

Original

## Prevalence of childhood obesity in Spain; National Health Survey 2006-2007

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### Abstract

**Introduction:** Childhood Obesity has become a Public Health priority due to its high prevalence and consequences in health status.

**Objective:** To estimate prevalence of obesity in the children included in the National Health Survey of 2006-2007 and to determine its association with socioeconomic position and other socio-demographic variables.

**Methods:** Cross-sectional study using data available from 6,139 Spanish children between 2-15 years old, included in the National Health Survey. Parents or guardians reported weight and height to estimate obesity prevalence according to the International Obesity Task Force cut-offs for body mass index.

**Results:** Obesity prevalence was 10,3% and overweight prevalence was 18,8%. Obesity was more prevalent in children from 4-5 years age (18,3%) and overweight in the 8-9 years stratus (25,5%). Overweight was more frequent in boys than girls (19,8% versus 17,8%;  $p = 0,04$ ). Canary Islands, Ceuta and Melilla, Valencia and Andalusia were the Autonomous Communities with higher obesity prevalence in contrast with the Basque Country, Galicia and Madrid which showed the lowest prevalence. This distribution generates a north to south gradient in obesity prevalence. Both, obesity and overweight showed an inverse association with socioeconomic position ( $p < 0,05$ ).

**Conclusion:** Childhood obesity rates in Spain accounts from ones of the highest in Europe, with a strong geographic and socioeconomic gradient. Priority should be given to effective interventions that can reach the most vulnerable groups as identified in this study, like restrictions on TV food advertising and tax reliefs to promote healthy eating.

(Nutr Hosp. 2012;27:154-160)

DOI:10.3305/nh.2012.27.1.5414

Key words: *Obesity. Prevalence. Childhood. Spain.*

### PREVALENCIA DE OBESIDAD INFANTIL EN ESPAÑA; ENCUESTA NACIONAL DE SALUD 2006-2007

### Resumen

**Introducción:** La obesidad infantil constituye una prioridad de Salud Pública dada su elevada prevalencia y sus consecuencias en la salud.

**Objetivo:** Estimar la prevalencia de obesidad en los niños incluidos en la Encuesta Nacional de Salud de 2006-2007 y determinar su asociación con la posición socioeconómica y otras variables socio-demográficas.

**Métodos:** Estudio transversal que recogió datos secundarios de la Encuesta Nacional de Salud, contando con una muestra representativa de 6.139 niños españoles de 2-15 años de edad. Se utilizó peso y talla reportados por los padres o tutores para estimar la prevalencia de obesidad según los puntos de corte para el índice de masa corporal recomendados por la International Obesity Task Force.

**Resultados:** La prevalencia de obesidad fue de 10,3% y de sobrepeso de 18,8%. La obesidad fue más prevalente en los niños de 4-5 años (18,3%) y el sobrepeso en niños de 8-9 años (25,5%). El sobrepeso fue más frecuente en niños que en niñas (19,8% versus 17,8%;  $p = 0,04$ ). Canarias, Ceuta y Melilla, Valencia y Andalucía fueron las Comunidades Autónomas con mayor prevalencia de obesidad en contraste con el País Vasco, Galicia y Madrid que presentaron las más bajas, generándose un gradiente norte-sur en la prevalencia de obesidad. Tanto la obesidad como el sobrepeso presentaron una asociación lineal inversa con la posición socioeconómica ( $p < 0,05$ ).

**Conclusión:** La prevalencia de obesidad infantil en España se sitúa entre las más altas de Europa y presenta importantes variaciones regionales y en función de factores socioeconómicos que deberían tenerse en cuenta para priorizar intervenciones dirigidas a los grupos más vulnerables, como restricciones a la publicidad alimentaria y exenciones de impuestos para promover una alimentación saludable.

(Nutr Hosp. 2011;27:154-160)

DOI:10.3305/nh.2012.27.1.5414

Palabras clave: *Obesidad. Prevalencia. Infantil. España.*

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Recibido: 15-IV-2011.  
 1.ª Revisión: 8-VI-2011.  
 2.ª Revisión: 21-VII-2011.  
 Aceptado: 29-VII-2011.

### Abbreviations:

NAOS: Nutrition, Physical Activity and Obesity Prevention Strategy.

SEP: Socio-economic position.

NHS: National Health Survey.

NSI: National Statistics Institute.

IOTF: International Obesity Task Force.

BMI: Body Mass Index.

Kg: Kilograms.

m: Meter.

NHANES: National Health and Nutrition Examination Survey.

GDP: Gross Domestic Product.

### Introduction

Childhood obesity is associated with early appearance of the metabolic syndrome<sup>1</sup> and more frequent presence of psychosocial disorders.<sup>2,3</sup> The persistence of obesity in adulthood leads to a higher risk of chronic diseases, lower life expectancy, and reduced life quality.<sup>3</sup>

In recent decades the frequency of childhood obesity has increased progressively throughout the world.<sup>4</sup> In Spain, obesity was prevalent in 8.5% of the population aged 2-17 years in 2003,<sup>5</sup> twice as high as in the 1980s.<sup>6</sup> In response, the Nutrition Physical Activity and Obesity Prevention Strategy (NAOS), was formulated in 2005 to promote a healthy lifestyle, establishing prevention of childhood obesity as a public health priority in Spain.<sup>7</sup>

The prevalence of obesity in Europe is higher in early childhood than in adolescence, whereas the pattern by sex varies among countries.<sup>8</sup> In the developed countries, children in lower socioeconomic position (SEP) usually have a higher frequency of obesity.<sup>9</sup> The level of regional economic development may also contribute to the north-south gradient of childhood obesity observed in Spain<sup>10</sup> and Europe,<sup>8</sup> while differences in obesity levels between urban and rural areas also appear to be related to the phase of the economic cycle—of growth, recession or stability—in which each country finds itself.<sup>11</sup>

Monitoring childhood obesity, its socio-demographic and socio-economic determinants and identifying vulnerable communities is a fundamental step in any effort aimed to cope with this epidemic. A valuable epidemiological resource for this purpose is the 2006-2007 National Health Survey (NHS), that collected information on children's (0-15 years) habits and health status in order to design and evaluate plans, programs, and activities to promote healthy lifestyles and prevent major diseases.

### Objectives

The objective of this study was to estimate the prevalence of childhood obesity based on NHS data for

2006-2007 and to determine its relation with family socioeconomic position (SEP) and other socio-demographic variables.

### Methods

The data were taken from the NHS, a cross-sectional study carried out in all of Spain between 2006 and 2007.<sup>12</sup> Participants were selected by multistage random sampling, stratified by size of Autonomous Community (region) to ensure that the sample was representative at that level. The first-stage units were the census sections of the Municipal Population Census of 2006; the second-stage units were primary family households; and the third-stage units were the persons finally interviewed. The participant from the household is selected by a procedure which allocates the same chance for every children or adolescent to be selected for answering the questionnaire.<sup>12</sup>

The questionnaire was administered by trained personnel. The Health and Social Policy Department and the National Statistics Institute (NSI) performed training sessions for the NSI's provincial delegates, who were then responsible for the interviewers' training at the local level. Most interviewers were civil servants from the NSI, experts in undertaking this kind of interviews and used to working with health oriented questionnaires. The NHS consisted of one section aimed for adults and another for children aged 15 years or less, which was answered by their parents or guardians. Data for addressing child's health status and lifestyle characteristics were collected through several questions. Specifically, weight and height of children was obtained by the following: "Can you tell me about how much your child weighs in kilograms, without shoes or clothing?" and "Can you tell me about how tall your child is in centimetres, without shoes?" Based on these responses body mass index (BMI) was calculated, defined as weight (kg) divided by height squared (m<sup>2</sup>). Overweight or obesity was defined for each sex and age group according to the cut-off points proposed by the International Obesity Task Force (IOTF).<sup>13</sup> The questionnaire included a section collecting detailed information about the socio-demographic and socio-economic characteristics of the sample. Areas with more than 10,000 inhabitants were considered urban and all others rural, in accordance with the definition of the National Statistics Institute<sup>14</sup> and the classification used in previous studies in Spain.<sup>10,15</sup> Family SEP was established asking for the occupation of the primary earner in the household. The categories were:

- 1<sup>st</sup> Civil service and company managers Professions with 2<sup>nd</sup> and 3<sup>rd</sup> university degree cycle.
- 2<sup>nd</sup> Company managers with fewer than 10 employees. Professions with 1<sup>st</sup> university degree cycle.
- 3<sup>rd</sup> Administrative and professional support staff for administration and financial management.



**Table I**  
Distribution of the sample of children aged 2-15 years in the 200-2007 National Health Survey, Spain

	<i>n (%)</i>	<i>Weight and/or height not available n (%)</i>
<i>Sex</i>		
Male	3,190 (52.0)	952 (50.0)
Female	2,950 (48.0)	951 (50.0)
<i>Age (years)</i>		
2-3	841 (13.7)	362 (19.0)
4-5	753 (12.3)	323 (17.0)
6-7	772 (12.6)	299 (15.7)
8-9	815 (13.3)	318 (16.7)
10-11	952 (15.5)	233 (12.2)
12-13	1,019 (16.6)	196 (10.3)
14-15	986 (16.1)	172 (9.0)
<i>Size of municipality of residence (by inhabitants)</i>		
< 10,000	1,266 (24.2)	476 (25.0)
10,001-50,000	1,764 (28.7)	522 (27.5)
50,001-400,000	2,113 (34.4)	566 (29.7)
> 400,000	996 (16.2)	338 (17.8)
<i>Socioeconomic position<sup>a</sup></i>		
1 <sup>st</sup> . High	842 (13.7)	210 (11.0)
2 <sup>nd</sup> . Middle-high	683 (11.1)	209 (11.0)
3 <sup>rd</sup> . Middle	1,475 (24.0)	374 (19.6)
4 <sup>th</sup> . Middle-low	2,392 (39.0)	859 (43.6)
5 <sup>th</sup> . Low	669 (10.9)	273 (14.3)
Not available	77 (1.3)	43 (2.3)
<i>Total</i>	6,139	1,903

<sup>a</sup>: Classification based on occupation of the principal earner in the household:

1<sup>st</sup>. Civil service and company managers. Professions associated with 2<sup>nd</sup> or 3<sup>rd</sup> cycle university degrees.

2<sup>nd</sup>. Managers of companies with fewer than 10 employees. Professions associated with a 1<sup>st</sup> cycle university degree.

3<sup>rd</sup>. Administrative and professional support, staff for administration and financial management.

4<sup>th</sup>. Skilled and semi-skilled manual workers.

5<sup>th</sup>. Unskilled workers.

4<sup>th</sup> Skilled and semi-skilled manual workers.  
5<sup>th</sup> Unskilled workers.

The statistical analysis was done with the SPSS program (Chicago, IL, USA), version 15 for Windows. The Chi-square test was used to analyse the association of overweight and obesity with socio-demographic variables. Statistical significance was established as  $p < 0.05$ .

## Results

The initial sample of children in the 2006-2007 NHS was composed of 8,042 persons aged 2-15 years. The response rate for weight and height was 76.34%, therefore the sample analysed consisted of 6,139 children. Table I shows the socio-demographic characteristics of those with and without information on anthropometric variables. The percentage of children under 9 years was higher among those who lacked information on weight and/or height; the rest of the socio-demographic variables did not vary widely between the two groups.

The prevalence of excess weight (overweight plus obesity) was 29.1%, with 18.8% overweight and 10.3% obesity (table II). The prevalence of obesity was higher in those aged 4-5 years (18.3%), and overweight was higher in those aged 8-9 years (25.5%). When analysed according sex, the overall prevalence of overweight was higher in boys than in girls (19.8 % and 17.8%, respectively;  $p = 0.04$ ). The prevalence of obesity was also higher in boys (10.6%) than in girls (10.0%), but the difference did not reach statistical significance.

Figure 1 shows the prevalence of obesity and overweight by Autonomous Community. The regions with the highest prevalence of obesity, with figures over 13%, were the Canary Islands, Ceuta and Melilla, Valencia, Andalusia, and La Rioja. Asturias, the Basque Country, Galicia and Madrid had the lowest prevalence of obesity, at less than 6.5%.

The frequency of childhood overweight and obesity decreased progressively with increasing family SEP ( $p$  for linear trend  $< 0.05$ ) (table III). The same trend was seen in all sex and age groups, except in girls under age 12. However, the prevalence of over-





**Table II**  
Prevalence of overweight and obesity in the population aged 2-15 years, by age and sex.  
2006-2007 National Health Survey, Spain

Age (years)	Obesity <sup>a</sup> % (95% CI)			Overweight <sup>a</sup> % (95% CI)			Obesity and Overweight % (95% CI)		
	Girls	Boys	Total	Girls	Boys	Total	Girls	Boys	Total
2-3	15.7 (11.8-19.5)	14.9 (11.5-18.2)	15.1 (12.6-18.6)	15.7 (11.8-19.5)	14.5 (11.1-17.5)	15.0 (12.5-17.5)	31.4 (26.3-36.1)	29.4 (25.1-33.5)	30.2 (26.9-33.3)
4-5	19.4 (15.3-23.5)	17.2 (13.2-21.2)	18.3 (15.4-21.2)	17.6 (13.6-21.5)	12.0 (8.5-15.4)	14.8 <sup>b</sup> (12.2-17.4)	37.0 (32.0-41.9)	29.2 (24.4-32.0)	33.2 <sup>b</sup> (29.7-36.5)
6-7	18.0 (13.9-21.9)	16.4 (8.9-15.5)	17.1 <sup>b</sup> (14.4-19.8)	19.3 (15.1-23.4)	17.9 (13.9-21.8)	18.6 (15.7-21.4)	37.3 (32.2-42.3)	34.3 (29.4-39.1)	35.7 (32.2-39.1)
8-9	9.8 (6.7-12.8)	12.3 (8.9-15.5)	11.2 (8.9-13.3)	27.8 (23.2-32.3)	23.3 (19.1-27.5)	25.5 (22.4-28.5)	37.6 (32.7-42.4)	35.8 (31.0-40.5)	36.7 (33.2-40.0)
10-11	7.6 (5-10.3)	6.6 (4.2-8.8)	7.1 (5.4-8.8)	18.7 (14.9-22.3)	22.4 (18.5-26.1)	20.6 (17.9-23.1)	26.2 (22.0-30.3)	29.0 (24.8-33.0)	27.6 (24.6-30.5)
12-13	1.9 (0.5-3.1)	6.0 (3.8-8.9)	4.0 <sup>b</sup> (2.7-5.2)	14.9 (11.6-18.1)	26.7 (22.7-30.6)	21.0 <sup>b</sup> (18.4-23.5)	16.6 (13.1-19.9)	32.8 (28.6-36.9)	25.0 <sup>b</sup> (22.2-27.7)
14-15	2.2 (0.7-3.6)	4.5 (2.5-6.3)	3.4 (2.2-4.5)	12.0 (8.8-15.0)	19.5 (15.9-22.9)	15.9 <sup>b</sup> (13.5-18.2)	14.2 (10.8-17.4)	23.8 (20.0-27.5)	19.3 <sup>b</sup> (16.7-21.8)
Total	10.0 (8.8-11.7)	10.6 (9.4-11.6)	10.3 (9.5-11.0)	17.8 (16.3-19.2)	19.8 (18.3-21.2)	18.8 <sup>b</sup> (17.8-19.8)	27.7 (26.0-29.3)	30.4 (28.7-32.0)	29.1 <sup>b</sup> (27.9-30.2)

<sup>a</sup>: Obesity and overweight according to IOTF criteria.

<sup>b</sup>:  $p < 0.05$  for gender comparison.

weight and obesity in the latter group was also greater in the low socioeconomic stratum than in the high stratum ( $p < 0.05$ ) (data not shown). To further explore the relationship between obesity and economic development at a population level, we analysed the prevalence of excess weight by Autonomous Community, and we found a strong inverse correlation ( $r = -0.68$ ;  $p < 0.05$ ) (fig. 2).

The highest figures for obesity and overweight were observed in medium-sized municipalities (31.2% in municipalities with 10,001 to 50,000 inhabitants and 29.1% in those with 50,001 to 400,000 inhabitants), (table III). Finally, in children under 12 years, obesity was more prevalent in urban than in rural areas (14.0% and 11.5% respectively;  $p = 0.04$ ), whereas in adolescents the opposite phenomenon was observed (3.4%

**Table III**  
Prevalence of overweight and obesity in the population aged 2-15 years, by socioeconomic position and size of municipality of residence. 2006-2007 National Health Survey, Spain

	Obesity % (95% CI)	Overweight % (95% CI)	Obesity and overweight % (95% CI)
<i>Socioeconomic position<sup>a</sup></i>			
High	5.0 (3.4-6.5)	14.7 (12.2-17.1)	19.8 (17.0-22.5)
Middle	10.9 (9.9-11.8)	19.3 (18.1-20.4)	30.2 (28.8-31.5)
Low	12.7 (10.1-15.3)	20.8 (17.6-23.9)	33.5 (29.8-37.1)
<i>p</i> for linear trend	< 0.05	< 0.05	< 0.05
<i>Size of municipality of residence (population)</i>			
< 10,000	9.5 (7.8-11.1)	17.4 (15.2-19.5)	26.9 (24.3-29.3)
10,001-50,000	11.1 (9.5-12.5)	20.1 (18.2-22.0)	31.2 (29.0-33.4)
50,001-400,000	10.5 (9.1-11.8)	18.6 (16.8-20.2)	29.1 (27.1-31.1)
> 400,000	9.4 (7.4-11.2)	18.7 (16.2-21.2)	28.1 (25.1-30.9)
<i>p</i> for linear trend	0.245	0.720	0.810

<sup>a</sup>: The middle position corresponds to 2<sup>nd</sup>, 3<sup>rd</sup>, and 4<sup>th</sup> group according to the classification in table I.



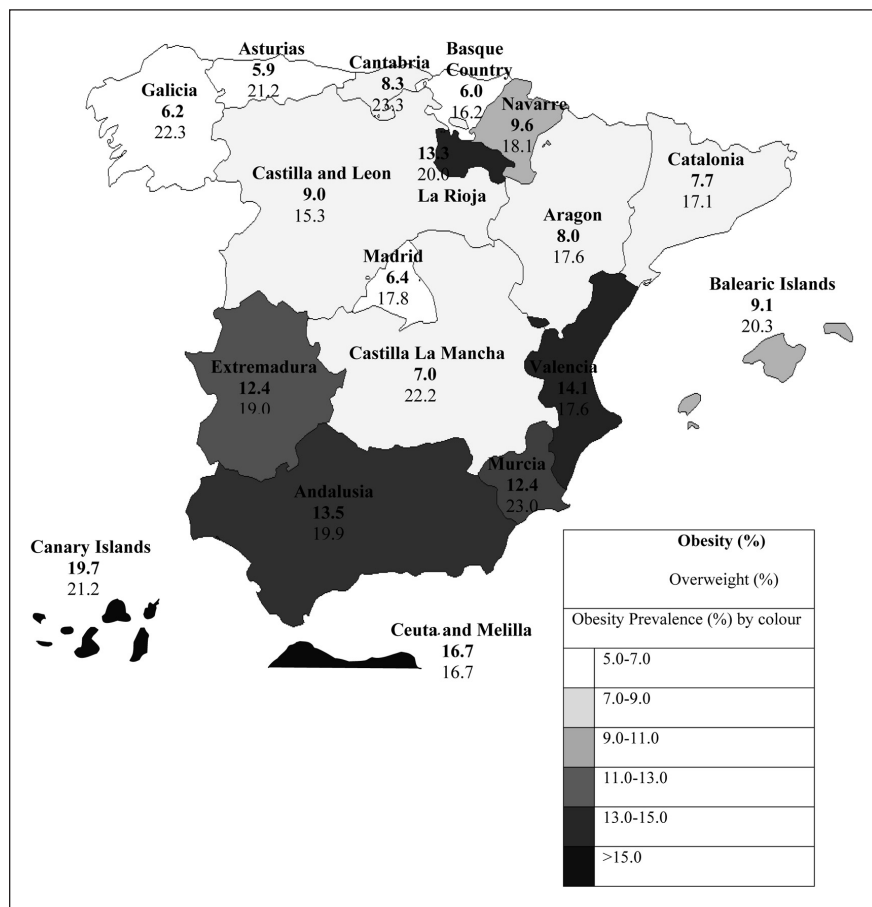


Fig. 1.—Prevalence of obesity and overweight in the population aged 2-15 years by Autonomous Community. 2006-2007 National Health Survey, Spain.

and 5.0%, respectively), although this difference did not reached statistical significance ( $p = 0.1$ ) (table IV).

**Discussion**

The 2006-2007 NHS showed that 10.3% of the Spanish population aged 2-15 years was obese and

18.8% was overweight. Thus, about 1 in 3 Spanish children and adolescents have excess weight. Obesity was more frequent in early childhood than in adolescence, and higher in prevalence in the Canary Islands, in the south and south-eastern areas of the peninsula and in the lowest socioeconomic strata.

The prevalence of childhood obesity appeared higher than the 7.9% observed in 1998-2000 in the enKid study, the only with national-level data on measured weight and height.<sup>10</sup> It is interesting to note that the 2003-2004 NHS showed a prevalence of obesity of 8.5% in those under age 17,<sup>5</sup> which is almost 2 percentage points less than the observed in the 2006-2007 NHS. These observations, confirmed by other local and regional studies<sup>15-16</sup> show that the upward trend of obesity in Spanish children, initiated three decades ago,<sup>17</sup> has continued. Within the European Union, Spain is one of the countries with higher rates of excess weight in childhood. Even though comparison of data is difficult due to different methodologies and age ranges, between 11 to 15 years of age, only Malta from 10 countries self reported data, presented higher rates than Spain's.<sup>2,8</sup> Furthermore if the comparison is made with measured weight and height data of children aged between 5 and 15 years, Spain would have one of the 3 highest rates in both boys and girls.<sup>4,8</sup>

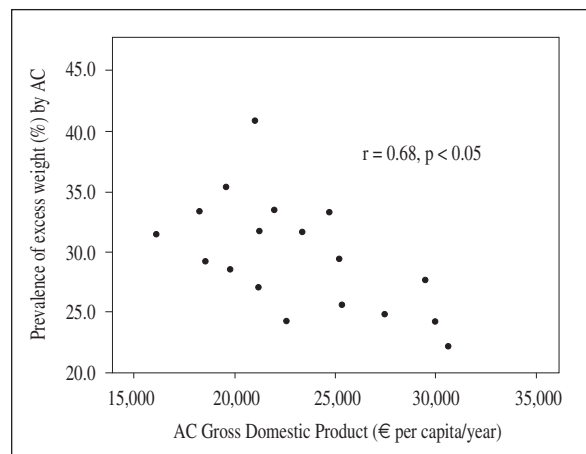


Fig. 2.—Correlation between prevalence of excess weight by Autonomous Community and Community's gross domestic product in 2007, Spain.





**Table IV**  
*Prevalence of obesity and overweight in urban and rural areas. 2006-2007 National Health Survey, Spain*

Age group	Rural <sup>a</sup> % (95% CI)	Urban <sup>b</sup> % (95% CI)	P
<i>Childhood (≤ 12 years)</i>			
Obesity	11.5 (9.3-13.6)	14.0 (12.8-15.2)	0.04
Overweight	18.2 (15.6-20.8)	19.2 (17.8-20.5)	0.33
Obesity and overweight	29.8 (26.6-32.8)	33.2 (31.5-34.8)	0.05
<i>Adolescence (&gt; 12 years)</i>			
Obesity	5.0 (2.6-7.3)	3.4 (2.4-4.3)	0.10
Overweight	15.3 (11.5-19.0)	19.2 (17.2-21.1)	0.33
Obesity and overweight	20.3 (16.1-24.4)	22.6 (20.4-24.6)	0.34
<i>Total</i>			
Obesity	9.5 (7.8-11.2)	10.5 (9.6-11.3)	0.34
Overweight	17.4 (15.2-19.5)	19.2 (18.0-20.3)	0.16
Obesity and overweight	26.9 (24.3-29.3)	29.7 (28.3-30.8)	0.05

<sup>a</sup>: Rural ≤ 10,000 population; Urban > 10,000 population.

As described in the enKid study,<sup>10</sup> our analyses show that the global prevalence of overweight and excess weight was higher in boys. However, after disaggregating data by sex and age, the prevalence of obesity and overweight was higher in girls aged 4-7 years whereas in boys we observed significant higher rates of obesity and particularly overweight between 12-15 years, similar to what was reported in children and adolescents from northern Spain between 1985 and 1995.<sup>17</sup> Our results are also consistent with a local study,<sup>16</sup> which found no differences by sex in the prevalence of obesity in children aged 9-10 years, suggesting that this is a period of transition for obesity in the distribution by sex. From 6 to 9 years of age the prevalence of excess weight reached a peak over 35% and then declined in adolescence specially in girls, the same observation found at regional,<sup>18</sup> national<sup>10</sup> and European<sup>4,8</sup> studies. In contrast, the prevalence of excess weight in the United States was similar in both sexes and between children (aged 6-11) and adolescents (aged 12-19), as described in 2002.<sup>19</sup> Most recent data from NHANES (2007-2008) found that prevalence was higher in Hispanic adolescent males,<sup>20</sup> which could reflect the influence of social and cultural factors. In our setting, the lower prevalence of obesity in adolescents, particularly in girls, may reflect the influence of fashion and social stereotypes on body image.<sup>21,22</sup> This influence may be less marked in the United States, where there is more social acceptance of obesity, as shown by parents' erroneous perception of their children's weight, especially when they are obese.<sup>23</sup> However, a point of concern is that recent evidence shows that despite the increase in childhood obesity in Spain, parental perception of excess weight in children has not improved,<sup>24</sup> suggesting that social acceptance of childhood obesity is increasing.

The north-south-southeast gradient of childhood obesity in the 2006-2007 NHS coincides with the pattern observed in national<sup>10</sup> and multi-provincial<sup>25</sup> studies in Spain. A similar gradient has been observed in Italy<sup>26</sup> and throughout Europe.<sup>4,8</sup> It is illustrative that, with a

few exceptions including Galicia, Castilla and Leon, and La Rioja, the map of childhood overweight and obesity by Autonomous Community is the inverse of the map of per capita gross domestic product (GDP) in 2007 (27) (fig. 2); specifically, the correlation between per capita GDP and excess weight was -0.68;  $p < 0.05$ . A study that analysed the relation between GDP and the prevalence of obesity in adolescents in 35 European countries<sup>28</sup> observed a positive association in countries with medium and low income, whereas in high income countries, including Spain, this association was null or negative. With regard to family SEP, it was inversely associated with the prevalence of overweight and obesity, which is consistent with most studies in developed countries.<sup>9</sup> In our study this association persisted in all age and sex groups, unlike the AVENA study in Spanish adolescents, where the inverse relation with SEP was found only in males,<sup>29</sup> and the enKid study, where it was observed only in children under age 14.<sup>10</sup>

In the early 1990s obesity in Spain was more prevalent in rural areas among adult men.<sup>30</sup> At the end of the decade the enKid study found no significant differences in childhood obesity by size of municipality of residence.<sup>10</sup> Our data reinforce this trend of attenuation of rural predominance in obesity, a finding that had already been described in the United States in recent decades.<sup>11</sup> Even though differences in obesity and overweight prevalence between rural and urban areas were small and did not reach statistical significance, when disaggregating by age, obesity plus overweight was higher in urban compared to rural areas. In contrast, a recent study of preadolescent schoolchildren (aged 10-12 years) in Galicia found that obesity was higher in rural areas,<sup>15</sup> which suggests that there are local geographic variations in this pattern associated with regional economic development, similar to what has been observed across countries.<sup>28</sup>

Self-reported data usually overestimate height and underestimate weight, both in adults and in children and



adolescents. Additionally, non-response for weight and height is frequently higher among obese participants, leading to an underestimation of obesity prevalence.<sup>31</sup> However, BMI based on reported weight and height has been shown to be reasonably valid for classifying individuals as obese or not obese in representative samples of the Spanish population, in adults and children<sup>32,33</sup> and in other epidemiological studies.<sup>34</sup> Furthermore, the distribution analysis of the study variables found no significant differences between responders and non-responders. So this bias in the direction of underestimating the prevalence of obesity does not seem to invalidate our results.

In conclusion, childhood obesity is a serious, growing public health problem in Spain, with a strong geographic and socioeconomic gradient. To help combat this epidemic, prevention policies should be implemented that give priority to effective interventions that can reach the most vulnerable groups as the described in this study, like restrictions on TV advertising of high-fat and high-sugar foods, and tax reliefs to promote healthy eating among the most economically deprived, two measures successfully implemented in countries like UK, where a stabilization in the prevalence of children obesity has been observed in recent years.<sup>35</sup>

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