Economics and Human Biology 28 (2018) 1–13

Contents lists available at ScienceDirect

Economics and Human Biology

journal homepage: www.elsevier.com/locate/ehb

The rise in obesity in Cuba from 2001 to 2010: An analysis of National Survey on Risk Factors and Chronic Diseases data

Peng Nie[a,b,*], Alina Alfonso Leon[c], Maria Elena Díaz Sánchez[d], Alfonso Sousa-Poza[b]

[a] School of Economics and Finance, Xi'an Jiaotong University, Xi'an, China
[b] Institute for Health Care & Public Management, University of Hohenheim, 70599 Stuttgart, Germany
[c] Centre for Demographic Studies (CEDEM), University of Havana, Cuba
[d] Instituto Nacional de Higiene de los Alimentos, Cuba

ARTICLE INFO

Article history:
Received 31 January 2017
Received in revised form 8 November 2017
Accepted 11 November 2017
Available online 15 November 2017

JEL Classification:
I10
C30

Keywords:
Obesity
Decomposition
Cuba

ABSTRACT

Using two waves of the National Survey on Risk Factors and Chronic Diseases in Cuba, we identify demographic and socioeconomic characteristics associated with obesity among urban adults aged 18+ and decompose the change in obesity within this 9-year period using both the mean-based Blinder-Oaxaca decomposition and a nonlinear approach. Our results reveal significant increases in overweight and obesity (2.3, 3.1, and 7.6 percentage points for BMI-based overweight, BMI-based obesity, and abdominal obesity, respectively). Depending on the decompositional approach and obesity measure, our analysis explains between 13% and 51% of the rise in overweight and obesity, with most part attributable to changes in risky behavior, age, and education. Of particular importance are the large decline in smoking and the population's changing age structure.

1. Introduction

The prevalence of overweight and obesity is high and increasing worldwide (Global BMI Mortality Collaboration, 2016), with over 1.9 billion adults aged 18 and older being overweight in 2014 and a further 600 million being obese (WHO, 2016). In Latin America, this obesity epidemic, with rates as high as 60% among adults, is part of a series of rapid demographic, epidemiological, and nutritional transitions (Kain et al., 2003). This epidemic constitutes a major public health risk to individual quality of life, longevity, and health system costs, one that without intervention will continue to rise across much of Latin America (Webber et al., 2012).

Cuba represents a particularly interesting case among the Latin American countries because, rather than experiencing major economic fluctuations, it has been in constant recovery since the 1991–1995 economic crisis (referred to as the "special period"), with GDP per capita nearly tripling between 2001 and 2010 (World Bank, 2016a). The significant decline in obesity documented during this hardship period (Franco et al., 2013) highlights the important effect of macroeconomic conditions on obesity. At the same time, Cuba has been aging so rapidly that by 2020, 25% of its total population is expected to be 60 and older, the highest proportion of older adults in any Latin American country (Ministry of Public Health, 2009). As this study documents, a nation's age structure is strongly associated with its obesity prevalence.

Cuba is also undergoing an epidemiologic transition in which infectious illnesses are being replaced by noncommunicable diseases (NCDs) (Llibre Rodríguez, 2013), which now pose significant health concerns (Devi, 2014). For example, Cuban rates of coronary heart disease (CHD) are higher than elsewhere in Latin America, not only because better quality health care has raised overall survival rates of CHD (Webber et al., 2012), but also because of rising overweight and obesity. Moreover, without effective intervention, the prevalence of overweight and obesity is predicted to increase from 58% (67%) in 2010 to a staggering 94% (89%) in 2050 for males (females), respectively (Webber et al., 2012), the highest among all Latin American countries.

Yet despite a large body of literature on obesity determinants worldwide (e.g., Popkin and Gordon-Larsen, 2004), in developing countries (Monteiro et al., 2004), and in Latin America (Cuevas et al., 2009; Kain et al., 2003), together with growing concerns about obesity in Cuba, very little research examines the developments and factors associated with adult obesity in that nation. In fact, we are aware of only two such studies: Díaz et al. (2009), who use data from the 2001 National Survey on Risk Factors and

* Corresponding author at: School of Economics and Finance, Xi'an Jiaotong University, Xi'an, China.
E-mail addresses: Peng_Nie@uni-hohenheim.de (P. Nie), alina@cedem.uh.cu (A. Alfonso Leon), maryelen@infomed.sld.cu (M.E. Díaz Sánchez), alfonso.sousa-poza@uni-hohenheim.de (A. Sousa-Poza).

https://doi.org/10.1016/j.ehb.2017.11.003
1570-677X/

Chronic Diseases (NSRFCD) to show a 30.8% and 11.8% prevalence of overweight and obesity, respectively, in adults aged 20+; and Franco et al. (2013), who combine data from all three NSRFCD surveys (1995, 2001, and 2010) with other information to identify the associations between obesity and the incidence of diabetes, cardiovascular disease, and cancer. These latter authors show that the prevalence in the overweight and obesity categories increased from 33.5% in 1995 to 52.9% in 2010. Nonetheless, although these studies shed useful light on obesity in Cuba, they are primarily descriptive, with limited use of the microeconometric techniques necessary to clearly depict the main factors associated with obesity in this nation.

The major contribution of our study, therefore, is to provide the most in-depth and up-to-date analysis of Cuban obesity, with a focus on changes over the 2001–2010 period. In addition to identifying the main characteristics associated with obesity, we are able to assess the individual statistical contributions of demographic and socioeconomic factors to changes in obesity during this decade by combining conventional Blinder-Oaxaca decomposition with Fairlie (1999) nonlinear decompositional techniques. As in Fitzenberger et al. (2011) and Finks et al. (2011), we use these decompositional techniques to analyze changes across time. Our analytic results reveal significant increases in adult overweight and obesity within this relatively short time period. In general, an elevated probability of being overweight or obese is associated with being female, living with a partner, and having a higher level of education or alcohol consumption. Smoking is associated with lower levels of overweight and obesity. We also note some differences depending on the measurement of obesity used. Thus, for example, high levels of education go hand in hand with higher levels of overweight and abdominal obesity, yet lower levels of BMI-based obesity. The decompositional outcomes also demonstrate that risky behaviors (particularly smoking), age, and education are important contributors to the obesity increase. Prior to reporting these outcomes (Section 3) and summarizing the conclusions to which they point (section 4), we first describe our data and analytical methods (section 2).

2. Data and methods

2.1. Data and study sample

The data for this analysis are taken from the National Survey on Risk Factors and Chronic Diseases (NSRFCD), conducted by the National Institute of Hygiene, Epidemiology and Microbiology, the National Statistics Bureau, and the Nutrition and Food Hygiene Institute (Díaz et al., 2009; Gorbea Mariano, 2014). This nationally representative survey, which uses a stratified multistage cluster sampling design (Díaz et al., 2009), was administered in all urban areas in 1995 (NSRFCD I) and 2001 (NSRFCD II) and in both urban and rural areas in 2010 (NSRFCD III). It thus covers 14 provinces and the Isle of Youth special municipality. The survey design compensates for selection probability differences in the various subgroups by weighting samples in inverse proportion to the probability of individual selection, taking gender and age into account (Díaz et al., 2009). A total of 22,851 and 7915 individuals aged 15+ were surveyed in 2001 and 2010, respectively. We restrict our analytic sample to adults aged 18 and older for whom detailed demographic, socioeconomic, and anthropometric information is available in both waves (NSRFCD II and III). Likewise, for better comparability with NSRFCD II, we restrict the NSRFCD III data to urban areas. Our final pooled sample contains 25,318 observations (20,218 and 5100 for the NSRFCD II and NSRFCD III, respectively). In order to assure that the sample is representative of the Cuban urban population, we perform all analyses using appropriate sampling weights.

2.2. Study variables

2.2.1. Dependent variables

Our proxies of weight status are BMI (in kg/m^2) and waist circumference (WC), measured at the midpoint between the bottom of the ribs and the top of the pelvis. Our measures of obesity status are overweight (BMI 25–29.9 kg/m^2), general obesity (BMI $\geq 30\,kg/m^2$), and abdominal obesity (males: WC ≥ 90 cm; females: WC ≥ 80 cm). The cutoff points for the first two are based on WHO criteria (Díaz et al., 2009; Franco et al., 2013); those for the latter, on International Diabetes Federation (IDF) criteria (Alberti et al., 2007). All these measures were taken by experienced field personnel. Although BMI is the most common measure used to depict overweight, it does not capture the distribution of body fat, which can give rise to misleading results. WC is a more accurate measure of the distribution of body fat and has been shown to be more strongly associated with morbidity and mortality (Dagan et al., 2013; Janssen et al., 2004). Because differences are observable between the effects of these two measures on health outcomes, the use of both obesity measures is often recommended (Dagan et al., 2013).

2.2.2. Explanatory variables

Our explanatory variables are age, gender, race, marital status, educational level, and risky behavior (smoking and drinking alcohol). Male is a dummy variable equal to 1 if the respondent is male, 0 otherwise. Race is measured on a 3-point scale with 1 = White, 2 = Mulatto, and 3 = Black and then recoded as a set of dummy variables with "White" as the reference group. Marital status is first measured on a 4-point scale of 1 = single, 2 = married/living together, 3 = widowed, and 4 = separated/divorced and then converted to a set of dummy variables with "single" as the reference group. Similarly, educational levels are first coded as 1 = no schooling, 2 = primary school, 3 = secondary school, 4 = qualified worker, 5 = technical school, 6 = high school, and 7 = university and then converted to a set of dummy variables with "no schooling" as the reference group. Smoking and drinking behaviors are measured by the questions, "Do you currently smoke any tobacco products, such as cigarettes, cigars or pipes?" and "Have you consumed any drinks that contain alcohol, such as beer, wine, moonshine, cider or others during the previous 30 days?" Both responses are coded 1 if yes and 0 otherwise.

2.3. Estimation procedure

2.3.1. Ordinary least squares (OLS)

To examine the association between demographic or socioeconomic factors and weight status (based on BMI and WC), we estimate the following OLS model:

$$WS_i = \beta_0 + \beta_1 X_i + \beta_2 P + \beta_3 Y + \varepsilon_i \quad (1)$$

where WS_i represents the weight status of individual i, and X_i denotes a vector of individual i's characteristics. P is a set of provincial dummy variables, Y is a set of year dummy variables, and ε_i is the error term. We also assess the linkage between individual obesity and demographic and socioeconomic characteristics by applying this same specification in a probit estimation of overweight, BMI-based obesity, and abdominal obesity.

2.3.2. Blinder-Oaxaca (BO) decomposition

We use the BO decomposition to quantify the contribution of specific factors to the average gap in an outcome between two groups or time periods. The mean-based BO decomposition of weight status over time is based on the assumption that the relation between individual bodyweight and a set of demographic