



ORIGINAL ARTICLE

Food habits of the school population from La Mancha-Centro Health Area (Ciudad Real)<sup>☆</sup>



A. González-González<sup>a,\*</sup>, M.P. Falero-Gallego<sup>b</sup>, O. Redondo-González<sup>c</sup>,  
A. Muñoz-Serrano<sup>b</sup>

<sup>a</sup> Sección de Endocrinología y Nutrición, Hospital General Universitario de Ciudad Real, Ciudad Real, Spain

<sup>b</sup> Servicio de Pediatría, Hospital General Mancha Centro, Alcázar de San Juan, Ciudad Real, Spain

<sup>c</sup> Unidad de Apoyo a la Investigación; Unidad de Investigación, Docencia y Formación, Hospital General Mancha Centro, Alcázar de San Juan, Ciudad Real, Spain

Received 22 March 2015; accepted 4 June 2015

Available online 1 February 2016

KEYWORDS

Diet;  
Food habits;  
School;  
Childhood

Abstract

**Objective:** To assess the dietary pattern of the school population from La Mancha-Centro Health Area (Ciudad Real).

**Methodology:** A cross-sectional study conducted on a representative sample of schoolchildren aged 6–12 years, using a questionnaire to determine their general dietary habits and a record of their 24-h intake.

**Results:** A total of 1142 schoolchildren were included, with 612 boys (53.6%) and 530 girls (46.4%), and a mean age of  $9.3 \pm 1.7$  years of age. The frequency of food intake was  $4.62 \pm 0.6$  times a day, which decreased with the age of the schoolchildren ( $P = .044$ ), and increased with the educational level of parents ( $P = .004$ ). Food preference influenced the choice in the meals consumed. The level of appetite was related directly with weight and body mass index (BMI) ( $P < .001$ ), age ( $P = .02$ ), and number of daily food intakes by the children ( $P = .038$ ). The food groups most frequently consumed were cereals and their derivatives (92.8%), milk and dairy products (90.45%), while vegetables were the least consumed (35.46%). Over 70% of the sample usually consumed olive oil.

**Conclusion:** The dietary pattern of the school population maintains some of the features of traditional Mediterranean dietary pattern, such as the habit of daily breakfast, the greater consumption of olive oil and cereals. On the other hand, other characteristics are remarkable, such as the low consumption of fruit and vegetables and the high consumption of meat.

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<sup>☆</sup> Please cite this article as: González-González A, Falero-Gallego MP, Redondo-González O, Muñoz-Serrano A. Patrón dietético de la población escolar del Área La Mancha-Centro (Ciudad Real). An Pediatr (Barc). 2016;84:133–138.

\* Corresponding author.

E-mail address: [abelg@sescam.jccm.es](mailto:abelg@sescam.jccm.es) (A. González-González).

**PALABRAS CLAVE**

Dieta;  
 Hábitos dietéticos;  
 Escolares;  
 Infancia

**Patrón dietético de la población escolar del Área La Mancha-Centro (Ciudad Real)****Resumen**

**Objetivo:** Valorar el patrón dietético de la población escolar del Área de Salud La Mancha Centro (Ciudad Real).

**Metodología:** Estudio transversal sobre una muestra representativa de los escolares de 6 a 12 años. Se utilizó un cuestionario para explorar los hábitos dietéticos generales y un recordatorio de ingesta de 24 h.

**Resultados:** Se evaluó a 1.142 escolares, 612 niños (53,6%) y 530 niñas (46,4%), con una edad de  $9,3 \pm 1,7$  años. La frecuencia de la ingesta de alimentos, de  $4,62 \pm 0,6$  veces al día, decrecía de forma estadísticamente significativa con la edad de los escolares ( $p=0,044$ ) y aumentaba con el nivel educativo de los padres ( $p=0,004$ ). La preferencia era un factor influyente en la elección de los alimentos consumidos. El grado de apetito se relacionó de forma directa con el peso y el índice de masa corporal ( $p < 0,001$ ), la edad ( $p = 0,02$ ) y el número de ingestas diarias ( $p = 0,038$ ). Los grupos de alimentos más frecuentemente ingeridos fueron los cereales y derivados (92,8%), la leche y derivados (90,45%) y los menos, las verduras y hortalizas (35,46%). Más del 70% de la muestra consumía como aceite habitual el de oliva.

**Conclusión:** El patrón dietético de los escolares mantiene algunas de las características del patrón de dieta mediterránea tradicional, como el hábito de desayuno, el elevado consumo de aceite de oliva o de cereales, pero no otras, destacando el escaso consumo de verduras y frutas, y el elevado de carnes.

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**Introduction**

An adequate nutrient intake adapted to each age ensures the correct physical and cognitive development of the child, prevents acute nutrition problems, such as iron deficiency or tooth decay, and reduces the risk of chronic diseases such as cardiovascular disease, cancer or osteoporosis.<sup>1,2</sup>

Different healthy dietary patterns have been proposed both for the general population and for specific population subsets: children, the elderly, pregnant women, etc. Those addressing the healthy paediatric population are usually endorsed by various scientific associations or public health agencies, and tend to concur on important aspects, such as the daily distribution of food intake into several meals, the weekly frequency of consumption of various food groups, or the determination of specific foods or amounts of food that are recommended or recommended against.<sup>3-6</sup>

The dietary habits of children in developed countries have been changing in recent years. These changes in dietary patterns have contributed to increases in the prevalence of obesity and associated diseases, such as disorders of carbohydrate metabolism and dyslipidaemia.<sup>7</sup> This increase in the prevalence of obesity has been associated with an increase in the energy density of the foods consumed, but also with daily eating frequency, a reduced dietary diversity, or the more or less frequent consumption of certain food groups.<sup>8-10</sup>

The aim of this study was to analyse the dietary patterns of a representative sample of the population of schoolchildren in the Health Area of La Mancha Centro (Ciudad Real) in order to determine their dietary profile and compare it

to the most common dietary patterns that are considered healthy.

**Materials and methods****Study design, scope, and population**

We conducted a cross-sectional study on a representative sample of schoolchildren aged 6–12 years that resided in the Health Area of La Mancha Centro, which includes several towns in Ciudad Real, Cuenca and Toledo.

We performed two-stage sampling in a population of 13,896 children enrolled in 73 schools, with probabilities proportional to the size of the primary units. In the first stage, 20 clusters (schools) were chosen, and in the second stage, 60 children were selected at random from each of these schools.

We designed an ad hoc data collection model to gather information on aspects related to dietary patterns, which was recorded in two data collection notebooks (DCNs). The DCN1, filled out by the researchers, was used to evaluate the presence of iodine deficiency disorders, and the DCN2, completed by the parents and/or legal guardians of the children, were used to specifically analyse the diet.

The study was approved by the clinical research ethics committee of the Hospital General La Mancha Centro. All participants were given an informed consent form that was signed by the parents or legal guardians.

**Table 1** Distribution of foods into groups.

Food groups	Included foods
1	Milk and dairy products
2	
2a	Meat and meat products (such as cured meats or pâtés)
2b	Fish
2c	Eggs
3	Potatoes, legumes and nuts
4	Vegetables
5	Fruits
6	Bread, pasta and sugar
7	Fats, oils and butter

### Description of the study variables

The DCN2 was used to collect sociodemographic data, the relevant medical history of the child, the number of siblings and the educational attainment of the parents, and included a questionnaire designed to assess qualitative aspects of the diet: number of daily eating occasions (3, 4, 5 or >5), food preferences (most and least palatable), appetite (poor, fair, good and very good), consumption of dairy, consumption of fish, consumption of oil, and special diets. This questionnaire was supplemented with a record of the foods consumed in the past 24 h (the amounts consumed were not documented), and the foods recorded in this log were later categorised into seven groups for the purposes of analysis (Table 1).

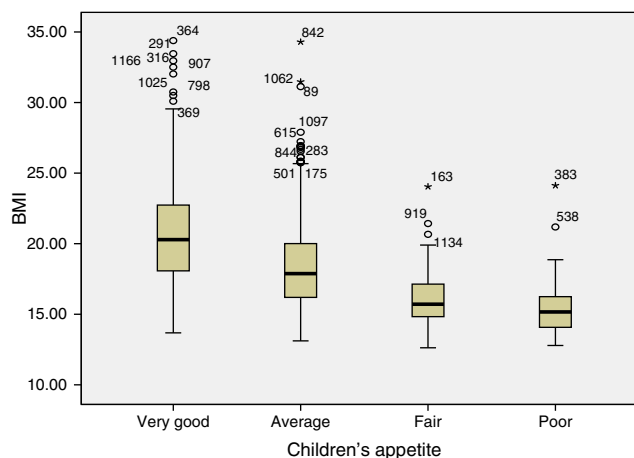
### Statistical analysis

We have summarised quantitative variables as measures of central tendency and dispersion (mean and standard deviation [SD]) and qualitative variables as absolute frequencies and relative frequencies expressed as percentages. We analysed the degree of association between dietary habits and age, sex, parental educational attainment, number of siblings, eating frequency and anthropometric measurements. The association was analysed by means of either ANOVA or the chi squared test and the Spearman correlation coefficient, depending on the type of variable. We performed the calculations with the statistical software PASW 18.0 and EPIDAT 3.1 (Xunta de Galicia, OPS).

**Table 2** Characteristics of children by sex.

	Boys	Girls
Age (years)	9.62 ± 0.07	9.43 ± 0.86
Weight (kg)	35.39 ± 0.49	35.53 ± 0.56
Height (cm)	136.56 ± 0.50	139.47 ± 2.66
BMI (kg/m <sup>2</sup> )	18.57 ± 0.15	18.46 ± 0.17
Number of siblings	1.57 ± 0.04	1.65 ± 0.05

Data expressed as mean ± standard deviation.

**Figure 1** Association between appetite level and body mass index (weight [kg]/height<sup>2</sup> [m<sup>2</sup>]).

### Results

We analysed the diet of a final sample of 1142 schoolchildren, including 612 boys (53.6%) and 530 girls (46.4%), aged between 5.8 and 13.2 years (mean ± SD = 9.3 ± 1.7) (Table 2). Two children (0.2%) completed the DCN themselves, including the section pertaining to appetite. Of all schoolchildren, 52.7% walked to school, and only 15.6% used the school lunch service.

### Dietary patterns and food preferences

#### Appetite

The information regarding the appetite of the children was obtained from the mother in 76.2%, the father in 9.4%, and both parents in 7.8% of cases. More than half of the sample under study (52.4%) reported their appetite as being "normal", while 23.6% reported it being "very good", 15.4% "fair" and only 3.6% "poor". The appetite level was directly and significantly correlated to body weight and body mass index (BMI) ( $P < .001$ ) (Fig. 1) (Table 3), age ( $P = .02$ ) and the number of daily eating occasions ( $P = .038$ ), but not with sex, the number of siblings or parental educational attainment.

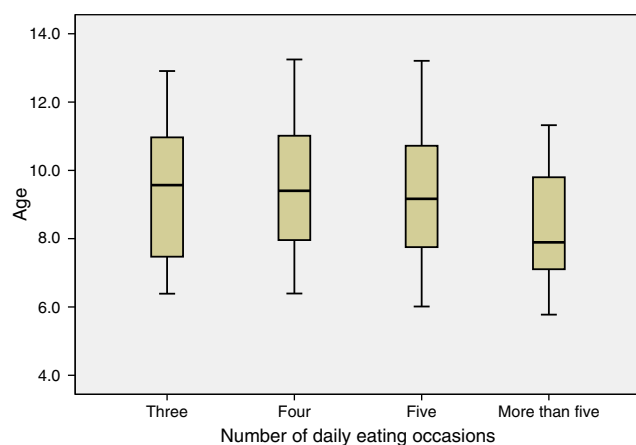
#### Number of daily eating occasions

The mean number of daily eating occasions was  $4.62 \pm 0.6$ . Most of the schoolchildren (59.8%) ate five times a day, and only a minority (4.8%) ate only three times a day. Eating frequency decreased with increasing age ( $P = .044$ ) (Fig. 2), and

**Table 3** Average BMI by appetite level of children.<sup>a</sup>

Appetite	N (%)	BMI (kg/m <sup>2</sup> )	
		Mean ± SD	Range
Very good	320 (28.6)	20.76 ± 3.85	13.69–34.39
Normal	587 (52.4)	18.41 ± 3.11	13.11–34.29
Fair	173 (15.4)	16.07 ± 1.83	12.63–24.04
Poor	40 (3.6)	15.51 ± 2.22	12.79–24.12

<sup>a</sup> ANOVA ( $P < .001$ ).



**Figure 2** Association between eating frequency and age of schoolchildren.

increased with parental educational attainment ( $P = .004$ ). We did not find an association with other variables such as body weight, BMI, sex or number of siblings.

### Food preferences

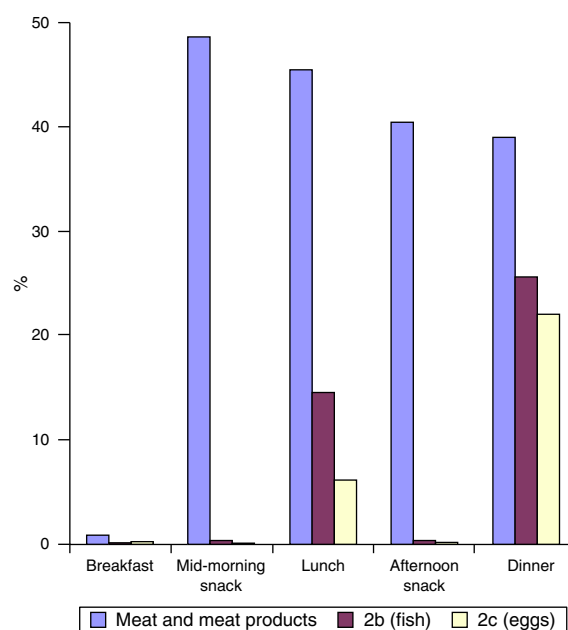
When children were asked about their favourite food, the most frequent answer was pasta (29.4%), followed by meat (13.9%) and rice (9.8%). The least preferred foods included vegetables (6%), legumes (3.9%) and fish (1.9%). Vegetables were the most disliked food in a majority (61.1% of surveyed children), followed by legumes (20%) and fruits (4.8%).

Only 29% of children reported liking dairy products when specifically asked about it, although 90.6% consumed the equivalent of two or more glasses of milk a day. Of the children that did not like dairy, 87% would consume the equivalent of two or more glasses of milk a day, compared to 96.8% of children that reported enjoying dairy, a difference in consumption that was significantly associated to food preference ( $P < .001$ ). Furthermore, 91.1% of boys consumed two or more glasses of milk a day compared to 87.3% of girls ( $P = .043$ ). The intake was not associated with body weight, BMI, age, parental educational attainment or the number of siblings.

Although only 22.6% of children liked fish, 55.5% had fish three or more times a week. Of the children that disliked fish, 49.2% consumed it fewer than three times a week, a percentage that was considerably lower (28.4%) in children that enjoyed fish. Thus, there was a significant correlation between food preference and actual fish intake ( $P < .001$ ). Consumption of fish three or more times a week was inversely correlated to age ( $P = .036$ ) and directly correlated to parental educational attainment ( $P = .001$ ), but was not associated with sex, body weight, BMI or the number of siblings.

### Other data

Only 3.3% of the children were on a special diet. The most frequent reason for it was celiac disease (25%). Other reasons included diabetes, excess weight, lactose intolerance, food allergies, etc.



**Figure 3** Percentage of children that consumed protein-rich foods from animal sources throughout the day.

More than 70% of the sample consumed olive oil on a regular basis, compared to oils from other sources, such as sunflower seed or soy.

### Food log of the past 24 h

The consumption by the children, at least once a day, of foods from the different food groups in decreasing order was: group 6 (92.8%); group 1 (90.45%); group 2 (88.7%); and within it subgroups 2a [83.36%], 2b [37.56%] and 2c [28.19%]; group 5 (68.12%); group 3 (44.5%) and group 4 (35.46%).

The daily distribution of protein-rich foods (meat, fish and eggs) was considerably disparate: while meat and meat derivatives (2a) were consumed by similar percentages in every meal (ranging from 39.1% at dinner to 48.6% in the mid-morning) except at breakfast (only 0.9%), the consumption of fish (group 2b) and eggs (2c) was mostly concentrated on dinner (fish, 25.8%; eggs, 22.2%), with the consumption of these subgroups being considerably lower in other eating occasions (Fig. 3). Of all schoolchildren, 21.36% consumed meat or meat products at lunch and dinner, and 5.5% on four eating occasions during the day (mid-morning, lunch, afternoon and dinner).

**Breakfast:** 14.2% of the schoolchildren skipped breakfast. The most common breakfast (58.3%) consisted exclusively of a dairy product and one item from group 6 (bread, pasta or sugar), although the frequency of intake of foods from these two groups was higher if we included combinations with other foods. A dairy product was consumed during breakfast by 81.6% of children, alone or combined with other foods, and bread or cereal by 70.8%.

**Mid-morning snack:** 87.1% of respondents had some type of mid-morning snack. The most frequent pattern was a combination of one item from group 6 (cereal) and one from subgroup 2a (meats and cured meats) (23.3%). Sixty-four

percent of the children ate cereal-based foods, alone or combined with other foods, and 48.6% ate foods from group 2a.

**Afternoon snack:** 84.6% ate an afternoon snack. The most common mid-afternoon snacking pattern consisted of a food from group 6 (cereal) and one from group 1 (dairy) (12.1%). The foods consumed most frequently in the afternoon snack, alone or combined with other foods, belonged to groups 6 (69.8%), 2a (39%) and 1 (38%).

**Lunch and dinner:** the dietary patterns of the midday meal (lunch) and dinner were not as well defined as the patterns observed in breakfast and the mid-morning and afternoon snacks. There was greater variability in the two main meals. No single pattern (combination of food groups) exceeded a frequency of 6% for lunch or 5% for dinner. With that in mind, the most frequently consumed food groups, alone or in different combinations, were groups 6 (44.6%), 2a (43.7%) and 3 (36.2%) at lunch, and groups 2a (39.1%), 6 (38.2%) and 1 (34.2%) at dinner.

## Discussion

The results obtained in this study allowed us to identify some of the main characteristics of the usual diet of schoolchildren in this geographical area of the Submeseta Sur (southern portion of the central plateau of the Iberian peninsula) where the provinces of Ciudad Real, Toledo and Cuenca meet.

The size of the towns in the geographical area under study, in which there is a short distance between residences and schools, a social environment that allows children to eat at home and for appropriate school hours with an intensive morning schedule, may account for the fact that more than half of the children walked to school and only 15.6% used the school lunch service.

Dietary behaviour is regulated by a complex neuroendocrine mechanism that is based on the interplay of hunger and satiety signals.<sup>11</sup> Eighty-six percent of the surveyed schoolchildren had a good or very good appetite, and appetite level was directly and significantly correlated to body weight, BMI, age and number of daily eating occasions. This could suggest that appetite provides an indirect measure of intake amounts, and thus that appetite is greater in children that are older, have a higher BMI or eat more frequently. However, age, BMI and eating frequency may influence how parents perceive the children's appetite, a hypothesis supported by the fact that we did not find an association between eating frequency and body weight or BMI.

Most of the surveyed schoolchildren ate at least five times a day (breakfast, mid-morning snack, lunch, afternoon snack and dinner), and consequently the mean number of daily eating occasions was high. Eating frequency was higher in younger children and in children with parents with higher educational attainment. In the enKid study, Serra-Majem et al. also found that eating frequency decreased with increasing age.<sup>12</sup> We did not find an association between eating frequency and body weight or BMI. Several studies have suggested that a dietary pattern characterised by a higher eating frequency, especially if it is based on less energy-dense foods and offset with physical activity, has a positive

impact on obesity, although this relationship has yet to be clearly established.<sup>10,13,14</sup>

In our study, some of the foods at the base of the food pyramid, such as vegetables and legumes, were perceived to be among the least appetising, probably because these foods and the dishes in which they are prepared are less palatable. There is evidence that palatability influences food choices.<sup>15</sup> In our study, the two least-consumed food groups were also the two perceived as the least palatable.

It is known that a varied diet facilitates adherence to dietary recommendations.<sup>16,17</sup> The benefits of a dietary pattern like the Mediterranean diet (MD) derive not only from its dietary diversity, but also from the consumption of some of the specific foods that it includes, such as olive oil—as the main source of lipids—or considerable amounts of vegetables, fruits and legumes that, in addition to ensuring nutrient adequacy, have been shown to reduce the incidence of cardiovascular diseases and some types of cancer.<sup>18,19</sup> According to the KIDMED study, less than 50% of the population of children and youth in Spain adhere to an optimal MD.<sup>20</sup> In this study, we did not use any validated instruments to assess adherence to a MD pattern, but the percentages of oil and cereal consumption (although it was not specified whether the cereal consumed was whole-grain or refined) were consistent with this dietary pattern. However, the intake of other foods deviated from this pattern, such as the low consumption of fruits and vegetables and excessive consumption of meats.

Dietary variety was considerable in the two main meals (lunch and dinner), and low in other eating occasions, in which dietary patterns were quite homogeneous. More than 85% of schoolchildren had breakfast, in which dairy was the most frequently consumed food group, followed by foods from group 6 (essentially cereal). On this subject, there is evidence that food intake early in the day improves academic performance in children<sup>1</sup> and that the frequent consumption of cereals at breakfast may contribute to preventing overweight and obesity.<sup>21</sup> It is also worth noting that when it came to the distribution of foods throughout the day, fish and especially eggs were mostly consumed at dinner, probably due to sociocultural factors. We specifically assessed the intake of dairy and fish outside the 24-h recall questionnaire, as these foods have a high iodine content and we wanted to assess for consumption of the minimum amounts that would guarantee an adequate iodine intake. The actual intake of both food groups, and especially of dairy, was above the proposed cut-off point, despite the low preference for these foods.

The limitations of this study mostly pertain to its retrospective nature and to the main source of data consisting of a 24-h diet intake recall; however, other authors have used a similar methodology.<sup>22</sup> On the other hand, its strengths are that it is the first study to describe the dietary pattern of these children from La Mancha, and that, given that the sample was representative of the population, its results can be counted on to be robust.

In conclusion, the dietary pattern of schoolchildren in the towns belonging to the Health Area of La Mancha Centro maintains some of the characteristics of the traditional MD, such as the habit of daily breakfast and a high intake of olive oil and cereals, although it also has a low consumption

of vegetables and fruits and an excessive consumption of meat.

## Funding

This study has received funding from a research grant from the Fundación Socio-Sanitaria de Castilla-La Mancha (AN-2010/44).

## Conflicts of interest

The authors have no conflicts of interest to declare.

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