

Prevalence of overweight and obesity in rural and urban settings of 10 European countries

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Abstract

Objectives. First to explore differences in prevalence of overweight and obesity between rural and urban areas of 10 European countries, then to determine whether body mass index varies with the countries' gross domestic product.

Methods. We used baseline data (2004) from countries participating in the Study of Health, Ageing and Retirement in Europe, which included 16,695 non-institutionalized individuals aged 50–79 years with body mass index ≥ 18.5 kg/m². Height and weight were self-reported and body mass index categorized as normal weight (18.5–24.9 kg/m²), overweight (25.0–29.9 kg/m²) and obesity (≥ 30 kg/m²). Weighted prevalences of overweight and obesity in rural and urban areas were estimated, and logistic regressions performed to investigate the association between rural residence and body mass index, adjusting for age, sex, household income and education. Spearman's correlation examined the relationship between body mass index and gross domestic product.

Results. We found no differences in the prevalence of overweight and obesity between rural and urban areas. Separate analysis by gender, age, education or income level did not reveal additional rural–urban variations. Body mass index was slightly higher when gross domestic product was lower.

Conclusions. Programs aimed at preventing or managing overweight and obesity in the 50–79 years age range should be addressed to residents of both rural and urban areas, but tailored to their specific characteristics.

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Introduction

The prevalence of obesity may differ significantly between regions of the same country (Tran et al., 1998; Willms et al., 2003) often reflecting unfavorable socio-economic status and/or environmental conditions. In developing countries with the lowest gross domestic product (GDP), residents of urban regions are more likely to be overweight or obese than people living in rural areas. With increasing GDP, however, this variation decreases and the

prevalence of obesity in rural and urban regions converges in most countries. This trend may be due to economic growth that starts first in cities and progressively extends to rural regions (Mendez et al., 2005).

In contrast to developing countries with low GDP, many western countries show a greater regional distribution of obesity in rural areas. Studies from Sweden, Germany, Canada and the United States suggest that the prevalence of obesity may be higher in rural than in urban settings (Boehm et al., 2005; Borders et al., 2006; Jackson et al., 2005; Kettle et al., 2005; Rasmussen et al., 1999; Reeder et al., 1997). Borders et al. (2006) also showed that in Texas (US), the odds for being obese were higher in rural regions compared to central cities. In that study, however, within the urban environment, people living in the center of a city showed the same lower tendency toward excess weight as those living in counties adjacent to a city. This

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is somewhat surprising since suburban environments may be regarded as obesogenic (Kushi, 2006).

In the US, some regions appear to be more affected by poverty than others and its residents may be particularly disadvantaged with respect to opportunities for physical activity, healthy nutrition and health care (Jackson et al., 2005; Patterson et al., 2004; Tai-Seale and Chandler, 2003). Hence, information about the regional distribution of obesity is needed in order to tailor public health interventions directed to the management and prevention of the obesity epidemic. To date, however, no study has contrasted rural–urban prevalence of overweight and obesity across European countries, using standardized questionnaires. In this study, we aimed at comparing rural and urban prevalence of overweight and obesity across 10 European countries. We also explored whether body weight changed in accordance with changing GDP, in these 10 countries.

Methods

Data source, setting and participants

This study involved the secondary analysis of data from the Survey of Health, Ageing and Retirement in Europe (SHARE), a new international data source on ageing (Börsch-Supan and Jürges, 2005a; Börsch-Supan et al., 2005). Nationally representative samples (Börsch-Supan and Jürges, 2005b) of non-institutionalized individuals aged 50 years and over were drawn from 10 European countries (Austria, Denmark, France, Germany, Greece, Italy, the Netherlands, Spain, Sweden, Switzerland), and baseline data collection organized in 2004. An overall response rate of 61.8% was obtained, varying across countries from 50.2% to 73.6%, except in Switzerland (37.6%) (Börsch-Supan et al., 2005). SHARE data were self-reported and collected through standardized face-to-face interviews (entire generic English and translated survey questionnaires available online: <http://www.share-project.org/>). Of the 19,123 non-institutionalized individuals aged 50 years and over participating in SHARE, we excluded 548 individuals due to missing or implausible information regarding height, weight, or body mass index. We also excluded 170 underweight (body mass index (BMI) <18.5 kg/m²) individuals as extreme cases in this age range. Indeed, underweight participants represented only 1% of the total sample and their exclusion did not change the prevalence estimates. Individuals aged 80 years and over were not included because a sizable proportion of this population does not live in the community, and their proportion may be related to BMI as well as to the rural/urban nature of residence. Our working sample size therefore consisted of 16,695 individuals aged 50–79 years, with a BMI ≥ 18.5 kg/m².

Measures

Height and weight were used to compute BMI, which was divided into three categories: normal weight (BMI 18.5–24.9 kg/m²), overweight (BMI 25.0–29.9 kg/m²) and obesity (BMI ≥ 30 kg/m²). We will use the term of excess weight (BMI ≥ 25.0 kg/m²) when referring both to overweight and obese individuals.

The rural–urban variable was developed from a single question on the survey, answered primarily by the trained interviewer: “In which type of area is the building located? A big city; the suburbs or outskirts of a big city; a large town; a small town; a rural area or village?”. If the interview did not take place at home, the participant was asked a similar question: “How would you describe the area where you live?”, using the same response categories. Big cities, their suburbs or outskirts, and large and small towns are difficult to truly separate in Europe. Therefore, we decided a priori to dichotomize (0/1) that variable into urban and rural, the latter including only people living in a rural area or a village. We hypothesized that rural areas or villages would be more accurately defined, and therefore less prone to misclassification.

Statistical analysis

For each country, we first described the population and estimated the prevalence of overweight and obesity in rural and urban areas. Then we stratified the prevalence analyses individually by gender, age category (50–64 years or 65–79 years), income level (< or > median income) and education (< or ≥ 12 years) in order to detect possible rural–urban differences in the prevalence of overweight and obesity. Finally, we built multivariate logistic regression models to examine the relation between BMI and rural residence (reference: normal weight), adjusting for i) age, gender, and ii) age, gender, years of education and purchasing power parity-household income (euros) adjusted for the size of the household (ppp-household income) (Huisman et al., 2003). The relationship between BMI and GDP was explored using the Spearman’s correlation coefficient.

None of the variables considered had ≥ 2% missing data. All analyses were performed on weighted data (age, gender and non-response), using Stata 8.0. *P*-values < 0.05 were considered significant.

Results

Characteristics of the study populations are presented in Table 1. Except for the participants’ mean age and the proportion of women included, all other variables showed significant differences across countries (*P*-values of Chi-squared test: < 0.001). According to SHARE, 43.5% of Europeans aged 50 to 79 years were overweight and 18.2% were obese (Table 2). The estimated prevalence of overweight and obesity across countries highlights that Austria, Greece and Spain had the highest prevalence of obesity, ranging from 19.9% to 24.0%.

Fig. 1 shows that, except for Greece, the rural and urban prevalences of overweight and obesity in the 10 countries were essentially equal. Only in Greece was the 29% rate of rural obesity significantly higher than the 20% for urban obesity. The prevalence of excess weight was significantly higher when gross domestic product (GDP) per capita (US\$, purchasing power parity) (OECD, 2005) was lower (Spearman’s rho = −0.09, *P*-value < 0.001). In none of the countries were rural–urban differences apparent when separate prevalence estimations were performed by gender, age, education or income level. In addition, BMI was normally distributed with a similar pattern in both rural and urban areas (rural mean 26.7 kg/m², 95% confidence interval (CI): 26.5, 26.9; urban mean 26.6 kg/m², 95% CI: 26.5, 26.7).

Table 3 shows the adjusted odds ratios for overweight and obesity according to rural residence, relative to normal weight individuals. The only significant association (Greece: obesity OR 1.5, 95% CI: 1.0, 2.2, *P*-value 0.035) disappeared after further adjustment for education and household income.

Discussion

We found no differences in the prevalence of overweight and obesity between rural and urban areas of 10 European countries, except in Greece. In this country however, the difference was explained by socio-economic factors.

We hypothesize that the absence of urban–rural differences may relate to the high GDP of these European countries. Indeed, no or only small differences in prevalence of obesity between rural and urban environments are also found in developing countries with relatively high GDP (e.g., Mexico, Brazil,

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