

## **Educational Differences in Excess Body Weight: A Closer Look**

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Yan Yu  
Australian Demographic and Social Science Research Institute  
Australian National University  
[Yan.yu@anu.edu.au](mailto:Yan.yu@anu.edu.au)

### **Introduction**

Excess body weight has reached epidemic proportions in both developed and developing countries with long-term social and health implications (WHO 2000). As the leader in this world-wide phenomenon, the U.S. has 66% of its adult population currently having a body mass index (BMI) greater than 25 and therefore considered as overweight or obese (Ogden et al. 2006). The prevalence increased from about 50% in the late 1970s. Overweight or obesity was projected to be reached by all American adults by 2048 (Wang et al. 2008).

Population heterogeneities with respect to body weight is a critical issue, but poorly understood. U.S. educational and income weight differences were found to have declined since the 1970s; and it was even claimed that the most rapid increase in obesity (BMI 30 and greater) occurred in the more advantageous social groups, and at the turn of the twenty-first century, America's least educated white men and black women were less or no more likely to be obese than their more educated counterparts (Wang and Beydoun 2007; Zhang and Wang 2004). However, other studies found an inverse education-weight relationship among U.S. adults (Mokdad et al. 2003) and among women and US-born white men in California (Sanchez-Vaznaugh et al. 2009) in the year 2001, and among cohorts of U.S. high school graduates over the 18-45 age interval since 1986 (Clarke et al. 2009). These differences are consistent with studies of neighborhood characteristics, which found that the socio-economically disadvantaged groups continue to be more exposed to environments that encourage unhealthy life styles such as lack of physical activities and unbalanced diet (Giles-Corti and Donovan 2002; Powell et al. 2007).

The fact that two thirds of Americans are overweight speaks for the power of social and environmental forces to overcome individual will. A better understanding of differences or no differences among sub-populations will not only inform the development of effective and efficient public policies and interventions to tackle the issue, but also help to predict the future of population health. This paper examines educational differences

in body weight and their change over the last three decades, using measured BMI data in the U.S. cross-sectional series of the National Health and Nutrition Examination Survey.

Preliminary analysis indicated that the well-documented increase in body weight applied to almost all educational groups. However, weight differences by education persisted over time in a gender-specific way. In 1999-2006, 42% of women aged 25-44 with a college degree or higher were overweight or obese, compared to 63% among those with a high school degree, and 69% among those who did not graduate from high school. These differences, either in absolute or relative terms, were no smaller than those in 1976-80. Despite the secular trend, today's most educated women are still less likely to be overweight than the least educated thirty years ago. Male educational differences have weakened but continued to exist. In 1999-2006, the overweight prevalence is still higher among high school than college graduated men: 71% vs. 65%.

## **Data and Methods**

The study uses U.S. data from the National Health and Nutrition Examination Surveys (NHANES). Conducted by the National Center for Health Statistics, the NHANES consists of a series of cross-sectional samples that represent the U.S. non-institutionalized population. Anthropometric and other health conditions data are collected at the baseline health examinations and interviews. This study uses three samples with respective baselines in 1976-80 (NHANES II), 1988-94 (NHANES III) and 1999-2006. The third sample combines continuous survey data that were collected over the eight-year period.

The analysis is restricted to those aged 25-44 at baseline, because it has been shown previously that older adults are more susceptible to illness-related weight change, weight loss in particular, and the age restriction would help to reduce heterogeneities among weight groups (Barone et al. 2006; Losonczy et al. 1995). The analysis is thus focused on body weight in early adulthood that has not been long exposed to manifest or occult diseases. The lower bound of age 25 is used to allow for the completion of a college degree.

Body Mass Index (BMI) is calculated as weight in kilograms divided by height in meters squared. Body weight and height are measured through a standard protocol at baseline. The cut-points of the World Health Organization Guidelines (2000) are used to define three weight groups: Lean (BMI 25 and less), Overweight (BMI between 25 and 30) and Obese (BMI 30 and greater). Education is classified into four groups: less than high school, high school or GED, some college and college degree or higher.

After deleting 896 pregnant cases and 240 cases missing for education or BMI measurement, the final analytic sample has 7731 men and 8196 women. Sample descriptive statistics for BMI and education are presented in Table 1 (male) and Table 2 (female). As expected, body weight has increased over the surveys. Also notable is the increasing percentage of female college graduates, and of those with some college education among both men and women.

Figure 1 (male) and Figure 2 (female) graph the population weight distribution by each education category. Except for male high-school drop-outs, all educational groups have weighed heavier in 1999-2006 than in 1976-80. Educational differences in the propensity to be overweight or obese have declined but continued to exist among men, and shown no sign of decline among women.

Logistic regressions will further be used to model the changing educational patterns separately for men and women, adjusting for age, smoking status and race and ethnicity. An exercise will also be performed to replicate the analysis in Zhang and Wang (2004).

## Reference

- Barone, B.B., J.M. Clark, N.-Y. Wang, L.A. Meoni, M.J. Klag, and F.L. Brancati. 2006. "Lifetime Weight Patterns in Male Physicians: The Effects of Cohort and Selective Survival." *Obesity* 14(5):902-908.
- Clarke, P., P.M. O'Malley, L.D. Johnston, and J.E. Schulenberg. 2009. "Social Disparities in BMI Trajectories across Adulthood by Gender, Race/Ethnicity and Lifetime Socio-Economic Position: 1986-2004." *International Journal of Epidemiology* 38(2):499-509.
- Giles-Corti, B. and R.J. Donovan. 2002. "Socioeconomic Status Differences in Recreational Physical Activity Levels and Real and Perceived Access to a Supportive Physical Environment." *Preventive Medicine* 35(6):601-611.
- Losonczy, K.G., T.B. Harris, J. Cornoni-Huntley, E.M. Simonsick, R.B. Wallace, N.R. Cook, A.M. Ostfeld, and D.G. Blazer. 1995. "Does Weight Loss from Middle Age to Old Age Explain the Inverse Weight Mortality Relation in Old Age?" *American Journal of Epidemiology* 141(4):312-321.
- Mokdad, A.H., E.S. Ford, B.A. Bowman, W.H. Dietz, F. Vinicor, V.S. Bales, and J.S. Marks. 2003. "Prevalence of Obesity, Diabetes, and Obesity-Related Health Risk Factors, 2001." *Journal of the American Medical Association* 289(1):76-79.
- Ogden, C.L., M.D. Carroll, L.R. Curtin, M.A. McDowell, C.J. Tabak, and K.M. Flegal. 2006. "Prevalence of Overweight and Obesity in the United States, 1999-2004." *Journal of the American Medical Association* 295(13):1549-1555.
- Powell, L.M., S. Slater, D. Mirtcheva, Y. Bao, and F.J. Chaloupka. 2007. "Food Store Availability and Neighborhood Characteristics in the United States." *Preventive Medicine* 44(3):189-195.
- Sanchez-Vaznaugh, E.V., I. Kawachi, S.V. Subramanian, B.N. Sanchez, and D. Acevedo-Garcia. 2009. "Do Socioeconomic Gradients in Body Mass Index Vary by

Race/Ethnicity, Gender, and Birthplace?" *American Journal of Epidemiology* 169(9):1102-1112.

Wang, Y. and M.A. Beydoun. 2007. "The Obesity Epidemic in the United States Gender, Age, Socioeconomic, Racial/Ethnic, and Geographic Characteristics: A Systematic Review and Meta-Regression Analysis." *Epidemiologic Review* 29(1):6-28.

Wang, Y., M.A. Beydoun, L. Liang, B. Caballero, and S.K. Kumanyika. 2008. "Will All Americans Become Overweight or Obese? Estimating the Progression and Cost of the US Obesity Epidemic." *Obesity* 16(10):2323-2330.

WHO. 2000. *Obesity: Preventing and Managing the Global Epidemic: Report of a WHO Consultation on Obesity*. Geneva: World Health Organization.

Zhang, Q. and Y. Wang. 2004. "Trends in the Association between Obesity and Socioeconomic Status in U.S. Adults: 1971 to 2000." *Obesity Research* 12(10):1622-1632.

Table 1: Male Sample Characteristics, Un-weighted Counts (Weighted Mean or Percentage), Aged 25-44, NHANES

	NHANES II (1976-80)		NHANES III (1988-94)		NHANES 1999-2006	
Body Mass Index						
Mean		(25.5)		(26.6)		(28.0)
<25 (Lean)	898	(49.3)	1171	(41.6)	929	(32.0)
[25, 30) (Overweight)	690	(39.3)	1152	(40.2)	1216	(39.8)
>=30 (Obese)	212	(11.4)	606	(18.2)	857	(28.2)
Education Groups						
< High school	403	(19.9)	914	(17.7)	836	(19.1)
High school or GED	641	(34.6)	949	(32.8)	751	(26.3)
Some College	304	(17.8)	604	(22.9)	780	(27.4)
College degree	452	(27.7)	462	(26.6)	635	(27.2)
Total	1800		2929		3002	

Table 2: Female Sample Characteristics, Un-weighted Counts (Weighted Mean or Percentage), Aged 25-44, NHANES

	NHANES II (1976-80)		NHANES III (1988-94)		NHANES 1999-2006	
Body Mass Index						
Mean		(24.6)		(26.1)		(28.0)
<25 (Lean)	1222	(64.1)	1465	(54.9)	1021	(42.0)
[25, 30) (Overweight)	404	(20.7)	920	(21.8)	789	(25.8)
>=30 (Obese)	317	(15.2)	1046	(23.3)	1012	(32.2)
Education Groups						
< High school	517	(23.4)	962	(16.7)	685	(15.9)
High school or GED	825	(43.0)	1254	(35.9)	644	(23.8)
Some College	311	(17.5)	677	(22.9)	859	(31.7)
College degree	290	(16.1)	538	(24.5)	634	(28.6)
Total	1943		3431		2822	

Figure1: Male Prevalence of Overweight or Obesity (Body Mass Index  $\geq 25$ ) by Education Groups, Aged 25-44, Weighted, NHANES

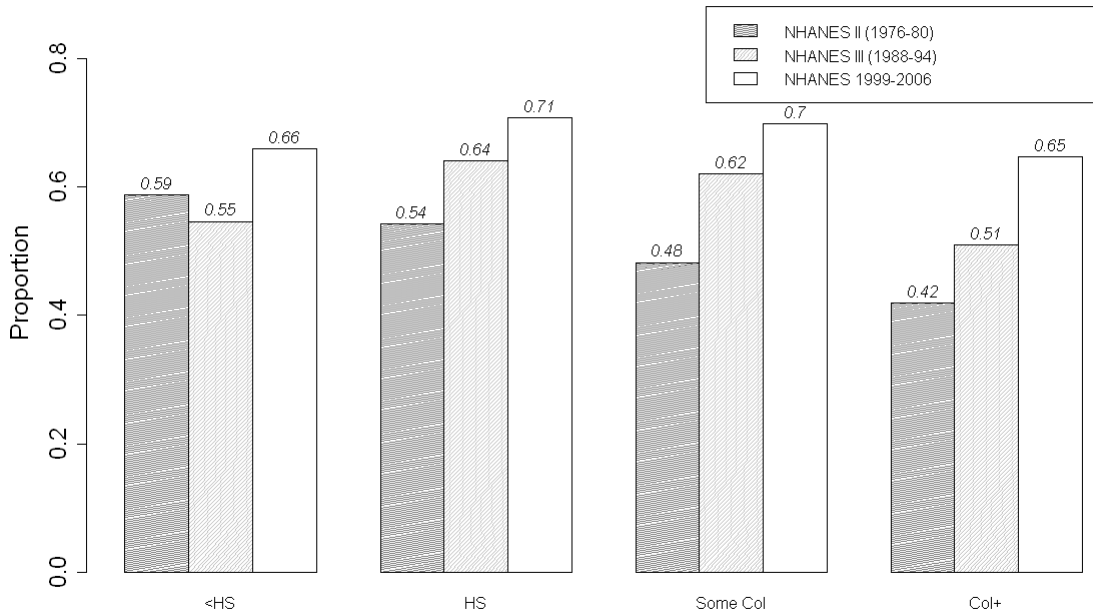


Figure2: Female Prevalence of Overweight or Obesity (Body Mass Index  $\geq 25$ ) by Education Groups, Aged 25-44, Weighted, NHANES

