Economics and Human Biology 15 (2014) 23–40

Contents lists available at ScienceDirect

Economics and Human Biology

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

Decomposing race and gender differences in underweight and obesity in South Africa

Susan L. Averett [a,*], Nicholas Stacey [b], Yang Wang [a]

[a] Lafayette College, Easton, PA 18042, United States
[b] Brown University, Providence, RI 02912, United States

ARTICLE INFO

Article history:
Received 28 July 2013
Received in revised form 12 May 2014
Accepted 12 May 2014
Available online 28 May 2014

JEL classification:
I12
I14

Keywords:
Obesity
Underweight
South Africa
Fairlie decomposition

ABSTRACT

Using data from the National Income Dynamics Study, we document differentials in both underweight and obesity across race and gender in post-Apartheid South Africa. Using a nonlinear decomposition method, we decompose these differences across gender within race and then across race within gender. Less than one third of the differences in obesity and underweight across gender are explained by differences in covariates. In contrast, at least 70% of the obesity differences across race are explained by differences in covariates. Behavioral variables such as smoking and exercise explain the largest part of the bodyweight differentials across gender. For bodyweight differentials across race within gender, however, socioeconomic status and background variables have the largest explanatory power for obesity differentials, while background variables play the key role in explaining the underweight differentials. These results indicate that eradicating obesity and underweight differentials will require targeting policies to specific groups.

1. Introduction

Obesity has reached epidemic proportions in many developed countries including the United States (OECD, 2012).[1] Developing countries have not been spared from the obesity epidemic (Khan, 2006; WHO, 2013). In fact, developing countries often face an even more serious problem, the double burden of malnutrition. While there is still a sizeable proportion of underweight persons in the population, the percentage of obese people is also increasing (Popkin, 1994; Florêncio et al., 2001; Kapoor and Anand, 2002; Doak et al., 2005; Kruger et al., 2005; Lukito and Wahlqvist, 2006; Goedecke et al., 2006; Prentice, 2006; Shafique et al., 2007; Poskitt, 2009). In many of these developing countries, the proportion of the population that is overweight or obese even exceeds that which is underweight (Mendez et al., 2005).[2]

Both underweight and obesity are related to an increased risk of chronic diseases, reduced well-being and quality of life, and higher health care costs in the present and future (Joubert et al., 2007; WHO, 2013). In a developing country context, it is particularly important to examine the determinants of both underweight and obesity in order for policymakers to design well-targeted measures for the population groups at risk. The coexistence of obesity and underweight poses a particular challenge to policymakers as policies to combat the latter may exacerbate the former (Caballero, 2005).

In this paper, we focus on South Africa, a country that well illustrates this double burden of malnutrition, with

* Corresponding author. Tel.: +1 610 330 5307; fax: +1 610 330 5715.
E-mail addresses: averetts@lafayette.edu (S.L. Averett), Nicholas_stacey@brown.edu (N. Stacey), wangy@lafayette.edu (Y. Wang).

[1] The World Health Organization (2013) defines obesity as a body mass index (BMI), (weight(kg)/height(meters)^2), greater than or equal to 30.

[2] Underweight is defined by the World Health Organization to be a BMI at or below 18.5.

http://dx.doi.org/10.1016/j.ehb.2014.05.003
1570-677X/

stark differences in underweight and obesity across race and gender. It has been documented that even as far back as the late 1990s 56.6% of women and 29.2% of men have been reported as obese or overweight and 12.2% of men and 5.6% of women as underweight in South Africa; in addition, 58.5% of Black women were obese or overweight as compared to 49.2% of White women, while 25.4% of Black men were obese or overweight as compared to 54.5% of White men (Puoane et al., 2002). And data from 2008 (described below) show that the percentage of obese South African's has increased since that time. In this paper, we aim to analyze these race and gender differentials in obesity and underweight.

Specifically, using a new data set fielded in 2008, the first wave of the National Income Dynamics Study (NIDS) (SALDRU, 2013), we document and decompose the differences in the prevalence of underweight and obesity across race within gender and across gender within race in South Africa. Given South Africa's previous Apartheid system which severely limited the economic activity of non-White individuals, we hypothesize that the body-weight differentials across race may be driven by observable differences in socioeconomic status and health behaviors but that the differentials across gender may be more difficult to explain.

We find that less than one third of the differences in obesity and underweight prevalence across gender can be explained by differences in observed characteristics. In contrast, at least 70% of the obesity differences across race are explained by differences in those characteristics.

Compared to the U.S., relatively few studies have examined factors that explain variations in bodyweight status across individuals in South Africa, and most of these studies have been focused on subsets of the broader South African population due to a lack of data on the entire population (e.g., Case and Deaton, 2005; Case and Menendez, 2009; Steyn et al., 2000). Moreover, we are aware of only one previous study that decomposes the differences in obesity for South Africans and this study is limited to data from only one township in one city (Case and Menendez, 2009). In addition, even though there are several studies that examine the determinants of both underweight and obesity in a South African context, most of them focus on children and adolescents instead of the whole (adult) population (e.g., Cameron, 2003; Kimani-Murage et al., 2010; Reddy et al., 2009). This paper contributes to the literature by documenting South Africa's double burden of obesity and underweight, and by decomposing the stark differences in the prevalence of these conditions across race and sex groups, using a nationally representative data set.[3] Even though the specific results of this study may not be directly generalizable for other parts of the developing world due to differences across countries, our research provides some insight into the unique and complex nature of the serious issue of the double burden of malnutrition that is troubling many developing countries (Caballero, 2005).

1.1. Decomposing obesity and underweight differentials in South Africa

We employ the Fairlie (2005) decomposition technique which is an adaptation of the well-known Blinder/Oaxaca decomposition (Blinder, 1973; Oaxaca, 1973) for binary dependent variables and has been used to decompose obesity differentials (e.g., Costa-Font et al., 2010).[4] Following Fairlie (2005) and Costa-Font et al. (2010), the decomposition for a non-linear equation of the type $P(Y=1)=F(x\hat{\beta})$ for the total obesity/underweight differential between men and women can be expressed as:

$$\bar{Y}^m - \bar{Y}^f = \left[\sum_{i=1}^{N^m}\frac{F(x_i^m\hat{\beta}_m)}{N^m} - \sum_{i=1}^{N^f}\frac{F(x_i^f\hat{\beta}_m)}{N^f}\right] + \left[\sum_{i=1}^{N^f}\frac{F(x_i^f\hat{\beta}_m)}{N^f} - \sum_{i=1}^{N^m}\frac{F(x_i^f\hat{\beta}_f)}{N^f}\right] \quad (1)$$

where f and m refer to females and males respectively, $\bar{Y}^j$ is the average probability of being obese or underweight for gender j (=f, m), x_i^j is a row vector of observed independent variables for individual i with gender j, F is the cumulative distribution function for the standard normal distribution, and N refers to the sample size for each gender group. The first bracket shows the part of the obesity or underweight differential between men and women that is due to differences in the covariates (i.e. the independent variables), more commonly known as the explained portion of the differential. The second bracket represents the portion of the obesity or underweight differential due to differences in coefficients, more commonly known as the unexplained portion of the differential.[5]

[3] Our paper is also related to the literature on health inequality, with weight outcomes such as obesity and underweight being important measures/determinants of people's health. In the interest of space, we will not provide a full review of this literature; however interested readers can find valuable information on other approaches to quantifying and decomposing health inequalities in Kakwani et al. (1997), Wagstaff et al. (2003) and Wagstaff and Van Doorslaer (2004).

[4] Other examples of decomposition analyses applied to obesity include Case and Menendez (2009), Liu et al. (2013) and Etile (2014). Case and Menendez (2009) use the Blinder-Oaxaca method to decompose obesity differentials across men and women in one South African township. Liu et al. (2013) use the Blinder-Oaxaca method to decompose height and weight for age differentials across urban and rural Chinese children. Etile (2014) used recentered influence function regressions to decompose the contribution of education to the changing distribution of BMI in France, between 1981 and 2003.

[5] This part is "unexplained" in the sense that it cannot be explained by the differences in the covariates. It by no means indicates that this part is meaningless. According to Fortin et al. (2011), this part reflects "structure effects" and helps to answer such questions as "Would males and females still have such different bodyweight outcomes if they had the same observed characteristics?" Such questions are interesting as they reveal the limits of policies that just try to reduce the differences in observable covariates.