and shoots (again due largely to higher winter intake of *grellos*, which is fundamentally a winter crop and has so far not been canned or otherwise commercially processed and preserved to any significant extent).

Table 4
Colour code key for Figs. 2–5

Food group	Clear grey	Grey	Dark grey	Black
Carbohydrates other than sweet foods	Bread	Potatoes	Pasta	Cereals
Vegetables	Fruits and inflorescences	Bulbs	Leaves and shoots	Roots
Fruit	Apples and pears	Citric fruit	Fruit juices	Others
Dairy products	Milk	Yoghurt	Cheese	Others
Protein-rich foods	Meat	Fish	Eggs	Dried legumes
Sweet foods	Sugar	Honey	Confectionery	Sweet pastries
Added fats	Olive oil	Seed oils	Lard	Others

3.4. Fruit

Fruit intake was very low in all energy-requirement groups, especially among men aged 20–59 years, at least 50% of whom eat no fruit at all. Within this extreme situation, intake is significantly higher on the coast than inland, thanks to higher intake of what is listed in Table 4 as “other fruit”. Regardless of sex, season, age group or geographical location, the most-consumed fruit type is apples and pears, followed in summer by the fruit of *Prunus* species (e.g., peaches, apricots) and the rest of the year by citric fruit.

3.5. Dairy products

The only energy-requirement group with a dairy products intake complying with the recommendations is that of inland women aged 50–64 years. The remaining groups have intakes of between one third and three quarters of the recommended quantity. Except for women aged 20–49 years, intake is always greater inland than on the coast, due to greater cheese intake, the inland municipalities studied belonging to one of the main cheese-producing areas of Galicia. On the coast, the second-most-consumed dairy product is yoghurt instead of cheese.

3.6. Protein-rich foods

If geographical location is not considered, only women aged 50–64 years have a protein-rich food intake near the recommended level, intake by the other groups being excessive. The most-consumed protein-rich food is meat, followed by fish and shellfish, eggs and legumes, in that order. Although fish intake is significantly greater on the coast than inland, meat intake is very much higher than fish intake in both areas (and more meat is consumed on the coast than inland). Among meats, men eat roughly similar quantities of pork and beef, whereas women prefer beef; and the most-consumed type of meat is beef in spring and summer, and pork in autumn and winter. The most-consumed type of fish is white fish.

3.7. Added fats

In all the energy-requirement groups, intake of added fats is within or close to recommended limits. The least-used fats are butter and margarine, the most-used vegetable oils employed for frying, are especially olive oil and sunflower seed oil; on the coast, these two oils are consumed in roughly equal quantities, but olive oil is the more favoured inland. The other important kind of added fat is lard, especially in winter in the inland area, where intake is 50% higher than on the coast; men consume two-and-a-half times as much lard as women.

3.8. Sweet foods

The sweet food intakes of all the energy-requirement groups are less than the recommended maximum intakes. Sugar is in all cases the most-consumed kind of sweet food (in terms of helpings), followed by confectionery and sweet pastries; honey is the least-consumed of the kinds of sweet food listed in Table 4. Among the elderly the most-consumed kind of sweet food is sugar, and, in the youngest age group, it is sweet pastries. In this category, there is little difference between the inland and coastal areas.

4. Discussion

4.1. General

The results of this study show the diet of the rural population of Galicia to be following the same trends as have been observed in neighbouring countries in recent years. In particular, intake of complex carbohydrate foods, vegetables, fruit, legumes and dairy products is low, and intake of protein-rich food of animal origin is high. These low intakes of fruit, vegetables, cereals and legumes mean that the diet of the population studied has a very low dietary fibre content. The high consumption of fatty meats, together with the high consumption of lard (especially by men) and sweet pastries made with animal fats or saturated fats of vegetable origin, makes the saturated fatty acids and cholesterol contents of the diet excessive, which implies a high risk of developing cardiovascular diseases in the Galician population (Vega Fernández, 2002).

4.2. Comparison with similar studies in Mediterranean areas

It is not easy to compare results obtained in different studies, since the methods used for the dietary assessment, including age range, classification of food items, questionnaires, statistical analysis are not really comparable. What is clear is that, although Galicia is located in the northwest of Spain (Mediterranean country), its typical diet presents several differences in comparison with other Mediterranean Spanish regions and other Mediterranean countries (e.g., Greece, Italy). All these areas consume the same types of foods but the quantities are very different. The main variations between our results and those obtained in other Mediterranean areas (Moreiras, Carvajal, & Campo, 1995; Trichopoulou et al., 1995b; Trichopoulou et al., 1998, 1986), were: a lower median intake of cereals, legumes, fruits and vegetables (except potatoes), a higher intake of potatoes, meat, fish and dairy products; and a lower ratio of monounsaturated to saturated fat. However, even when there are

several variants of the Mediterranean diet, data indicate some similarities in the food patterns of Mediterranean countries: a greater intake of olive oil, cereals, legumes, fruit and vegetables than in most European countries (UK, Germany, Norway).

4.3. Implications for dietary education policy

To correct this imbalance, and to minimize the incidence of cardiovascular diseases, food habits education policy should aim at the following goals:

- a general increase in the consumption of complex carbohydrate foods by all groups (doubling their intake), especially rice and pasta, the least widely consumed forms of carbohydrate-rich food in rural Galicia;
- an increase, multiplied at least by threefold, in the consumption of fruit (especially in men of 20–59 years) and vegetables (in all groups), which, together with an increase in carbohydrate foods consumption, would raise the intake of dietary fibre, vitamins and minerals;
- a reduction in lard consumption, especially in inland municipalities, so as to reduce saturated fats and cholesterol intake;
- with the same aim, reduction and partial replacement of meat consumption by consumption of fish and legumes (the latter, in particular, are rich in both high-quality protein and fibre, and have an excellent ratio of nutritional value to cost); in general, a reduction of meat consumption by half in coastal areas and especially in all the men groups, and a small reduction (25%) in women groups.
- an slight increase in the consumption of dairy products, especially in young men and in coastal areas, mainly as fermented dairy products that help reinforce the immune system.
- a small reduction in sweet pastries consumption in young groups.

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