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Decomposing Cross-Country Gaps in Obesity and Overweight: Does the Social Environment Matter?

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Abstract

A key question underpinning health production, and one that remains relatively unexplored, is the influence of socio-economic and environmental factors on weight gain and obesity. Such issues acquire particular relevance when data from two Mediterranean countries (Italy and Spain) are compared. Interestingly, the obesity rate was 5 percentage points higher in Spain in 2003 while in 1990 it had been roughly the same in the two countries. This paper reports a non-linear decomposition of gaps in overweight (body mass index – BMI - between 25 and 29.9 kg/m^2), class 1 (BMI≥30 kg/m^2) and class 2 obesity (BMI≥35 kg/m^2) between Spain and Italy by both gender and age. We isolate the influence of lifestyles, socio-economic and environmental effects in explaining cross-country gaps in the prevalence of obesity. Our findings suggest that when the social environment (peer effects) is not controlled for, eating habits and education are the main predictors of total cross-country gaps (36-52%), albeit that these two factors have a different impact depending on gender and age. Somewhat paradoxically, however, when we controlled for the social environment, these previous predictors lost their explanatory power and peer effects were found to explain between 46 and 76% of gaps and to exhibit an increasing age pattern.
J.E.L Classification: I12; I18; I19

Keywords: obesity, obesity gaps, non-linear decomposition, education, Italy, Spain.

Resum

Una qüestió clau sobre la producció de salut relativament poc explorada es refereix a la influència dels factors socioeconòmics i mediambientals sobre el pes i l'obesitat. Aquesta problemàtica adquireix particular rellevància quan es comparen dos països Mediterranis com Itàlia i Espanya. És interessant adonar-se que l'obesitat a Espanya és 5 punts percentual més elevada al 2003 mentre que a l'any 1990 era aproximadament la mateixa en ambdós països. Aquesta article presenta una descomposició no lineal dels gaps o diferencials en taxes de sobrepès (índex de massa corporal – IMC- entre 25 i 29.9 9 kg/m^2), obesitat classe 1 (IMC≥30 kg/m^2) i classe 2 (IMC≥35 kg/m^2) entre Espanya i Itàlia per gènere i grups d'edat. En explicar aquests gaps entre països aïllem les influències dels estils de vida, els efectes socioeconòmics i els mediambientals. Els nostres resultats indiquen que quan no es controla pels efectes mediambientals (efectes de grup o 'peer effects') els hàbits alimentaris i el nivell educatiu són els principals predictors del gaps totals entre països (36-52%), si bé aquests dos factors exerceixen un impacte diferenciat segons gènere i edat. Un tant paradoxalment, quan controlem pels efectes de grup aquests predictors perden la seva capacitat explicativa i els efectes de grup passen a explicar entre el 46-76% dels gaps en sobrepès i obesitat i mostren un patró creixent amb l'edat.

1. Introduction

The recent increase in the prevalence of obesity is widely recognised to constitute a major threat to health in most western countries and is estimated to be responsible for up to 6% of total health care expenditure in Europe as well as for generating other socio-economic costs (WHO, 2006). Among the OECD countries, the obesity rate has grown on average by 8% (Flegal *et al*., 2002), while its prevalence has tripled over the last two decades in Europe, where it now reaches epidemic proportions (Branca *et al*., 2007). However, on the whole, few studies have sought to explain significant cross-country differences present in Europe,[1] even though such research might shed valuable light on the issues underlying the problem. These major differences between countries would appear to illustrate the importance of institutional factors (e.g., education systems) and socio-environmental effects (e.g., values and lifestyles), both of which can influence the diet and physical activity (or the caloric balance) that ultimately are responsible for weight gain.

Economic theory has traditionally sought to conceptualise health production, with obesity capturing the anthropometric dimensions of health[2], in terms of rational individual decisions (in the tradition of Grossman, 1972) that are driven by comparisons of the costs and benefits of healthy actions. In line with this way of thinking, individuals are seen as the producers of their own health and although they receive utility from being healthy, at the same time they experience sacrifices in terms of opportunity costs from foregoing other

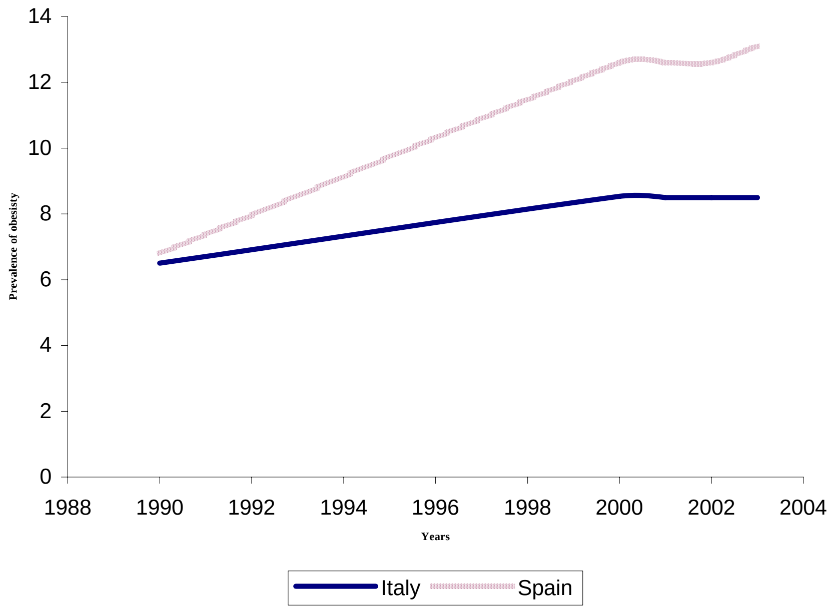
[1] For instance, based on the weight and height measurements of the adult population, the prevalence of overweight in Europe is estimated to range between 32% and 79% in men and between 28% and 78% in women, while obesity ranges from 5% to 23% among men and between 7% and 36% among women (Branca *et al*., 2007).
[2] Biologically speaking, weight gain is simply conceptualised as a caloric imbalance between the amount of calories ingested and those expended, in the presence of inadequate physical activity and a poor diet.

consumption activities. In the specific case of obesity, therefore, the latter would include the pleasure gained from food intake and, in general, energy saving incentives that prevent unnecessary physical activity. However, alternative approaches call for the role of information and environmental determinants of health to be taken into consideration. Indeed, health behaviour is likely to be socially learned and, accordingly, formed in the specific community of reference, rather than to result purely from the balancing out of costs and benefits in isolation. However, whether education, in terms of the impact it might have on influencing an individual's information-processing capacity (Lleras-Muney, 2007; Kenkel, 1991), and social environment are behind the prevalence of obesity is an empirical question that needs to be explored further.

Current research into obesity emphasises several rational forms of behaviour. Examples of these include the impact technological changes has on the number of calories expended (Cutler *et al.*, 2003), and the effects that more sedentary lifestyles and jobs, in combination with the effects of lower food prices resulting from agricultural innovations, are having on enhancing caloric intake (Lakdawalla and Philipson, 2002, Philipson 2001, Rashad *et al.*, 2006, Finkelstein *et al.*, 2005). Similarly, other incentive driven explanations are derived from lower food prices: in particular, Chou *et al.*, (2004) report a negative correlation between individuals' body mass indexes (BMI) and food prices in fast-food and full-service restaurants. Other explanations hypothesize that an increase in the rate of time preference, or the rate at which future benefits are discounted against current consumption decisions, also contribute to the obesity epidemic (Komlos, *et al*, 2003). Only more recently have the roles of information and, in particular, that of education been recognised (Cawley *et al*, 2007), although the association between education and obesity is far from clear-cut. It might be hypothesized, however, that food-related health behaviours are learned from one's social environment or from one's peers, so that common patterns emerge largely out of social interactions. Hence, both the observed and unobserved opportunity costs of health production can be key drivers of the obesity gap.

In explaining cross-country differences in the prevalence of overweight and obesity, this paper draws on paradoxical evidence from two Mediterranean countries, Italy and Spain. Indeed, while we would not expect to find significant differences in terms of the penetration of fast food, technology and the strenuousness of work, unusually we found large differences in the two countries' obesity rates. Thus, in 2003, self-reported obesity (as proxied by a BMI greater than 30) was roughly 8% in Italy and 14% in Spain, while in 1990 the rates of prevalence did not differ statistically (see **Figure 1**). In such a short period of time, the respective genetics of the two populations cannot provide a reasonable explanation for such differences, which can only reflect the distinct roles played by lifestyles – primarily smoking and the consumption of certain foods - and cultural patterns that affect feeding behaviour, along with other effects associated with 'urban sprawl' or the propensity to take exercise (Erwing *et al.*, 2003). All these factors arguably influence an individual's energy balance, namely the difference between energy intake and energy expenditure through physical activity. Thus, some authors report a decline in physical activity over time (Bleich *et al.*, 2007), while others describe the effects resulting from the excessive consumption of high caloric foods (Drewnoswski and Darmon, 2005). However, we need to examine the extent to which traditional lifestyles and other environmental factors explain cross-country differences in the prevalence of obesity.

Figure 1. Patterns of obesity in Italy and Spain, 1990-2003.



Source: OECD Health Data, 2005 & Pagano and La Vecchia, (1994).

This paper empirically decomposes cross-country gaps in the rates of prevalence of overweight and obesity in Italy and Spain. Given that the variable of interest is binary, we draw upon methods of non-linear decomposition (Fairlie, 1999, 2005) to examine the underlying factors (including age, education and lifestyles) that might explain cross-country overweight and obesity gaps in two very similar Mediterranean countries. We do so by defining subsamples according to different criteria of interest, namely age/gender variation. This methodology is accordingly designed to identify among these observable factors -aggregated into broad groups- those factors that account for the cross-country gaps. Note that the decomposition is undertaken with and without the inclusion of peer effects, our proxy for the social environment.[3] Our empirical strategy for identifying peer effects involves the selection of a regional variable, particularly

[3] On determining the level of aggregation for the identification of peer effects, it is important to ensure that there is no sorting and that selection groups are narrow, because if the groups are too widely defined heterogeneity is found.

relevant in Spain and Italy, which avoids individual sorting given the limited mobility in both countries.

This approach has not, to the best of our knowledge, been previously employed for the analysis of obesity in health or nutrition, although it has been demonstrated to be specifically useful for exploring differences in binary outcomes. This paper, therefore, seeks to contribute to the paucity of literature undertaking cross-country comparisons of obesity. As far as we can ascertain, the only exception here is a paper by Contoyannis and Wildman (2007) in which the authors use relative distribution analysis to examine changes in the distribution of BMI using non-parametric methods. Interestingly, in a comparison of England and Canada, their results indicate that the expansion of BMI increased at a much faster rate over time in England. However, as to which factors contribute to creating this gap remains unclear. Finally, we have identified two studies that, in a similar vein to ours, examine within country differences in obesity (between two regions in Denmark, Halkjær and Sørensen, 2004, and across Spanish regions, Gutierrez-Fisac *et al.*, 1999). The evidence drawn from these studies suggests that differences are mainly attributable to educational level and intelligence test scores.

Our findings, on the other hand, suggest that eating habits and education are the main predictors of total cross-country gaps between Italy and Spain (36-52%). Among men, eating habits explain up to 35% of obesity gaps in early adulthood, whilst education explains 43% of these gaps in later adulthood. Among women, education appears to explain about 26% and 38% of the obesity gaps in early and middle adulthood respectively, while eating habits only explain these gaps in older adulthood (24%). Paradoxically, when controlling for social environment in the obesity decomposition, peer effects override previous results regardless of gender and explain between 46-76% of total gaps and exhibit an increasing age pattern.

The rest of the paper is structured as follows. In the next section we present our data and in section three we discuss our empirical strategy. Section four reports the results and section five discusses these findings.

2. Data

We use cross-sectional data drawn from representative surveys for Italy and Spain. The Italian data are taken from the 2003 edition of the National Survey on Daily Life ("Indagine sugli Aspetti della Vita Quotidiana"), a survey conducted by the National Institute of Statistics (ISTAT) that collects multipurpose individual data including health conditions, healthcare access, dietary habits and body weight and height. The original sample contains information on 20,547 complete households comprising 44,384 adult individuals (aged 18 or above). The data for Spain come from the 2003 edition of the Spanish National Health Survey ("Encuesta Nacional de Salud"), a survey conducted by the National Institute of Statistics (INE) which gathers information on aspects such as self-assessed health status, primary and specialized health care utilization, consumption of medicines, lifestyles, conducts related to risk factors, anthropometrical characteristics, preventive practices and socio-economic status. The original dataset contained 21,650 adults aged 16-99 from all Spanish regions.

Both surveys are nationally and regionally representative and use very similar sampling procedures.[4] The wording of the two questionnaires is

[4] The SNHS-2003, for instance, follows a stratified multi-stage sampling procedure in which the primary strata are the Autonomous Communities and the sub-strata are then defined according to population size in particular areas. Within the sub-strata, municipalities and

surprisingly similar, which means the information we use in the analysis is directly comparable. This means that our task of homogenizing the variables and definitions proved effective. After discarding individuals younger than 18 and older than 65 years of age and observations with missing weight and height information, we ended up with a joint dataset of 29,640 observations: 14,515 Italians and 15,125 Spaniards.

In line with standard practice, our dependent variable of interest is a measure of overweight and obesity based on the Quetelet index or the individual's BMI, defined as weight in kilograms divided by the square of height in meters (kg/m^2). To compute this indicator, we used self-report data on the height and weight of each respondent. Our reason for using this index lies in the fact that the BMI correlates highly with body fat, while differing with age and gender. Women are more likely to have a higher percentage of body fat than men for the same BMI and, on average, older people may have more body fat than younger adults with the same BMI (Gallagher *et al.*, 1996).[5] According to the World Health Organization (2000), an individual with a BMI between 25 and 29.9 kg/m^2 is defined as overweight or pre-obese, while a person with a BMI of ≥ 30 kg/m^2 is classified as being ("class 1") obese. To examine cross-country differences at particular levels of obesity, adult obesity can be further sub-divided into obesity class 2 (BMI ≥ 35 kg/m^2) or severe obesity and obesity class 3 (BMI ≥ 40 kg/m^2) or morbid obesity. The importance of distinguishing between different types of obesity lies in the fact that NICE (2008) suggests that

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sections (primary and secondary sampling units respectively) are selected using a proportional random sampling scheme. Finally, individuals are randomly selected from the sections. The Italian National Survey on Daily Life follows a two-stage sampling procedure, with municipalities as the primary sampling units and households as the secondary sampling units. Municipalities are stratified by population size. Municipalities with population above a certain threshold are always included, whereas the smaller ones are selected at random.

[5] Unfortunately, the BMI does not take into consideration body composition (adiposity vs. lean weight) or body fat distribution. This means it may fail to predict obesity among very muscular individuals and the elderly.

BMI might overestimate obesity below the cut-off point of 35. In the United States, between 1986 and 2000, the prevalence of obesity class 3 quadrupled whilst class 1 doubled (Sturm, 2003; Ruhm, 2007). Furthermore, class 3 obesity seems to be the one that has experienced the largest growth levels in the United States (Freedman *et al.*, 2002). This growth in extreme levels of obesity is of particular concern because of its consequences for mortality (Flegal *et al.*, 2005), to the extent that it has been argued that it might reverse gains in life expectancy (Olshansky *et al.*, 2005).[6]

3. Methods and Variables

a) The Non-linear Decomposition

Our aim here is to compute differences or gaps in the prevalence rates of overweight and obesity between the two countries by subpopulation groups and, then, to decompose these differentials into their separate underlying factors. To do this, rather than apply the traditional Blinder-Oaxaca (Blinder, 1973; Oaxaca, 1973) decomposition method to determine differences in measurable characteristics on a continuous variable, we employed Fairlie's (1999, 2005) decomposition technique, as it is particularly suited to calculating gaps for binary variables, as is the case of our prevalence rates. The procedure computes the difference in the probability of an outcome between two groups and quantifies the contribution of group differences (e.g. black/white; male/female; north/south) in the independent variables to the outcome differential.

Following Fairlie (1999), the decomposition for a non-linear equation of the type $P(y=1) = F(x\hat{\beta})$ can be expressed as,

[6] However, our empirical analysis does not study obesity class 3, given its low rate of prevalence in both countries.

$$\bar{y}^S - \bar{y}^I = [\sum_{i=1}^{N^S} \frac{F(x_i^S \hat{\beta}^S)}{N^S} - \sum_{i=1}^{N^I} \frac{F(x_i^I \hat{\beta}^S)}{N^I}] + [\sum_{i=1}^{N^I} \frac{F(x_i^I \hat{\beta}^S)}{N^I} - \sum_{i=1}^{N^I} \frac{F(x_i^I \hat{\beta}^I)}{N^I}] \quad (3)$$

where $\bar{y}^j$ is the average probability of a specific obesity class in country *j* (*j*=*S*,*I* for Spain and Italy, respectively), x^j is the set of average values of the independent variables in country *j*, $\hat{\beta}^j$ is the coefficient estimates for country *j*, *F* is the cumulative distribution function from a standard normal or a logistic distribution and N^j refers to the sample size in each country. The first term in brackets shows the part of the cross-country gap that is due to group differences in the distribution of characteristics or the independent variables, also known as 'the explained part', whereas the second term represents the portion of the cross-country gap due to differences in coefficients or 'returns' to the exogenous covariates but it also captures differences in immeasurable or unobserved endowments. Similarly, the non-linear decomposition can be written as,

$$\bar{y}^S - \bar{y}^I = [\sum_{i=1}^{N^S} \frac{F(x_i^S \hat{\beta}^I)}{N^S} - \sum_{i=1}^{N^I} \frac{F(x_i^I \hat{\beta}^I)}{N^I}] + [\sum_{i=1}^{N^S} \frac{F(x_i^S \hat{\beta}^S)}{N^S} - \sum_{i=1}^{N^S} \frac{F(x_i^S \hat{\beta}^I)}{N^S}] \quad (4)$$

where in this case the estimated coefficients for Italy, $\hat{\beta}^I$, are used as weights to calculate the first term of the decomposition, and the Spanish distribution of average characteristics are employed as weights for the second term. Since the decompositions of equations (3) and (4) provide different estimates, to avoid this familiar index problem in our calculations we preferred to use the coefficient estimates ($\hat{\beta}^*$) from a pooled sample over all cases to weight the explained part of the decomposition (Oaxaca and Ransom, 1994).

According to Fairlie (2005), while equations (3) and (4) provide an estimate of the contribution of the explained and unexplained part to the total gap, the calculation of the separate contributions of the individual independent variables (or groups of covariates) is not direct. If one assumes that $N^S = N^I$ and $\hat{\beta}^*$ is the probit coefficient estimates for a pooled sample, the individual contribution of regressor x_k to the cross-country obesity gap can be expressed as,

$$\frac{1}{N^I}\sum_{i=1}^{N^I} F\left(\hat{\alpha}^* + x_{ki}^S \hat{\beta}_k^* + \sum_{m \neq k} x_{mi}^S \hat{\beta}_m^*\right) - F\left(\hat{\alpha}^* + x_{ki}^I \hat{\beta}_k^* + \sum_{m \neq k} x_{mi}^S \hat{\beta}_m^*\right) \quad (5)$$

which means that the contribution of a particular variable to the gap is calculated by holding constant the contribution of the other variables.[7] Notice that the computation of equation (5) involves a one-to-one matching of cases between the two groups (countries) and as they typically differ in size (in our case $N^I < N^S$), then a large number of random sub-samples from the larger group are drawn. Each of these random sub-samples of Spaniards is then matched to the Italian sample and finally separate decomposition estimates are calculated. The mean value of estimates from the separate decompositions is calculated and employed to derive the results for the entire Spanish sample.[8]

b) The Regressors

Consistently with conventional evidence on the determinants of body weight and obesity, **Table 1** presents the set of exogenous covariates employed in our econometric specifications for each country: i) the age and age square of each respondent at the date of the interview; ii) for marital status, a dummy

[7] See Fairlie (2005) for a description of how to compute the standard errors of these estimates following the delta method.

[8] As long as the separate contribution of an independent variable depends on the value of the other covariates, the Fairlie procedure randomizes the order of the variables to reduce the influence of the ordering on results.

indicated whether the individual was married or not; iii) we used three categories for educational level and one dummy variable measuring whether the individual was currently working; iv) a further dummy measured whether individuals owned private medical insurance; v) another dummy measured whether employed individuals needed to exert any physical activity in their work; vi) in the case of lifestyles, we considered nine dummies for smoking habits, breakfast and frequency of consumption of certain foods (i.e., fish, meat and vegetables) and vii) a final covariate was taken as a measure of an environmental factor which proxies peer effects. Peer effects are measured by assuming a pure endogenous effect (Case and Katz 1991) which is not a severe assumption if the research aims to examine broadly defined peer effects. We interpret peer effects widely so as to include prevailing social norms, namely people receiving utility by not deviating from the ‘‘average’’ group member behaviour (Akerlof, 1997). That is, peer effects are defined at an average regional BMI level of a reference group (defined in terms of gender, age group and level of education) so that there is no bias resulting from endogenous sorting given its broad definition. The downside is that we cannot distinguish contextual from endogenous effects (Manski, 2000).

Table 1. Variables, definitions and means (2003)

Variables	Definitions	Italy		Spain	
		Female	Male	Female	Male
	Sample size	7,367	7,148	7,813	7,312
Dependent:					
Overweight	= 1 if BMI is between 25 and 29.9; 0 otherwise	0.199	0.411	0.250	0.439
Obesity_1	= 1 if BMI is greater or equal than 30; 0 otherwise	0.068	0.084	0.115	0.122
Obesity_2	= 1 if BMI is greater or equal than 35; 0 otherwise	0.012	0.009	0.027	0.018
Independent:					
	Age				
Age	Age of the interviewee individual	41.72	41.61	39.81	39.48
Age_sq	Square of age / 100	19.02	18.83	17.55	17.26
	Civil Status				
Married	= 1 if married; 0 otherwise	0.583	0.554	0.596	0.574
	Education				
Edu_high	= 1 if university education; 0 otherwise	0.105	0.102	0.198	0.170
Edu_low	= 1 if primary or lower education; 0 otherwise	0.181	0.135	0.354	0.336
	Labour Status				
Employed	= 1 if employed; 0 otherwise	0.487	0.759	0.492	0.759
Work_hard	= 1 if the employed has a "hard work" *; 0 otherwise	0.094	0.224	0.073	0.254
	Health Insurance				
Insurance	= 1 if owner of a private health insurance; 0 otherwise	0.167	0.248	0.136	0.114
	Life Styles				
Curr_smoke	= 1 if current smoker; 0 otherwise	0.228	0.378	0.313	0.423
Past_smoke	= 1 if quitted smoking; 0 otherwise	0.168	0.250	0.128	0.201
Breakfast	= 1 if habitual breakfast; 0 otherwise	0.935	0.895	0.949	0.898
Nev_fish	= 1 if eats fish less than once a week or never; 0 otherwise	0.400	0.416	0.100	0.110
Nev_meat	= 1 if eats meat less than once a week or never; 0 otherwise	0.093	0.072	0.046	0.022
Nev_veget.	= 1 if eats vegetables less than once a week or never; 0 otherwise	0.028	0.055	0.056	0.097
Nev_fruit	= 1 if eats fresh fruits less than once a week or never; 0 otherwise	0.045	0.073	0.098	0.136
Nev_eggs	= 1 if eats eggs less than once a week or never; 0 otherwise	0.406	0.424	0.152	0.119
Nev_cereals	= 1 if eats bread & cereals less than once a week or never; 0 otherw.	0.006	0.004	0.055	0.032
Nev_milk	= 1 if eats dairy products less than once a week or never; 0 otherw.	0.035	0.042	0.030	0.038
Nev_pasta	= 1 if eats pasta, rice, potatoes less than once a week or never; 0 otherw.	0.522	0.492	0.335	0.328
Nev_legu	= 1 if eats legume less than once a week or never; 0 otherwise	0.536	0.536	0.164	0.124
Day_wine	= 1 if drinks wine on a daily basis; 0 otherwise	0.156	0.427	0.059	0.174
Day_beer	= 1 if drinks beer on a daily basis; 0 otherwise	0.022	0.115	0.023	0.118
Branch activ_1	= 1 if employed in the agriculture, hunting, silviculture and fishing industry; 0 otherwise	0.029	0.040	0.020	0.052
Branch activ_2	= 1 if employed in the manufacture and extractive industry; 0 otherwise	0.075	0.183	0.058	0.182
Branch activ_3	= 1 if employed in the construction industry; 0 otherwise	0.006	0.083	0.008	0.133
Branch activ_4	= 1 if employed in the whole and retail trade, motor vehicles reparation, personal goods, hotels and restaurants, transport, storage and communication industry; 0 otherwise	0.116	0.169	0.138	0.199
	Regional Variable				
Peers Effect	Regional average BMI level of a reference group **	23.30	25.38	24.39	25.93

Note: The reported means refer to each country's sub-sample of adults aged 18-65 (Italy N=14,515; Spain N=15,125) and are computed using sampling weights.

* "Hard work" is work that implies considerable physical exertion;

** The reference group is defined in terms of gender, age group and education level.

Source: "Encuesta Nacional de Salud 2003" (MSC) for Spain and "Indagine sugli Aspetti della Vita Quotidiana 2003" (ISTAT) for Italy.

4. Results

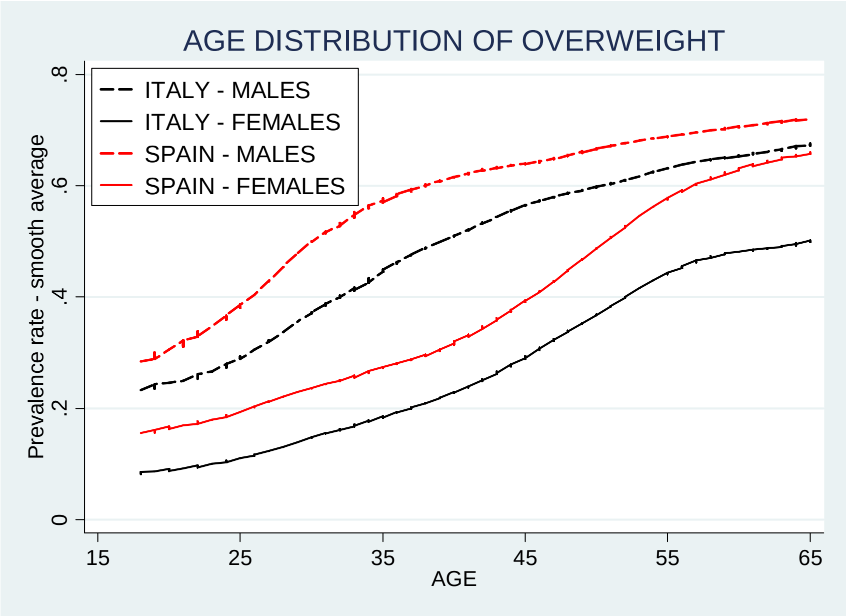
4.1 Descriptive evidence

In **Figure 2** we present the age distribution of the prevalence of self-reported overweight and obesity (classes 1 and 2) by gender and adults aged 18-65 in the two countries. According to this evidence, rates of overweight and obesity prevalence tend to increase as the individuals age up to a peak at, approximately, the age of 65 for both genders in the two countries, although this pattern is much more pronounced in the case of Spain. Rates of prevalence in Italy always lay well below the levels reached in Spain with a cross-country gap that remained largely constant for males, but which in the case of females widened principally at older ages. Paradoxically, obesity among Spanish females seems to exhibit a rate of prevalence that is double that of Spanish males and, interestingly, of Italian males and females as well. Therefore, we can conclude that there are major gender/age differences that require further examination.

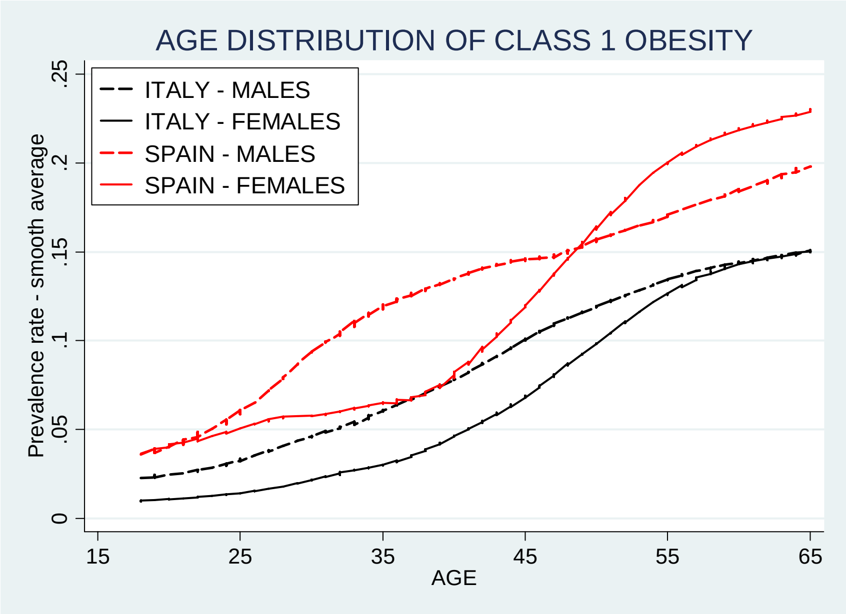
According to the data in **Table 1**, average “type 1” obesity prevalence in Italy for individuals aged 18-65 years old (7.6%) is well below that for similarly aged individuals in Spain (11.8%), approximately 4.2 percentage points (36%). The gap is not so great in absolute terms for “type 2”, but in relative terms is more than 50% lower. However, as in the case of overweight the relative gap is much lower. Hence, Italy differs markedly from Spain in the fact that there are fewer overweight and obese women throughout the entire life-cycle. Hence, our data suggest the existence of a life-cycle pattern in the generation of overweight and obesity by gender which might well be due to the interplay of a set of determinants that differs between both populations.

Figure 2. Overweight and Obesity incidence over the life cycle: Spain vs. Italy by gender in 2003

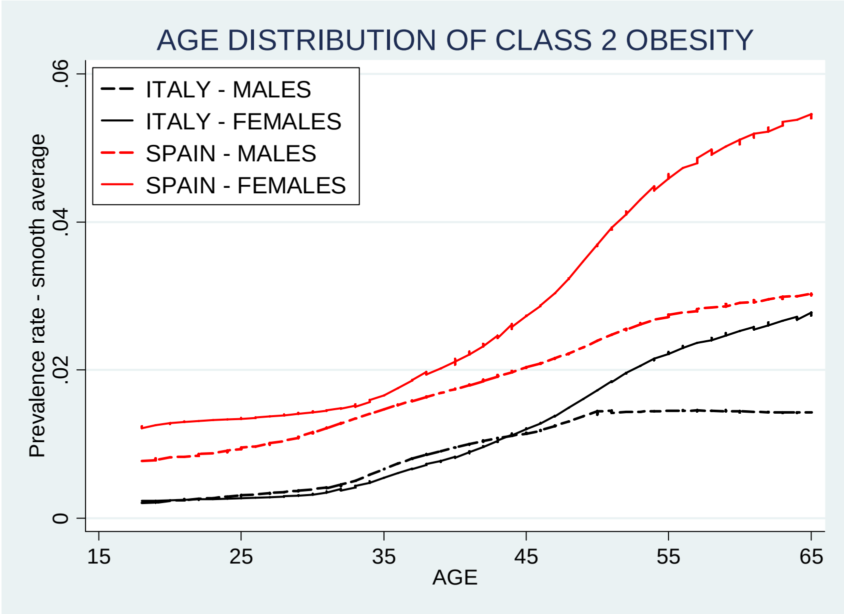
Panel A: Overweight



Panel B: Class 1 obesity



Panel C: Class 2 obesity



Source: "Encuesta Nacional de Salud 2003" (MSC) for Spain and "Indagine sugli Aspetti della Vita Quotidiana 2003" (ISTAT) for Italy. *Note:* Plots are obtained by running locally weighted regressions of the obesity indicator on age.

Table 1 also offers comparative information regarding the determinants of obesity. For instance, our sample highlights interesting differences in the self-report eating habits between two countries subject to similar general dietary patterns. While 10% of the Spanish population report consuming fish less than once a week or not at all, this proportion rises to more than 40% among the Italian population. In the case of meat, roughly 4% of Italians eat meat on a daily or on more than a daily basis, while 19% of Spanish people declare a similar frequency of consumption. Likewise, while 41% (54%) of Italians declare a low consumption rate of eggs (legumes) or less than once a week or never, a modest 13% (14%) of Spanish subjects report this frequency of consumption, respectively. Interestingly, both counties show very high and moderate levels of declared daily consumption of fruits and vegetables, respectively.[9] In terms of age, the Spanish sample is on average two years

[9] This evidence is compatible with the high levels of consumption of fruits and vegetables registered in both countries, well above the minimum recommended intake level of 400 grams/day (Branca *et al.*, 2007).

younger (39.6 vs. 41.7) owing to a larger share of individuals younger than 30 years of age. Interestingly, Spain has a more highly educated population (18.4% vs. 10.4%), but at the same time more people with low levels of educational attainment (34.5% vs. 15.8%). Employed status appears to be similar in both countries, as does the proportion of people with jobs that require considerable physical exertion. In the case of other lifestyles, Spain has a larger share of smokers (36.8%) than Italy (30.3%) while there is a larger number of those who have given up smoking in Italy (21% vs. 16.4%). Strikingly, our sample also shows a remarkably higher proportion of Italians that report drinking wine on a daily basis (29% vs. 11.6%). Finally, as for sector specific employment, we find that proportions are, on average, approximately similar. One of the advantages of using data from Italy and Spain lies in its regional heterogeneity. Given that our database is representative at the regional level, we were able to draw upon regional-specific differences to construct our peer effect variable, namely median BMI of the reference group defined by gender and age at the regional level.

To explore the determinants of obesity in each country, we ran two sets of probit regression models for the probability of being overweight (or pre-obese), obese and severely obese, comprising the full set of explanatory variables described in **Table 1**. Tables A1-2 in the appendix report the marginal effects of each determinant on the probability of each condition by gender in Italy and Spain, respectively. All models exhibited reasonable goodness of fit. As expected, the marginal effects exhibited the expected signs when estimated with acceptable precision. We found a statistically significant non-linear effect of age on the prevalence of overweight, and the same pattern was found for obesity class 1 (except for Italian men) and obesity class 2 (except for women). That is, in general overweight and obesity increase as people age until a peak is reached and then they decline. In comparative terms, it is worth noting that this age effect is stronger in the case of Spain for each obesity class and for both genders. Moreover, our results support the finding that the age impact declines in both countries as the severity of the condition increases.

Education is another important determinant of overweight and obesity. Having a university education reduces the probability of class 1 obesity in both countries and for both genders, this effect being comparatively higher in the case of Spanish women. Interestingly, education does not have a statistically significant impact on the prevalence of severe obesity in either country for men, while having a university degree only reduces this condition among the subpopulation of Spanish women. It is also worth noting that being employed has a negative impact on the probability of class 1 and class 2 obesity among Italian women and class 2 obesity among both Italian and Spanish men. In the case of lifestyles, our findings indicate that being an active smoker reduces the probability of being overweight (with the exception of Italian men), but does not influence the chances of being obese in either Italy or in Spain; yet, having smoked in the past increases class 1 and class 2 obesity among Italian women and class 1 obesity among Spanish men. Strikingly, dietary habits show that those that never eat fish in Spain are more likely to suffer from class 1 obesity (females) or class 2 obesity (men). Almost no consumption of fruit is found to have a positive influence on the occurrence of class 1 and 2 obesity among the female population in Spain.[10]

[10] This result is compatible with the finding that higher intakes of fruits and vegetables are linked to a lower risk of becoming obese among middle-aged women, after adjusting for age and other lifestyle covariates (He *et al.*, 2004).

4.2 Decomposition of cross-country obesity gaps: general population

Having identified the determinants of overweight and obesity in each country, we next report the results of cross-country gaps in the prevalence of overweight (pre-obesity) and obesity type by gender in **Table 2**. Overweight and obesity gaps that are statistically significant at 5% are larger among females than they are among males irrespective of the condition considered. This evidence suggests that differences in the characteristics of Italian women with respect to their Spanish counterparts are likely to be important in understanding this cross-country gap in overweight and obesity prevalence.

Table 2 shows Fairlie's decomposition of the cross-country gaps in overweight and the two obesity classes. We conducted the decomposition by gender, alternatively excluding and including the control for peer effects. The set of determinants we inserted in the model are able to explain, depending on the obesity type considered, between 34 and 51% of the overall cross-country gaps (i.e., the "explained part" or due to differences in the distribution of characteristics) when no peer effects were included, but this percentage rises to between 65 and 83% when the peer effects are controlled for. When no peer effects are included, country differences in eating behaviour explain 38 and 26% of the cross-country gaps in overweight among men and women respectively, while education explains 20% of the cross-country overweight gaps among women but not among men. Interestingly, whilst the contribution of education increases to 21-26% for the obesity class 1 gap and the effect of eating habits stays at 16%, about 40% of cross-country gaps in obesity class 2 among men are explained by eating habits and 24% among women, although in the case of the latter group education explains as much as 28% of the class 2 obesity gaps. Overall, our results indicate that there are significant lifestyle factors contributing to make Spanish people more obese than their Italian counterparts. This result is consistent with, for instance, Cutler *et al.* (2003) and Bleich *et al.* (2007) who suggest that an excess of caloric intake might be the factor responsible for the rise of obesity. However, when peer effects were included in the model, we found that they alone explain between 46 and 76% of total cross-country variability and that they override the effect of other covariates.

Table 2. Probit Decomposition of Cross-country Gaps in Overweight & Obesity by Gender

	Overweight				Class 1 Obesity				Class 2 Obesity			
	Male		Female		Male		Female		Male		Female	
Spanish prevalence rate (*)	0.448		0.265		0.128		0.117		0.018		0.028	
Italian prevalence rate (*)	0.411		0.210		0.087		0.066		0.010		0.012	
Spain/Italy gap	**0.038**		**0.055**		**0.041**		**0.052**		**0.009**		**0.016**	
Contributions on Overw./Obesity Gap:	Coeff.	%	Coeff.	%	Coeff.	%	Coeff.	%	Coeff.	%	Coeff.	%
Age	**-0.0053**	-14%	**-0.0008**	-1%	**-0.0028**	-7%	**-0.0015**	-3%	-0.0006	-7%	-0.0004	-3%
Married	**0.0032**	8%	**0.0010**	2%	**0.0009**	2%	0.0000	0%	-0.0001	-1%	-0.0002	-1%
Education	-0.0008	-2%	**0.0108**	20%	**0.0085**	21%	**0.0134**	26%	*0.0014*	16%	**0.0045**	28%
Employed + Phys. Exertion at work	0.0007	2%	-0.0002	0%	*-0.0007*	-2%	-0.0003	-1%	-0.0005	-5%	-0.0002	-1%
Branch of Activity	**0.0026**	7%	-0.0004	-1%	0.0008	2%	-0.0003	-1%	0.0008	9%	-0.0001	-1%
Insurance	0.0007	2%	**0.0020**	4%	0.0015	4%	**0.0015**	3%	0.0002	2%	0.0003	2%
Smoking	**-0.0017**	-4%	**-0.0020**	-4%	*-0.0007*	-2%	-0.0002	0%	-0.0002	-2%	-0.0001	-1%
Eating habits	**0.0143**	38%	**0.0144**	26%	**0.0067**	16%	**0.0082**	16%	**0.0035**	39%	**0.0039**	24%
All vars. Included (total explained)	0.014	36%	0.025	45%	0.014	34%	0.021	40%	0.005	51%	0.008	47%
Contributions on Overw./Obesity Gap:	Coeff.	%	Coeff.	%	Coeff.	%	Coeff.	%	Coeff.	%	Coeff.	%
Age	**-0.0034**	-9%	**-0.0006**	-1%	-0.0002	0%	**-0.0006**	-1%	0.0000	0%	0.0000	0%
Married	**0.0031**	8%	**0.0008**	1%	**0.0008**	2%	0.0001	0%	-0.0001	-1%	-0.0003	-2%
Education	-0.0039	-10%	-0.0006	-1%	0.0027	6%	0.0008	1%	0.0004	4%	0.0007	5%
Employed + Phys. Exertion at work	0.0008	2%	-0.0002	0%	-0.0005	-1%	-0.0003	-1%	-0.0008	-9%	-0.0003	-2%
Branch of Activity	*0.0025*	6%	-0.0004	-1%	0.0006	1%	-0.0003	-1%	0.0009	10%	-0.0001	-1%
Insurance	-0.0001	0%	**0.0016**	3%	0.0005	1%	**0.0011**	2%	0.0001	1%	0.0002	1%
Smoking	**-0.0016**	-4%	**-0.0021**	-4%	-0.0006	-1%	-0.0005	-1%	-0.0002	-2%	-0.0002	-1%
Eating habits	0.0069	18%	0.0050	9%	-0.0022	-5%	-0.0008	-2%	0.0021	24%	0.0011	7%
Peer effects	**0.0206**	54%	**0.0408**	74%	**0.0264**	64%	**0.0396**	76%	**0.0041**	46%	**0.0121**	76%
All vars. Included (total explained)	0.025	65%	0.044	81%	0.027	67%	0.039	75%	0.007	74%	0.013	83%

Note: (*) Unweighted overweight and obesity prevalence rates. To perform the decomposition a (unweighted) probit regression model on a pooled sample was run to derive the β coefficients (not shown). Contribution estimates are the mean values of the decomposition using 100 subsamples of Spanish. The order of the variables in each replication has been randomised. Coefficients statistically significant at 5% (10%) are in bold (italic) typeface.

4.3 Decomposition of cross-country class 1 obesity gaps by age groups and gender

Figure 2 not only shows markedly different patterns between men and women, but also quite distinct age specific effects in the case of obesity. Therefore, in this section we concentrate our analysis on the decomposition of cross-country gaps in class 1 obesity by age groups and gender. Our results indicate that **c**ross-country class 1 obesity gaps for Spanish and Italian men lie in the range of 3-4% for the youngest and oldest age groups and rise to 5.4% for those in the middle cohort (36-50 year olds) (Table 3). However, among women these differences are much greater and increase progressively, reaching 8 percentage points in the 51-65 age group.

On examining the contributing factors, we found that the explained part of the cross-country gap for men varies significantly from one age group to another: from as much as 51% for younger adults to just 15% for the older adults. However when peer effects were introduced we found that the differences in the distribution of characteristics (independent variables) explain between 70-84% of the cross-country gap in class 1 obesity (Table 3). A similar pattern was found for women: the explained part of the total gap ranges between 35-49% without peer effects and between 70-100% when these effects are included (Table 4).

Moreover, Table 3 reveals that for men, at early ages, cross-country differences in class 1 obesity are mainly explained by eating behaviour, in middle adulthood both eating behaviour and education play a role, while in later adulthood gaps are explained by education alone. A different pattern was found for women: in early adulthood 26% of the class 1 obesity gap can be explained by education while eating habits explain just 16%, education alone explains 38%

in middle adulthood, and both education and eating habits explain 22-24% of the gap in latter adulthood. Here again, the introduction of peer effects overrides education and eating habits in explaining gaps in obesity rates.

Table 3. Probit Decomposition of Cross-country Gaps in Obesity by Age Cohorts. (Males only)

	Class 1 Obesity. Male					
	Age cohort 18-35		**Age cohort 36-50**		**Age cohort 51-65**	
Spanish prevalence rate (*)	0.072		0.143		0.181	
Italian prevalence rate (*)	0.037		0.088		0.143	
Spain/Italy obesity gap	**0.035**		**0.054**		**0.038**	
Contributions on obesity gap:	Coeff.	%	Coeff.	%	Coeff.	%
Married	-0.0004	-1%	**0.0027**	5%	-0.0002	0%
Education	0.0040	11%	**0.0104**	19%	**0.0163**	43%
Employed + Phys. Exertion at work	0.0001	0%	0.0004	1%	-0.0015	-4%
Branch of Activity	-0.0004	-1%	0.0022	4%	0.0005	1%
Insurance	**0.0020**	6%	0.0006	1%	-0.0009	-2%
Smoking	0.0003	1%	0.0004	1%	-0.0011	-3%
Eating habits	**0.0122**	35%	0.0083	15%	-0.0072	-19%
All vars. included (total explained)	0.018	51%	0.025	46%	0.006	15%
Contributions on obesity gap:	Coeff.	%	Coeff.	%	Coeff.	%
Married	-0.0002	0%	**0.0021**	4%	-0.0002	-1%
Education	-0.0014	-4%	0.0038	7%	0.0012	3%
Employed + Phys. Exertion at work	0.0003	1%	0.0002	0%	-0.0010	-3%
Branch of Activity	-0.0008	-2%	0.0018	3%	0.0001	0%
Insurance	0.0013	4%	-0.0011	-2%	-0.0026	-7%
Smoking	0.0003	1%	-0.0002	0%	-0.0008	-2%
Eating habits	0.0037	11%	-0.0073	-13%	**-0.0196**	-51%
Peer Effects	**0.0260**	74%	**0.0459**	85%	**0.0498**	130%
All vars. included (total explained)	0.029	83%	0.045	84%	0.027	70%

Note: (*) Unweighted obesity prevalence rates. To perform the decomposition a (unweighted) probit regression model on a pooled sample was run to derive the β coefficients (not shown). Contribution estimates are the mean values of the decomposition using 100 subsamples of Spanish. The order of the variables in each replication has been randomised. Coefficients statistically significant at 5% (10%) are in bold (italic) typeface.

Table 4. Probit Decomposition of Cross-country Gaps in Obesity by Age Cohorts: (Females only)

	Class 1 Obesity. Female					
	Age cohort 18-35		Age cohort 36-50		Age cohort 51-65	
Spanish prevalence rate (*)	0.051		0.102		0.215	
Italian prevalence rate (*)	0.016		0.053		0.139	
Spain/Italy obesity gap	**0.035**		**0.049**		**0.076**	
Contributions on obesity gap:	Coeff.	%	Coeff.	%	Coeff.	%
Married	**-0.0020**	-6%	-0.0004	-1%	-0.0003	0%
Education	**0.0091**	26%	**0.0185**	38%	**0.0165**	22%
Employed + Phys. Exertion at work	0.0004	1%	0.0005	1%	-0.0012	-2%
Branch of Activity	-0.0004	-1%	-0.0012	-2%	0.0000	0%
Insurance	0.0001	0%	**0.0016**	3%	**0.0027**	4%
Smoking	0.0010	3%	-0.0015	-3%	0.0015	2%
Eating habits	*0.0055*	16%	-0.0004	-1%	**0.0185**	24%
All vars. included (total explained)	0.014	40%	0.017	35%	0.038	49%
Contributions on obesity gap:	Coeff.	%	Coeff.	%	Coeff.	%
Married	**-0.0021**	-6%	-0.0005	-1%	-0.0002	0%
Education	0.0001	0%	-0.0031	-6%	-0.0016	-2%
Employed + Phys. Exertion at work	0.0006	2%	0.0005	1%	-0.0015	-2%
Branch of Activity	-0.0003	-1%	*-0.0013*	-3%	0.0002	0%
Insurance	0.0000	0%	**0.0013**	3%	*0.0019*	3%
Smoking	0.0006	2%	-0.0016	-3%	-0.0009	-1%
Eating habits	0.0010	3%	**-0.0096**	-20%	-0.0033	-4%
Peer Effects	**0.0240**	70%	**0.0473**	96%	**0.0827**	109%
All vars. included (total explained)	0.024	70%	0.033	67%	0.077	100%

Note: (*) Unweighted obesity prevalence rates. To perform the decomposition a (unweighted) probit regression model on a pooled sample was run to derive the β coefficients (not shown). Contribution estimates are the mean values of the decomposition using 100 subsamples of Spanish. The order of the variables in each replication has been randomised. Coefficients statistically significant at 5% (10%) are in bold (italic) typeface

5. Discussion

This paper has attempted to address the unexplored question of what lies behind cross-country differences in overweight and obesity prevalence rates so as to clarify the role played by traditional education and lifestyles as well as by environmental factors, in this instance peer effects. In seeking to answer this question we have undertaken an empirical study of two countries, Italy and Spain, that in 1990 reported similar rates of obesity, but which surprisingly in 2003 presented a 5% gap approximately in their respective prevalence rates. We have performed a non-linear decomposition of this obesity (and overweight) gap, first with, and then without taking into account, these peer effects, on the understanding that cross-country differences in obesity should shed some light on the factors underpinning the obesity epidemic. Comparing Italy and Spain is a particularly relevant exercise as both countries are exposed to similar Mediterranean conditions, including the much written about Mediterranean diet, and enjoy similar levels of technology and socio-economic development, but the two countries are subject to significantly different social norms and values regarding body shape and, accordingly, their behaviour towards food differs markedly.

Both descriptive analyses and statistical inferences based on multivariate methods suggest that certain health production factors, including lifestyles, employment and education, are likely to influence obesity and its different classes. Our results suggest that country specific socio-environmental effects may explain these differences in obesity. These effects involve the different cultural responses to the common pressures to which both Italy and Spain have been subjected, namely the processes of European integration and globalisation and associated changes in lifestyles and habits. Indeed, our findings suggest that when socio-environmental factors are not accounted for, cross-country gaps in overweight and obesity among men and women can be largely explained by differences in lifestyles and education, although different behavioural patterns were identified between genders.

However, the explanatory power of these factors weakens when the socio-environment is controlled for through peer effects, regardless of age group and gender. Age specific effects are interesting and indicate that obesity peaks at the age of 55-65 irrespective of the country and gender under review. But, the effect on prevalence among Spanish females is twice that among Spanish males and, interestingly, among Italians of both genders. The main factor accounting for this difference appears to be related to lifestyles and education, especially at older ages. One explanation of these effects might lie in the different impact of the social values attached to keeping in good shape and being fit in the two countries, and the consequent effect this has on lifestyles. Other explanations might include the growing consumption of processed foods as people struggle to find time to prepare their own meals as well as a rising dependence on comfort foods. All in all, these results imply that preventive policies have a key role to play in improving lifestyles in those countries that exhibit marked increases in rates of obesity. And yet obesity prevention also needs to influence environmental sources of social health learning, and more specifically the role of social norms, which we have shown as being country specific.

Finally, a certain degree of caution must be adopted in interpreting our results given that this is the first attempt to decompose cross-country obesity rates. One variable that might influence the robustness of our results is the use of self-reported weight and height data as they are clearly subject to a degree of measurement error or prone to misreporting behaviour. However, this problem is perhaps partly offset by the exclusion from our sample of individuals aged 65 and over, typically the main source of misreporting owing to their relatively high levels of co-morbidities. Other caveats worth mentioning that might have had an impact on our results include the quality of information, which was far from complete and which might result in some sources of heterogeneity in lifestyle and eating habits, omnipresent in many social science surveys.

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Table A1. Marginal Effects for Overweight & Obesity Covariates (Females only)

	Overweight		**Class 1 Obesity**		**Class 2 Obesity**	
	ITALY	**SPAIN**	**ITALY**	**SPAIN**	**ITALY**	**SPAIN**
Age	**0.0103**	**0.0100**	**0.0057**	**0.0065**	0.0008	0.0010
Age_sq	**-0.0092**	**-0.0073**	**-0.0051**	**-0.0064**	-0.0008	-0.0012
Married	**0.0467**	**0.0309**	-0.0049	0.0103	**-0.0047**	-0.0023
Edu_high	-0.0208	**-0.0422**	**-0.0198**	**-0.0364**	-0.0026	**-0.0139**
Edu_low	*0.0263*	-0.0081	-0.0030	0.0153	-0.0002	0.0057
Employed	-0.0063	-0.0047	**-0.0160**	-0.0101	**-0.0049**	-0.0020
Work_hard	0.0232	*0.0328*	0.0042	-0.0124	-0.0052	*-0.0060*
Curr_smoke	**-0.0296**	**-0.0555**	0.0042	**-0.0267**	0.0013	-0.0047
Past_smoke	-0.0060	-0.0238	**0.0205**	**-0.0269**	**0.0059**	-0.0051
Breakfast	-0.0213	-0.0412	-0.0096	**-0.0355**	-0.0017	-0.0109
Nev_meat	-0.0079	-0.0225	*-0.0129*	-0.0065	-0.0027	0.0003
Nev_fish	-0.0034	-0.0110	0.0016	**0.0268**	-0.0008	0.0023
Nev_vege	-0.0061	0.0312	0.0005	0.0023	-0.0017	0.0016
Nev_fruit	-0.0153	-0.0218	-0.0117	**0.0336**	-0.0011	**0.0069**
Nev_eggs	-0.0008	0.0156	0.0041	-0.0021	0.0006	-0.0017
Nev_cereals	-0.0386	0.0193	-0.0298	**0.0301**	---	0.0082
Nev_milk	0.0357	0.0308	0.0211	-0.0156	0.0026	0.0056
Nev_pasta	**0.0171**	**0.0265**	0.0066	**0.0160**	*0.0018*	0.0027
Nev_legu	-0.0156	-0.0002	0.0041	**0.0227**	-0.0009	0.0057
Day_wine	0.0064	0.0061	**-0.0154**	-0.0233	**-0.0034**	-0.0034
Day_beer	-0.0261	-0.0493	*-0.0258*	-0.0268	-0.0028	*-0.0150*
Insurance	-0.0184	**-0.0337**	-0.0068	**-0.0283**	-0.0006	-0.0038
Branch activ_1	-0.0048	0.0468	0.0103	0.0211	---	0.0094
Branch activ_2	-0.0217	-0.0206	**0.0211**	-0.0084	**0.0161**	-0.0019
Branch activ_3	-0.0991	*-0.1030*	---	-0.0077	---	0.0356
Branch activ_4	-0.0256	-0.0082	0.0045	-0.0126	0.0016	-0.0039
Peers Effect	**0.0352**	**0.0268**	**0.0169**	**0.0247**	**0.0033**	**0.0059**
No. Of Obs.	6,944	7,813	6,909	7,813	6,673	7,813
Pseudo R^2	0.080	0.067	0.125	0.129	0.140	0.106
Obs. P	0.210	0.265	0.066	0.117	0.013	0.028
(Pred. P)	0.190	0.249	0.043	0.087	0.006	0.017

Note: Standard errors adjusted for clustering on region nominal variable. Statistical significance at 5% (10%) in bold (italic) typeset.

Table A2. Marginal Effects for Overweight & Obesity Covariates (Males only)

	Overweight		Class 1 Obesity		Class 2 Obesity	
	ITALY	**SPAIN**	**ITALY**	**SPAIN**	**ITALY**	**SPAIN**
Age	**0.0146**	**0.0215**	0.0018	**0.0083**	**0.0012**	**0.0017**
Age_sq	**-0.0119**	**-0.0210**	-0.0012	**-0.0088**	**-0.0013**	**-0.0017**
Married	**0.0687**	**0.0922**	**0.0184**	0.0117	-0.0009	-0.0023
Edu_high	0.0023	*-0.0309*	**-0.0230**	**-0.0214**	-0.0050	-0.0044
Edu_low	-0.0047	-0.0231	*-0.0102*	**0.0222**	0.0017	0.0006
Employed	0.0310	0.0101	0.0005	-0.0134	**-0.0059**	**-0.0131**
Work_hard	0.0123	-0.0045	0.0006	-0.0124	-0.0020	0.0027
Curr_smoke	0.0171	**-0.0321**	0.0000	-0.0043	-0.0007	-0.0015
Past_smoke	0.0373	0.0200	-0.0008	**0.0225**	0.0021	0.0002
Breakfast	**-0.0178**	**-0.0021**	**-0.0440**	**-0.0559**	-0.0037	**-0.0094**
Nev_meat	0.0036	-0.0857	*-0.0237*	-0.0108	0.0001	-0.0061
Nev_fish	0.0166	-0.0047	-0.0017	0.0185	0.0002	**0.0117**
Nev_vege	-0.0089	-0.0241	-0.0177	-0.0013	0.0003	-0.0002
Nev_fruit	0.0312	-0.0032	0.0078	-0.0150	0.0059	-0.0022
Nev_eggs	-0.0024	0.0125	**0.0153**	0.0165	0.0001	-0.0004
Nev_cereals	0.0175	**0.0904**	---	0.0220	---	0.0137
Nev_milk	-0.0104	-0.0495	-0.0125	-0.0122	---	0.0024
Nev_pasta	0.0068	*-0.0229*	0.0075	**0.0273**	0.0014	*0.0047*
Nev_legu	-0.0097	0.0108	0.0024	0.0185	**-0.0038**	0.0032
Day_wine	0.0026	0.0188	-0.0052	-0.0070	**-0.0044**	-0.0016
Day_beer	*0.0404*	-0.0229	0.0056	0.0026	0.0005	-0.0023
Insurance	-0.0093	*0.0287*	-0.0030	0.0086	0.0000	-0.0002
Branch activ_1	0.0427	0.0590	0.0071	**0.0370**	**0.0097**	**0.0117**
Branch activ_2	**-0.0319**	0.0275	*-0.0135*	-0.0095	*0.0050*	-0.0042
Branch activ_3	*0.0324*	0.0213	-0.0113	-0.0081	0.0030	0.0027
Branch activ_4	0.0195	0.0044	-0.0110	**0.0329**	0.0030	0.0104
Peers Effect	**0.0386**	**0.0173**	**0.0361**	**0.0340**	**0.0032**	**0.0050**
No. Of Obs.	6,702	7,312	6,803	7,312	6,415	7,312
Pseudo R^2	0.044	0.038	0.081	0.063	0.102	0.063
Obs. P	0.411	0.448	0.087	0.128	0.010	0.018
(Pred. P)	0.405	0.445	0.070	0.112	0.005	0.014

Note: Standard errors adjusted for clustering on region nominal variable. Statistical significance at 5% (10%) in bold (italic) typeset.