



RESEARCH ARTICLE

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# Are the eating habits of university students different to the rest of the Spanish population? Food availability, consumption and cost

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## Abstract

Knowledge of the eating habits of young people is highly relevant to understand the demand for food. The objectives of this paper are to identify and analyze the eating habits of a section of young people in relation to the food habits of the rest of the Spanish population, to evaluate the influence of food prices on eating habits and the relevance of those food products related to the Mediterranean diet. The three food surveys used in this study were the Food Balance Sheet (FBS), designed by the FAO, the Household Budget Survey (HBS), designed by the Spanish National Institute of Statistics and an individual survey given to enrolled students at the University of Castilla-La Mancha. The cross-sectional study which was carried out allowed us to discover the cost of food and the consumption habits of a section of young people. A change in food availability and consumption was identified between 2009 and 2012. The average availability per capita and day for food expenditure was €6.19, while the average consumption in the two surveys was €4. The average food availability was 125.58 g per capita and day with an average price of 0.0022 €/g. The behavior of these university students is different from that of the rest of the population. Fruits, legumes, vegetables and greens are the cheapest groups of food; however, the consumption of these food groups is the lowest whereas meat is one of the more expensive groups and is consumed in greater quantities by students. These results are relevant in order to encourage the dietary habits of young people towards the products included in the Mediterranean diet.

**Additional key words:** food surveys; availability; consumption; cost; young people and healthy eating patterns.

**Abbreviations used:** FBS (Food Balance Sheet); HBS (Household Budget Survey); UCLMS (University of Castilla-La Mancha survey).

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## Introduction

Until the beginning of the 21st century the growth in social wealth, manifested in an increase in life expectancy, was due fundamentally to improvements in nutrition and healthcare (Bidlack, 1996; Velázquez *et al.*, 2000). Analyzing the eating habits of the population helps to establish public policies related to the production or promotion of different foods. Besides, eating habits are important because they can affect the prevalence of disease and illness.

In general, in the Mediterranean area, countries follow the Mediterranean diet. Although this diet is far from being homogeneous and there can be differences between individual countries, this concept refers to the consumption of olive oil, fruits, vegetables, fish and seafood, legumes and cereals (Trichopoulou & Lagiou, 1997). Different studies show how the Mediterranean diet can prevent the development of cardiovascular or cerebrovascular diseases or even delay cognitive impairment (Serra-Majem *et al.*, 2006; Sofi *et al.*, 2008, 2010, 2014; Scarmeas *et al.*, 2009; Feart *et al.*, 2009,

Estruch *et al.*, 2013; Valls-Pedret *et al.*, 2015). Despite the positive effects of the Mediterranean diet on health having been cross-checked, studies evaluating dietary habits in Mediterranean countries confirm the change in Mediterranean eating behavior and show a shift towards an unhealthier type of diet (García-Closas *et al.*, 2006; da Silva *et al.*, 2009; Baldini *et al.*, 2009; León-Muñoz *et al.*, 2012; CIHEAM/FAO, 2015). Amongst the reasons explaining this change in trends the Western-type of economy is indicative, along with an urban and technology-driven culture and the globalization of food production and consumption which relate to the homogenization of food behaviors (Bach-Faig *et al.*, 2011). In this sense, being aware of the behavior of university students is very important because it is usually the first time that young people choose their own food in their lives and cook it (Chourdakis *et al.*, 2010; Ortiz *et al.*, 2012; Cervera *et al.*, 2013; Míguez *et al.*, 2013) and their dietary habits might suggest a demand for certain products in the future.

The data for eating habits and food consumption for a certain population can be obtained from these three sources of information: the Food Balance Sheet (FBS), the Household Budget Survey (HBS) and the specific individual nutrition surveys which have been developed in a country or for a particular sector of the population. Studies based on food surveys show the eating models of a group of countries (Lagiou & Trichopoulou, 2001; Serra-Majem *et al.*, 2003; Naska *et al.*, 2009), those of a particular country (Lagiou & Trichopoulou, 2001; Rodrigues *et al.*, 2007) or the worldwide tendencies of food consumption (Kearney, 2010).

But what factors explain why individuals consume some types of food and not others? According to Kearney (2010) it can be said that food consumption depends on food availability, food accessibility and food choice. Kearney (2010) also states that these factors are influenced by geography, demography, disposable income, socio-economic status, the level of urbanization, the region, the culture, marketing and consumer attitudes. In a more general way, these different factors explain the consumption of foods which can be synthesized around socio-demographic factors: culture, religion, educational levels, how work and leisure time is organized, the level of urbanization, etc); around economic reasons: disposable income, prices, globalization, trade liberalization, etc.; and psychological reasons related to tastes, preferences and consumer behavior.

As far as we know, the literature on food consumption, centers itself on those factors in general, on the influence of prices or consumer preferences for certain products. Within the first group, Kearney (2010) ex-

plains how trade liberalization, the processes of urbanization, marketing and the increase in wealth have contributed to a greater availability of products from the 70s in the last century onwards, which has eased consumer choice at the same time as it has increased the consumption of food rich in animal fat.

Generally speaking, with respect to prices, it is usually stated that the cost of food is an important factor (Rodríguez & González, 2009; Jiménez *et al.*, 2012). Andreyeva *et al.*'s (2010) systematic study on price elasticity for the demand of food, reflects that it is actually inelastic.

As far as consumer behavior and preferences are concerned, the relevant literature has analyzed the behavior and/or satisfaction of the consumer overall (Grunert, 2005; Verbeke, 2005; Vermeir & Verbeke, 2006); or what determines the consumption of certain foods like fish (Verbeke & Vackier, 2005; Honkanen *et al.*, 2005) and meat (Verbeke *et al.*, 2010; Resano *et al.*, 2011).

Hence, in the main, studies based on food surveys do not take into account the relationship between the cost of food, its availability and its consumption. Insofar as the choice of food is conditioned by its availability, affordability (cost) and individual preferences, uncovering these relationships is highly relevant. What's more, this relationship is analyzed with a group of young university students. The eating habits of young people informs us about the future demand for food as well as the possibility that the incidence of certain illnesses related to diets rich in fat will increase. Knowing why certain foods and not others are consumed is relevant to design nutritional policies (Edwards *et al.*, 2013); to develop and promote policies by the stakeholders in the food market and to increase consumer demand for all Mediterranean products.

The objective of this study was finding out the eating habits of a section of young people in relation to the food habits of the whole of the Spanish population, to evaluate the influence of food prices on eating habits and the relevance of food products related to the Mediterranean diet, considering the relationship between availability, consumption and cost.

## Material and methods

### Study design

The design of this work corresponds to a cross-sectional study for 2012, although prior to this a comparative analysis was carried out in 2009 and 2012. This current piece of research followed some of the investigation categories that were identified in the

Program for the European Master in Public Health Nutrition (Sjöström *et al.*, 2005), nutritional states, socio-demographic factors and inequalities, and used the information obtained from the FBS from the FAO, the HBS for Spain carried out by the Spanish National Statistics Institute and an individual questionnaire for Castilla-La Mancha's university students (UCLMS from now on) to discover food consumption behavior, expenditure, the relationship between consumption and availability, between prices and availability, between prices and consumption, as well as information on the cost of these food products.

To be able to compare the information from each of the selected sources, ten food groups were established: cereals (*i.e.* grains); fruits; legumes, vegetables and greens; meat; fish and seafood; oils and fats; dairy products; eggs; pastries, sugar and honey; and beverages (nondairy). These groups were based on the most-used food groups reported in previous nutritional literature (Rodrigues *et al.*, 2007; Cervera *et al.*, 2014; García-Meseguer *et al.*, 2014). The characteristics of the sources of data as well as the particularities of each food group, depending on the source of information used, are explained in detail below.

## Data sources

The information on food availability was obtained from the FBS for Spain, from FAOSTAT (<http://faostat3.fao.org/download/FB/FBS/S>) for the years 2009 and 2011; 2011 was the last year with available data. The FBS shows, for each food group (primary products and some elaborated products) potentially available for human consumption, its supply chain and its use. Among all of the information which the FBS gives, what was used was the supply chain of food products available for human consumption. The per capita supply for each food product available for human consumption was obtained by dividing the corresponding quantity with the volume of the population which shared it. The information on the per capita supply of food was expressed in kilograms and, applying the appropriate composition factors to all of the primary and elaborated products, information on the calorie value and protein and fat content was supplied. These data sets were collected on an annual basis and supplied by the countries involved.

No readjustments were made to this database, although it should be pointed out that when the food groups were unified to compare them with the other two data sources that, in the pulse and vegetable groups there was no data available and that in the group of beverages (nondairy), fruit juice was not included.

The information on food consumption was taken from two sources, the HBS for the years 2009 and 2012 for Spain and from the results of an individual questionnaire on eating habits in 2012 carried out on a group of enrolled students from the University of Castilla-La Mancha.

The main aim of the HBS is to obtain estimations of the annual consumption expenditure of private households, of how this is spread out over different goods and services, as well as the evolution of this expenditure with regard to the previous year. It also investigates energy sources (electricity, gas, liquid fuel, petrol, etc.) as well as the actual consumption of food which is the information that has been used in this study.

The population under study is the total of the private households residing in Spain as well as the people who live in them. Although the basic unit for this survey is the household, it also publishes results at the person level. Data is collected on an annual basis and is obtained from a sample survey in paper format (<http://www.ine.es/jaxiT3/Tabla.htm?t=10698>).

Actual food consumption is expressed in kilograms per person, with the exception of beverages which are measured in litres. In order to standardize our reference measurement and to make our comparisons it is estimated that 1 L weighs 1 kg.

When organizing food groups, it must be taken into account that for the pastries, sugar and sweets group, ice cream was also included. In the beverages (nondairy), fruit and vegetable juice was included as well as alcoholic beverages. Finally, eggs are expressed in units. To unify the measurement of food in kilograms, it was established that an average egg weighed 55 g.

The second source of information on food consumption came from the results of an individual survey that was developed in an earlier study by García-Meseguer *et al.* (2014). This survey was carried out during the academic year 2012/1013 on a group of enrolled students that were studying for different degrees at the Albacete Campus of the University of Castilla-La Mancha in Spain. A total of 304 students participated voluntarily in this study. The exclusion limit criterion for the male subjects was an energy intake higher than 4,000 kcal/day or lower than 800 kcal/day. For the female subjects the exclusion limit criterion was an energy intake of 3,500 kcal/day or an energy intake lower than 500 kcal/day (Willet, 1998). The second exclusion limit criterion was the presence of acute diseases which affected the diet of the subject and were present when the surveys were administered. So, the final sample was made up with 284 students, 160 women and 124 men, with an average age of 21.3 (SD=2.8), an average weight of 65.9 kg (SD=13) and an average height of 170 cm (SD=9). Approximately

85% of the subjects claimed to be non-smokers and to do some type of physical activity on a weekly basis. Although religious and cultural factors can influence the consumption of food products, this was not taken into account in this study since it was a homogeneous sample as far as these factors were concerned.

The information on food consumption was collected in paper format, with two 24-h dietary recalls, including one day at the weekend. To help estimate portion sizes, a visual guide of images with the measurements of portions was shown to the subjects (Gómez *et al.*, 2007). The students who agreed to take part completed the first 24-h dietary recall and answered general questions during their first appointment. All of the food and beverages they consumed were recorded. Following this, the students completed a survey on their first appointment, picked up the second 24-h dietary recall and returned it on their second appointment. The results of the survey were put into the ten selected food groups. The information on food prices was obtained from the HBS for the national total from 2012.

## Methodology

The variables thrown up from this survey are the total expenditure and the average expenditure per household/person and consumption unit depending on different levels of disaggregation. For this study, information on the value per unit of consumption, which is expressed in €/kg, and the quantity of food consumed per person in kilograms (except for beverages which is expressed in litres where 1 L weighs 1 kg) was used. With these data the value of the unit cost for each group of the se-

lected food groups was determined. To do this a weighted average was calculated for each of the food groups.

For each food group  $k$ , where  $k = 1, \dots, 10$ ,  $V_k$  was defined as the value of the unit cost of a kilogram of food in each group.

$$V_k = \frac{\sum_{i=1}^n c_i \cdot v_i}{\sum_{i=1}^n c_i}$$

where  $n$  is the number of food items in each group;  $c_i$  the quantity of food  $i$  (in kg) in the group  $k$ ; and  $v_i$  the unit value of food  $i$  (in €/kg) in group  $k$ .

The statistical analysis was carried out with IBM (SPSS Statistics 19). To quantify the relationship between prices and availability, prices and consumption and availability and consumption, Pearson's correlation coefficient was calculated. The level of statistical significance was set at  $p < 0.01$ .

## Results

Table 1 shows the average available quantities and consumption obtained from the three studies which were used in this analysis, the FBS for availability and the HBS and the individual questionnaire for the university students for consumption.

According to data from the FBS and the HBS for 2009 and 2011, it was observed that the average food availability fell from 231.40 g/person·day to 218.68. Average consumption fell from 159.05 g/person·day to 153.70. This decreasing trend coincided in the FBS and

**Table 1.** Average available/ consumption quantities (g/person·day) for the different food groups during 2009-2012 in Spain.

	2009		2011	2012	
	FBS	HBS	FBS	HBS	UCLMS
Cereals	275.34	197.81	244.38	187.95	187.70
Fruits	234.25	226.58	236.44	217.53	140.30
Legumes, vegetables and greens	442.19	252.33	363.01	245.75	180.80
Meat	265.75	148.22	255.07	146.58	198.20
Fish and seafood	117.53	65.21	116.16	61.10	65.00
Oils and fats	142.19	46.58	112.60	42.19	22.40
Dairy products	417.26	313.97	492.60	303.01	285.50
Eggs	38.36	19.54	37.81	20.82	22.30
Pastries, sugar and honey	69.86	30.68	67.40	29.86	25.40
Beverages (nondairy)	311.23	289.59	261.37	282.19	313.10
Mean	231.40	159.05	218.68	153.70	144.07

FBS, Food Balance Sheet. HBS, Household Budget Survey. UCLMS, an individual survey given to enrolled students at the University of Castilla-La Mancha. Mean is the average of the ten groups of food.

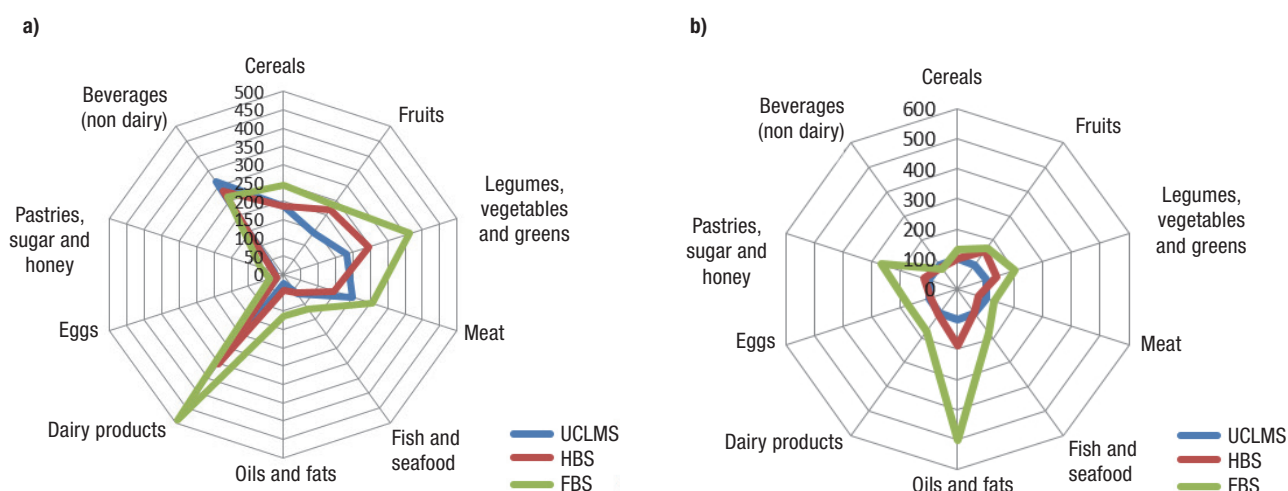
the HBS, with a fall in the average availability for the group of food of 5.7%, and with a fall in the average consumption of all of the food groups of 3.05% for food groups. As far as availability is concerned, fruits were the only category which showed a rising trend of 0.9% and the group of dairy products with an 18% increase. In the case of food consumption, the only positive trend was found in egg consumption, with a 6.5% increase.

The university students in 2012 showed less consumption in fruits (140.30 g); legumes, vegetables and greens (180.80 g); and oil and fats (22.40 g) in relation to the rest of the population (217.53 g; 245.75 g and 42.19 g, respectively). However, meat consumption (198.20 g) was greater than for the Spanish population (146.58 g) as a whole.

Fig. 1a reflects that the highest availability corresponded to dairy products with 492.60 g/person·day and coincided with the higher consumption in the food frequency survey for Spain with a value of 303.01 g/person·day.

Overall, food availability was greater than its consumption. However, for the students in the UCLMS, the highest consumption was 313.10 g/person·day for the category of beverages (nondairy), which was higher than its availability, which was 261.37 g/person·day. This imbalance between availability and consumption can be seen with greater clarity in Fig. 1b.

Table 2 collects the value of availability and average expenditure incurred on consumption for different food

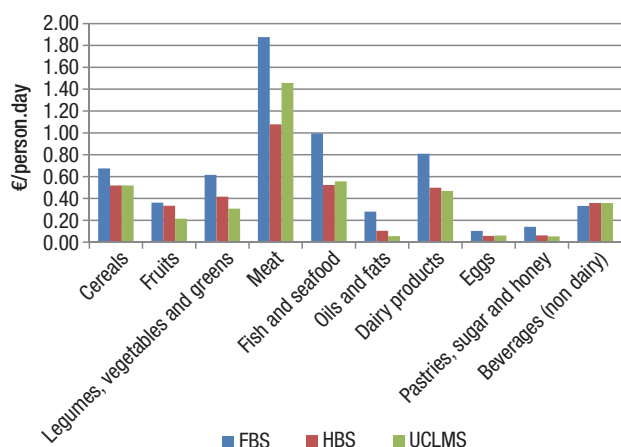


**Figure 1.** Availability and consumption of main food groups during 2012 in Spain, as an absolute amount in g/person·day (a), and % above or below the UCLMS (reference=1) (b). FBS, Food Balance Sheet. HBS, Household Budget Survey. UCLMS, an individual survey given to enrolled students at the University of Castilla-La Mancha.

**Table 2.** Value of availability and average expenditure (€/person·day) realized on consumption for different food groups in 2012 in Spain.

	FBS	HBS	UCLMS
Cereals	0.6748	0.5189	0.5183
Fruits	0.3614	0.3325	0.2145
Legumes, vegetables and greens	0.6151	0.4164	0.3064
Meat	1.8762	1.0782	1.4579
Fish and seafood	0.9947	0.5232	0.5566
Oils and fats	0.2790	0.1045	0.0555
Dairy products	0.8094	0.4979	0.4691
Eggs	0.1032	0.0568	0.0609
Pastries, sugar and honey	0.1408	0.0624	0.0531
Beverages (nondairy)	0.3319	0.3584	0.3584
Total	6.1866	3.9493	4.0505

FBS, Food Balance Sheet. HBS, Household Budget Survey. UCLMS, an individual survey given to enrolled students at the University of Castilla-La Mancha. Total is the average of the ten groups of food.



**Figure 2.** Average expenditure, as absolute amount in €/person·day, realized in 2012 on availability and consumption for the different food groups in Spain. FBS, Food Balance Sheet. HBS, Household Budget Survey. UCLMS, an individual survey given to enrolled students at the University of Castilla-La Mancha.

groups in 2012. By summing up what was spent on the different food groups, it is concluded that the total expenditure on food availability was 6.19 €/person·day and that the expenditure in each of the surveys ranged from €3.95 to €4.05, respectively. In other words, expenditure on food consumption was slightly higher in the group of students.

The greatest expenditure, in the three surveys, as is reflected in Fig. 2, occurred in the meat category, followed in every case by the fish and seafood category, with a disposable expenditure on meat of 1.88 €/person·day, and with a consumption expenditure for HBS and UCLMS from 1.08 to 1.46 respectively.

However, as far as food availability is concerned (FBS), the third food group with the highest expenditure was the dairy product one, with a value of 0.81 €/person·day, while in consumption, in both the HBS and the UCLMS, the third highest expenditure occurred in cereals (*i.e.* grains) with 0.52 €/person·day.

The lowest expenditure as far as availability is concerned was for eggs with 0.10 €/person·day. However, for the UCLMS the lowest consumption expenditure was for the pastries, sugar and honey and oil and fats groups with a value of 0.05 €/person·day.

Table 3 shows the relationship between prices and availability according to food groups. The average price obtained for the whole group of food was 0.0022 €/g of food with an average availability of 125.58 g/person·day. The most expensive food category was the fish and seafood one with a cost of 0.0086 €/g, with a below average availability, with 116.16 g/person·day. The lowest availability corresponded to the egg category with 37.81 g/person·day and a cost of 0.0027 €/g.

Besides, the Table 3 shows the actual relationship between consumption and cost for the surveys which were used. The cost swung between 0.00856 €/g in the fish and seafood category and 0.00127 €/g in the beverage (nondairy) category. The average total value of the food categories was 0.0022 €/g. As far as consumption is concerned some differences are observed across the two surveys. The highest consumption, in the HBS, corresponded to the dairy product category, with 303 g/person·day, while in the case of the young university students the highest consumption was of beverages (nondairy) with 313 g/person·day. Both surveys coincided with the lowest consumption occurring in eggs

**Table 3.** Relationship between price, availability and consumption for food groups during 2012 in Spain.

	HBS		FBS	HBS	UCLMS
	(€/kg)	(€/g)		(g/person·day)	
Cereals	2.7612	0.0028	244.3836	187.9452	187.7000
Fruits	1.5286	0.0015	236.4384	217.5342	140.3000
Legumes, vegetables and greens	1.6945	0.0017	363.0137	245.7534	180.8000
Meat	7.3557	0.0074	255.0685	146.5753	198.2000
Fish and seafood	8.5631	0.0086	116.1644	61.0959	65.0000
Oils and fats	2.4777	0.0025	112.6027	42.1918	22.4000
Dairy products	1.6431	0.0016	492.6027	303.0137	285.5000
Eggs	2.7300	0.0027	37.8082	20.8219	22.3000
Pastries, sugar and honey	2.0890	0.0021	67.3973	29.8630	25.4000
Beverages (nondairy)	1.2700	0.0013	261.3699	282.1918	313.1000
Mean	2.2203	0.0022	125.5831	153.6986	144.0700

FBS, Food Balance Sheet. HBS, Household Budget Survey. UCLMS, an individual survey given to enrolled students at the University of Castilla-La Mancha. Mean is the average of the ten groups of food.

with 20.82 and 22.3 g/person·day, respectively. The average total consumption of the food categories was 153.70 g for the HBS and 144.07 g for the UCLMS.

The behavior of the university students is different to the total population. Fruits, legumes, vegetables and greens are the cheaper groups of food; however these groups are the least consumed. Like meat, it is the second most expensive group and consumed more by students. Table 4 shows the actual relationship between the availability and consumption data from the three sources of information, obtaining a positive and highly significant relationship between them, with all of the coefficients of correlation higher than 0.846.

## Discussion

This paper contributes towards discovering the relationship between availability, consumption and cost for the population in general and for university students in particular.

When the information for availability and consumption in absolute terms from the data from the three sources of information was examined, it was observed that, in general terms, food availability is greater than the rate of consumption. Our results are similar to those of previous studies by Rodríguez *et al.* (1996), Serra-Majem *et al.* (2003), Rodrigues *et al.* (2007) and Naska *et al.* (2009), for all of the food groups with the exception of beverages (nondairy). For the category of beverages (nondairy), for both the HBS and the university students in Castilla-La Mancha, consumption levels are higher than availability, where the difference is more significant for the group of young university students. This result can perhaps be explained because university students drink more than the rest of the population (Alcácer *et al.*, 2008) or by the aggregation of foods which are in the groups of food products, since fruit and vegetable juice is included too. One differentiating finding from this study, along with those previ-

ously mentioned, is the falling trend in food availability and its consumption. In previous studies, when different periods of time are compared, a growth in availability and consumption is observed. This is also the case in Kearney's (2010) study of worldwide trends. However, for the period under analysis, 2009-2012, coinciding with the economic crisis, availability and consumption fall. This fact requires the development of further studies which should introduce a greater number of variables since shortages in certain basic food groups could lead to pockets of the population with nutritional deficiencies which could eventually affect the prevalence of certain illnesses.

When the availability and the consumption of the different groups of foods was analyzed, it was observed that the dairy products group showed the greatest increase as far as availability is concerned during this period. As far as consumption is concerned, the only food group which has grown is the egg one. This finding coincides with Kearney (2010) where it is seen that the level of egg consumption has doubled worldwide. Nonetheless, it is not always easy, as we see from previous studies by Rodríguez *et al.* (1996) and MAFF (2000), to explain trends in the consumption and availability of the different food groups.

With regard to the cost of foods consumed, the average consumption cost in the HBS was 3.95 €/person·day, and for the group of students this amounts to 4.05 €/person·day. Yet again a different pattern of behavior is observed for the group of young university students since their consumption levels are higher than average and food groups like meat, fish and seafood and cereals take up 75% of this consumption. The lowest expenditure differs in both surveys, since while in HBS it is eggs, in the UCLMS, the lowest expenditure is for the pastries, sugar and honey and oils and fats group, which could justify some youth consumption trends.

The average consumption for the total of the food groups was 153.70 g for the HBS and 144.07 g for the UCLMS. These differences in consumption could be related to age, but today there are other variables which

**Table 4.** Correlations between availability and consumption for food groups during 2012 in Spain.

		FBS	HBS	UCLMS
FBS	Pearson's correlation	1	0.913**	0.846**
	<i>p</i> -value		0.000	0.002
HBS	Pearson's correlation	0.913**	1	0.936**
	<i>p</i> -value	0.000		0.000
UCLMS	Pearson's correlation	0.846**	0.936**	1
	<i>p</i> -value	0.002	0.000	

FBS, Food Balance Sheet. HBS, Household Budget Survey. UCLMS, an individual survey given to enrolled students at the University of Castilla-La Mancha.

can help to explain these differences like structure according to sex, the geographic area where the surveys were carried out (let us keep in mind that the UCLMS was carried out on students from Albacete city), and educational level. These variables are just some of those mentioned by Rodrigues *et al.* (2007). It should also be remembered that consumer preferences and habits influence food consumption (Grunert, 2005; Honkanen *et al.*, 2005; Verbeke *et al.*, 2010).

As far as the relationship between prices and availability of the food groups is concerned, different behaviors are observed for the fish and seafood and the pastries, sugar and honey groups. The fish and seafood group is the one which most reflects the inverse relationship between prices and availability since this is the group which has the lowest availability and the highest price. In this sense food and nutritional guides recommend increasing the consumption of fish and this has to be compatible with the sustainability of marine stocks. On the other hand, for the pastries, sugar and sweets group, availability is low, but so is the price, which could lead to a higher consumption than is advisable (Davis & Carlson, 2015). This group belongs to the food group, which following the recommendations of the Mediterranean diet (Bach-Faig *et al.*, 2011) should be consumed in small amounts and left for special occasions. Although in general the demand for food is inelastic with relation to prices, it may happen that low prices favor a higher than advisable consumption (Davis & Carlson, 2015). Along these lines, Drewnowski & Specter (2004) highlighted that the relative price of the foods which cause obesity is low in relation to the price of healthier foods.

The relationship between consumption and prices for the two surveys used, showed similar behavior. The fish and seafood group was the most expensive. However, consumption differed considerably for the general population and for the group of university students. While in the HBS the highest consumption corresponded to the dairy products category, for university students the highest consumption was of beverages (nondairy). The lower consumption of fruits and legumes, vegetables and greens is one of the characteristics of the eating habits of the university students notwithstanding its low price. Previous studies by Baldini *et al.* (2009) and Cervera *et al.* (2014) confirmed the lower consumption of these groups of food for university students.

This behavior of young university students is relevant since, according to García-Meseguer *et al.* (2014) only 5.3% of the students surveyed followed the Mediterranean diet. This change in eating habits towards less healthy diets coincides with what has been observed for the general population in the CIHEAM/

FAO (2015) report and in the PREDIMED Study (<http://www.predimed.org>), where middle aged to aging Spaniards continue to show a greater loyalty to the Mediterranean diet than young people. This finding is important since serious illnesses like type-2 diabetes mellitus, cancer or cardiovascular diseases are associated to obesity and this is related to the intake of certain foods. Moreover, the regular consumption of alcohol is related to excess weight (Aranceta *et al.*, 2005).

Another relevant factor is the fact that the category which includes pastries, sugar and honey is cheaper. Grossman *et al.* (2014) established a relationship between the cost of these foods and obesity among young people. Knowing why the population consumes a particular food group is important for the design of public health policies in general or for the promotion and the production of some foods. If food choices can be explained by availability and cost, economic policy measures can be carried out (Rodríguez & González, 2009). From the realm of health economics the introduction of taxes on unhealthy foods has been recommended to reduce their consumption; however, if we take into account that the demand for these foods is inelastic, as López-Casasnovas (2013) indicates, these measures are not always effective public health measures. If, on the other hand, the choice of food can be explained by consumer preferences, the possibility of changing eating habits becomes more difficult and policies will have to be different. The studies by Verbeke & Vackier (2005), Honkanen *et al.* (2005), Vermeir & Verbeke (2006), Verbeke *et al.* (2010) and Resano *et al.* (2011), showed that, although, for example, in the case of fish, that its price acts as a negative element, tastes, safety, health and habits also influence consumption.

Overall, it can be advanced that our results confirm that prices are not so relevant because some foods included in the Mediterranean diet (fruits, legumes, vegetables and greens and oil and fats) are cheap but students consume little in relation to the rest of the Spanish population. In this sense, our results follow those of Baldini *et al.* (2009), Míguez *et al.* (2013) and Cervera *et al.* (2014), and suggest that other factors are at play (tastes, consumption habits) which would explain the behavior of young people.

The main limitation of this research involves the use of the results of a single questionnaire to study the eating habits of a group of enrolled students from a single university. A generalization of our conclusion by using this questionnaire on a larger sample of Spanish university students could be a useful area of further research. In any case, knowledge of the eating habits of the population is the starting point for designing public health policies to intervene and monitor diets



with the aim of improving people's quality of life and making them more efficient (López *et al.*, 1999) and to promote food included in the Mediterranean diet. According to Baldini *et al.* (2009) creative thinkers in manufacturing and retailing could be essential for the development of new products within the Mediterranean tradition that could be embraced by consumers of all ages.

The change in the trends in eating habits with the fall in the consumption of fruit and legumes and the increase in the consumption of meat and dairy products has implications for health and for agricultural production. The lower consumption of foods from the Mediterranean diet by university students implies a change in their tastes and habits towards less healthy foods. If measures are not taken to change this trend, in the future we could see an increase in health and environmental problems. Moreover, as the CEHIAM/FAO (2015) report highlights; the Mediterranean diet also contributes towards the preservation of the environment, since the production of the foods it contains requires less resources than animal factory farming.

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