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Socio-economic status and body mass index in low-income Mexican adults

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Abstract

The study reported here explored the associations of body mass index (BMI), socio-economic status (SES), and beverage consumption in a very low-income population. A house-to-house survey was conducted in 2003 of 12,873 Mexican adults. The sample was designed to be representative of the poorest communities in seven of Mexico's 31 states.

Greater educational attainment was significantly associated with higher BMI and a greater prevalence of overweight ($25 \leqslant BMI < 30$) and obesity ($30 \leqslant BMI$) in men and women. The combined prevalence of overweight and obesity was over 70% in women greater than the median age of 35.4 years with at least some primary education compared with a prevalence of 45% in women below the median age with no education. In both sexes, BMI was positively correlated with education, occupation, quality of housing conditions, household assets, and subjective social status. BMI and household income were significantly correlated in women but not in men. In the models including all SES variables, education, occupation, housing conditions and household assets all contributed independently and significantly to BMI, and household income and subjective social status did not.

Increased consumption of alcoholic and carbonated sugar beverages was associated with higher SES and higher BMI. Thus, in spite of the narrow range of socio-economic variability in this population, the increased consumption of high calorie beverages may explain the positive relationship between SES and BMI.

The positive associations between SES and BMI in this low-income, rural population are likely to be related to the changing patterns of food availability, food composition, consumption patterns and cultural factors. Contextually sensitive population-level interventions are critically needed to address obesity and overweight in poor populations, particularly in older women.

Keywords: Nutrition transition; Socio-economic status (SES); Social status; Poverty; Mexico; Body mass index (BMI)

Introduction

The prevalence of overweight or obesity in Mexico is over 60% in women and 50% in men, and these estimations of prevalence are as high in adults from poor rural areas as they are in a nationally representative sample of adults (Fernald et al., 2004). Obesity is a serious, chronic condition that contributes to numerous preventable diseases, including hypertension, diabetes and cardiovascular disease (Hill, Catenacci, & Wyatt, 2006), which are already present in a large number of Mexicans (Aguilar-Salinas et al., 2003). It has been estimated that 60% of the burden of chronic diseases will occur in developing countries by 2020 (WHO,

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2002). A critical remaining concern is whether there is variation within middle-income countries such as Mexico that could leave certain segments of the population more vulnerable to chronic diseases than others.

In the developed world there has been shown a consistently inverse relationship between socio-economic status (SES) and obesity or overweight for women, and no relationship in men or children (Sobal & Stunkard, 1989). In contrast, there is a positive relationship between SES and obesity in both sexes in the developing world. However, increasing evidence from between-country analyses within the developing world reveals that the association of obesity and per capita gross domestic product (GDP) is not a constant function (Monteiro, Moura, Conde, & Popkin, 2004). A meta-analysis of 30 countries showed a positive association between SES and obesity, but only in lower income developing countries—those with a GDP per capita <2500 USD (Monteiro, Conde, Lu, & Popkin, 2004). National data from poorer countries in Latin America, such as Guatemala and Honduras, for example, show higher levels of SES associated with a greater prevalence of obesity; however, in the richer countries, like Mexico, there is a clear negative association between SES and obesity (Barquera et al., 2003).

A remaining question is whether these between-country comparisons can be extended to within-country analyses. In other words, within a sub-group of the population, would the association between SES and body mass index (BMI) reflect a country's mean GDP per capita or would it reflect a different relationship depending on the mean GDP of the sub-population being investigated? Only a few studies have looked at these patterns, leaving a large research gap. In one study, an examination of SES and obesity in women in India, there was a consistently positive association between SES and the prevalence of overweight and obesity across states with varying per capita net domestic product, except for women in the lowest SES quintile (Subramanian & Smith, 2006).

The first goal of the analysis reported here was to examine the associations between BMI and SES in a rural, poor population within Mexico, a middle-income country. With an average GDP per capita of $9600, Mexico is positioned well above the $2500 threshold described above. For this reason, it would be reasonable to hypothesize that increasing SES would be associated with decreasing BMI. However, given that Mexico is currently undergoing nutritional transition, it is also possible that the association between SES and BMI in a low-income population (GDP/capita <1000 USD) could be positive, matching the pattern seen in countries such as India with a lower GDP per capita.

The second goal of the analysis was to assess the contribution of behavioral characteristics to BMI and to explore the associations between SES and these behaviors. Specifically, if there are differences in BMI by SES, is it possible that behavioral factors could mediate these relationships? The analyses focused on the consumption of sweetened, carbonated beverages (DiMeglio & Mattes, 2000; Malik, Schulze, & Hu, 2006; Schulze et al., 2004) and alcoholic beverages (Wannamethee, Field, Colditz, & Rimm, 2004; Wannamethee & Shaper, 2003), which have each been shown to be independently linked with obesity.

Research design and methods

Data source

The survey reported here was conducted in 2003 in 12,873 adults from 364 communities as part of a National Social Welfare Survey, which was designed to be representative of the poorest (income <20th percentile), rural (defined as towns with <2500 inhabitants), communities in seven (Guerrero, Hidalgo, Michoacán, Puebla, Querétaro, San Luis Potosí, and Veracruz) of Mexico's 31 states (Behrman & Todd, 1999a). These regions had a mean daily per capita income of $\leqslant$\$2US. Households were selected in two stages: first by identifying low-income communities and then by choosing low-income households within those communities (Behrman & Todd, 1999a, 1999b). Households were surveyed from September to December between 08:00 and 18:00 on all days of the week except Sundays. One or sometimes two adult members of each household were interviewed and in the majority of cases the person interviewed was the adult female; if both the adult male and female were at home, they were both interviewed. The interview teams were instructed to return to each home a minimum of three times to conduct the survey.

Body mass index

Height and weight were measured by trained and standardized personnel using standard techniques