More for the Money? Differences in the Prevalence of Adult Obesity in the U.S. by Income Level – 1999-2002

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Background

In 1988-94, 20.2 percent of adult males and 25.4 percent of adult females in the U.S. were obese (Flegal et al., 2002). By 1999-2002, the prevalence of obesity among U.S. adults had increased to 27.6 percent for males and 33.2 percent for females. Adult obesity is associated with an increased risk of stroke, coronary heart disease, type 2 diabetes, and certain cancers (National Institutes of Health, 1998). Therefore, the rate of increase and the high prevalence of obesity among adults have made obesity one of the leading public health issues in the United States (Public Health Service, 2001).

In the literature, there has been some evidence of an inverse association of obesity and socioeconomic status. Previous research has shown that in 1988-94 the prevalence of obesity was significantly higher among the low-income group compared to the high-income group for non-Hispanic white males and non-Hispanic white, non-Hispanic black, and Mexican American females (Ogden et al., 2003). However, more recent research has shown that from 1971 to 2000, the association between socioeconomic status (SES) and obesity has been weakening (Zhang and Wang, 2004).

In the present study, we calculated the prevalence of obesity among adults by age, sex, race/ethnic, and income groups to determine if differences by income level still exist. As part of the public health approach, it is important to accurately define public health problems so that interventions can be targeted appropriately.

Methods

The National Health and Nutrition Examination Survey (NHANES) uses a complex multistage probability design to select a representative sample of the noninstitutionalized US civilian population. Our sample consisted of non-pregnant adults aged 20 years or older.

Using a calibrated stadiometer and scale, height and weight were measured to calculate the body mass index (BMI, calculated as weight in kilograms divided by the square of height in meters) for each participant. Obesity was defined as a BMI of 30.0 or higher.

To define income, we used the poverty-income ratio (PIR, family income divided by poverty threshold). The advantage of this measure over income is that it takes into account family size. Family income was self-reported. Respondents were asked to report annual total combined family income. If the respondent did not know the income or refused to answer, a screener question was asked to identify whether the income was greater or less than $20,000. If the respondent answered the question, the respondent was asked to select an income range from a printed card. The mid-point of the selected income range was used as the family income value. If the respondent did not supply an income value or select an income range, the PIR was not calculated for the participant. The U.S. Office of Management and Budget (OMB) determines the poverty threshold. As an example, the 2001 poverty threshold for a four-person family with two children under the age of 18 was $17,960 (Proctor and Dalaker, 2002).

We used the PIR to define 3 income groups: low, middle, and high. Low-income was defined as a PIR of less than 1.3 or 130 percent of the poverty level. This is the cutoff point to determine eligibility in certain government programs, such as food stamps. Middle-income was defined as a PIR of at least 1.3 but not greater than 3.5. Participants with a PIR above 3.5 were considered high-income. The income definitions are consistent with previous research, which enables multi-year comparisons (Ogden et al., 2003).

We calculated the prevalence of adult obesity by age, sex, race/ethnic group, and income level. Because the prevalence of obesity can be higher among older age groups, we created two age groups for our analysis: 20-49 years and 50 years or older. We compared the prevalence of obesity across income levels within age, sex, and race/ethnic groups using t-tests. We used sampling weights to account for the complex survey design in the calculation of standard errors. We evaluated the tests at a 0.05 significance level and used a Bonferroni correction factor for multiple comparisons across the three income groups.

Results

Table 1 shows the sample size of adults by sex, race/ethnic group, age, and income level. In the high-income column, although Mexican Americans and non-Hispanic blacks are oversampled in NHANES, the sample sizes are fairly low ($n<70$), especially for the older age categories. However, all prevalence estimates had a relative standard error of less than 30 percent, an indication of statistical reliability and precision.

Table 2 shows the prevalence of obesity among adults by sex, race/ethnic group, age and income level. Among non-Hispanic white males, there was no significant difference in the prevalence of obesity across all income levels. For non-Hispanic black males, the only significant difference in obesity by income level was among men aged 50 years or older where 39.6 percent of high-income men were obese compared to 22.5 percent of low-income men. High-income Mexican American men aged 20-49 years had a significantly higher prevalence of obesity (38.5%) compared to their low-income (22.7%) and middle-income (23.2%) counterparts. Among Mexican American men aged 50 years and older, the low-income group had a significantly lower prevalence of obesity, 18.7 percent, than the middle-income group, 33.4 percent.

For females, there were no significant differences in the prevalence of obesity by income level within race/ethnic and age-specific groups. Although the point-estimates were higher for the low-income group compared to the high-income group for non-Hispanic white and Mexican American women aged 20-49 years and non-Hispanic white and black women aged 50 years and older, the differences were not significant.

Figure 1 presents the prevalence of obesity for men by race/ethnic group and income category using NHANES 1988-94 data (Ogden et al., 2003) and NHANES 1999-2002 data. Between 1988-94 and 1999-2002, the prevalence of obesity increased for all income categories for non-Hispanic whites, non-Hispanic blacks, and Mexican Americans. However, the largest increases in obesity occurred in the high-income category for all race/ethnic groups. In 1988-94, the prevalence of obesity among non-Hispanic males was significantly higher for the low-income group than the high-income group. By 1999-2002, the increase in obesity among the high-income group had caused the difference between income groups to disappear. The increase in obesity among high-income Mexican American males between 1988-94 and 1999-2002 resulted

in a significantly higher prevalence of obesity among high-income as compared to low-income Mexican American males.

For women, the prevalence of obesity increased across all race/ethnic groups and income categories (see Figure 2). However, the increase in the high-income category for all race/ethnic groups was larger than for other income categories. As a result, there was no longer a difference in the prevalence of obesity by income for non-Hispanic black and Mexican American women. Without dividing adults into age groups, the prevalence of obesity among low-income non-Hispanic white females was significantly higher than among high-income non-Hispanic white females.

Discussion

Within age and race/ethnic groups, the prevalence of obesity among low-income adults in the U.S. in 1999-2002 did not exceed that of high-income adults. For non-Hispanic Black males aged 50 years and older and for Mexican American males aged 20 to 49 years and 50 years and older, the prevalence of obesity in the high-income group was actually significantly higher than among the low-income group.

By comparing the 1999-2002 NHANES data with 1988-94 findings, we see that while the prevalence of obesity has increased among adults, differences in the prevalence of obesity by income have decreased over time. In 1988-94, the prevalence of obesity was significantly higher for low-income non-Hispanic white males and non-Hispanic white, non-Hispanic black, and Mexican American females than their high-income counterparts. By 1999-2002, the only sex and race/ethnic group with a significant difference in the prevalence of obesity between the high and low-income group was non-Hispanic white females, and even that disparity was smaller than in 1988-94.

The reduction in socioeconomic differentials in obesity prevalence between income groups is due to a larger increase in the prevalence of obesity in the high-income rather than the low-income group for all race/ethnic groups. These findings are consistent with previous research by Mujahid et al. (2005). Although their income groups differed from ours because they did not account for family size and varied by race, they found that among adults aged 45 to 64 years, BMI increases over time were not greater in the lower income groups and among black men and women were actually larger in the higher income compared to the lower income groups. Zhang and Wang (2004) used education to measure socioeconomic status and obtained similar results. They found that as the prevalence of obesity has increased, the disparity by socioeconomic status has decreased and the association between obesity and SES has weakened.

One limitation of our data is that income is self-reported. Some participants may not report their income accurately or decide not to report their income at all. In addition, our findings may have been limited by our income categories. Our "high-income" category is not that high and may not be what most people would consider high-income. Using our definition, a family of four with two children under the age of 18 would be considered high-income if they earned approximately $63,000 in 2001. It may be that if we had a large sample with an even higher income, we might see a lower prevalence of obesity. However, even with a high-income definition of a PIR greater than 350% of the poverty level, we did not have a large sample of non-Hispanic black and Mexican Americans in the high-income groups, which may have limited our ability to find significant differences.

Because NHANES is a cross-sectional study and obesity develops over a period of time, we do not know the income status of the participant when they first became obese. Laaksonen et al. (2004) found that when childhood socioeconomic status (parental education and childhood economic difficulties) was taken into account, the indicators of current socioeconomic status (education and occupation) were no longer associated with obesity. A prospective or longitudinal study would be helpful to identify the role of income in the process of becoming obese. However, our findings are useful in identifying that all income groups would benefit from obesity interventions. Many obesity interventions target low-income women, such as the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) and WiseWoman (http://www.cdc.gov/wisewoman/). While these are important programs for many reasons, the large increases in the prevalence of obesity in the high-income groups support the need for public health interventions for obesity that target adults of all income levels.

While we generally think of reducing socioeconomic health differentials as a positive finding, in this instance it is not. Instead of a reduction in the prevalence of obesity among the low-income group, the lack of disparity is due to greater increases in the prevalence of obesity among the high-income group for all race/ethnic groups. This trend is particularly concerning because one can assume that the greater resources in the high-income groups would afford better access to medical care and healthy food. However, it may be that higher income may be related to a more sedentary job and eating outside of the home, which may result in less physical activity and larger portion sizes. Further study to determine the factors associated with the increase in obesity among all income-groups is warranted.

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Table 1. Sample Size of Adults by Sex, Race/Ethnic Group, Age, and Income Level, NHANES 1999-2002

			Income Level		
Sex	**Race/Ethnic Group**	**Age, y**	**Low**	**Middle**	**High**
Males	Non-Hispanic White	20 - 49	146	282	438
		≥50	179	406	482
	Non-Hispanic Black	20 - 49	127	167	115
		≥50	86	120	99
	Mexican American	20 - 49	211	259	91
		≥50	133	153	62
Females	Non-Hispanic White	20 - 49	163	278	392
		≥50	182	411	405
	Non-Hispanic Black	20 - 49	168	171	88
		≥50	111	132	67
	Mexican American	20 - 49	206	204	91
		≥50	163	150	59

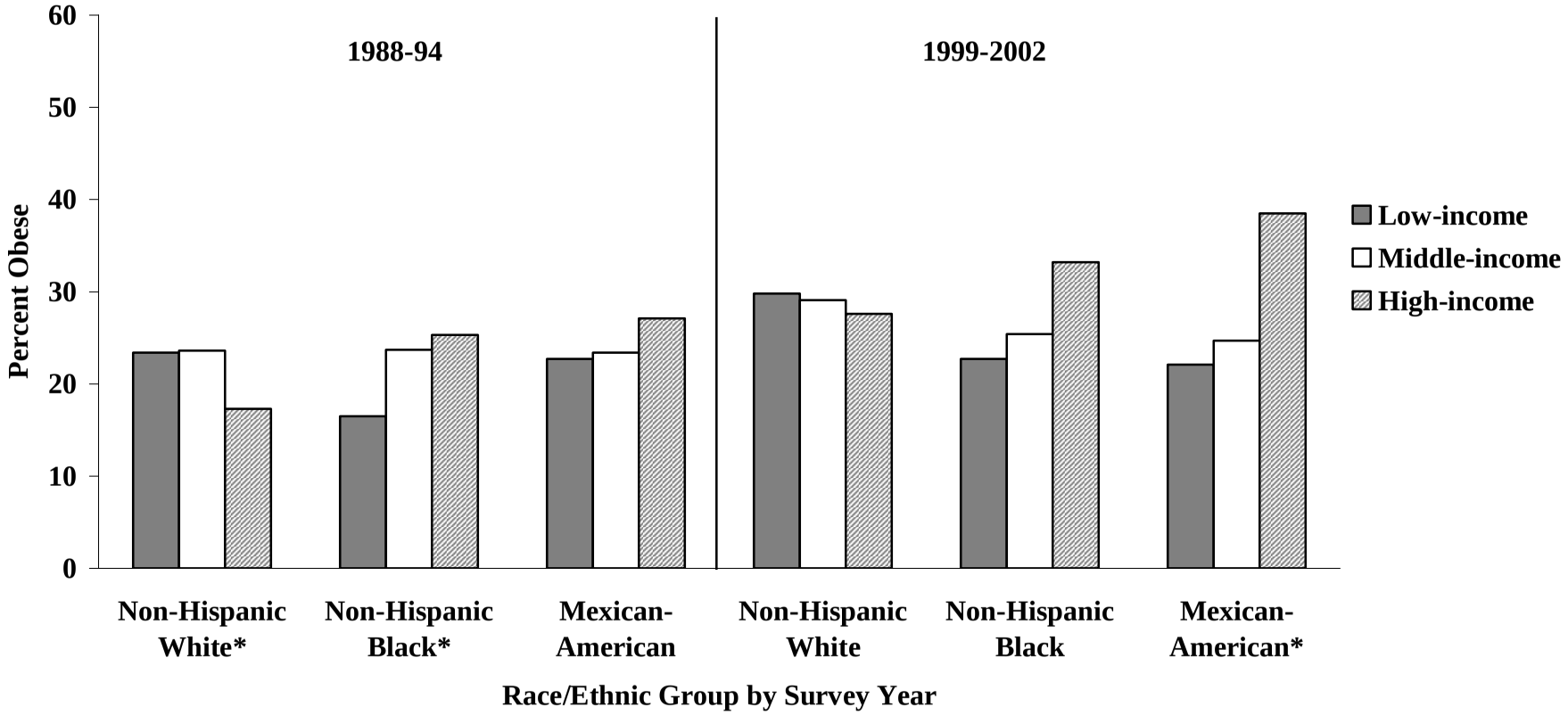
Table 2. Prevalence of Adult Obesity by Sex, Race/Ethnic Group, Age, and Income Level, NHANES 1999-2002

			Income Level		
Sex	**Race/Ethnic Group**	**Age, y**	**Low**	**Middle**	**High**
Males	Non-Hispanic White	20 - 49	28.4 (4.2)	25.9 (2.8)	24.5 (2.0)
		≥50	32.4 (4.3)	33.6 (2.7)	32.1 (2.3)
	Non-Hispanic Black	20 - 49	22.8 (4.3)	25.4 (3.8)	29.8 (3.6)
		≥50	22.5 (3.6)‡	25.3 (3.3)	39.6 (5.1)
	Mexican American	20 - 49	22.7 (2.7)‡	23.2 (3.3)‡	38.5 (4.1)
		≥50	18.7 (4.2)†	33.4 (4.1)	38.7 (6.9)
Females	Non-Hispanic White	20 - 49	33.7 (3.2)	31.4 (3.1)	24.4 (2.6)
		≥50	42.0 (3.7)	37.3 (3.2)	30.9 (2.4)
	Non-Hispanic Black	20 - 49	48.3 (4.3)	49.1 (4.4)	47.0 (4.0)
		≥50	52.0 (7.5)	56.4 (5.1)	43.4 (6.8)
	Mexican American	20 - 49	43.3 (4.9)	33.5 (3.2)	32.5 (5.8)
		≥50	41.5 (4.2)	37.9 (4.4)	52.4 (9.7)

† significantly different from middle-income group

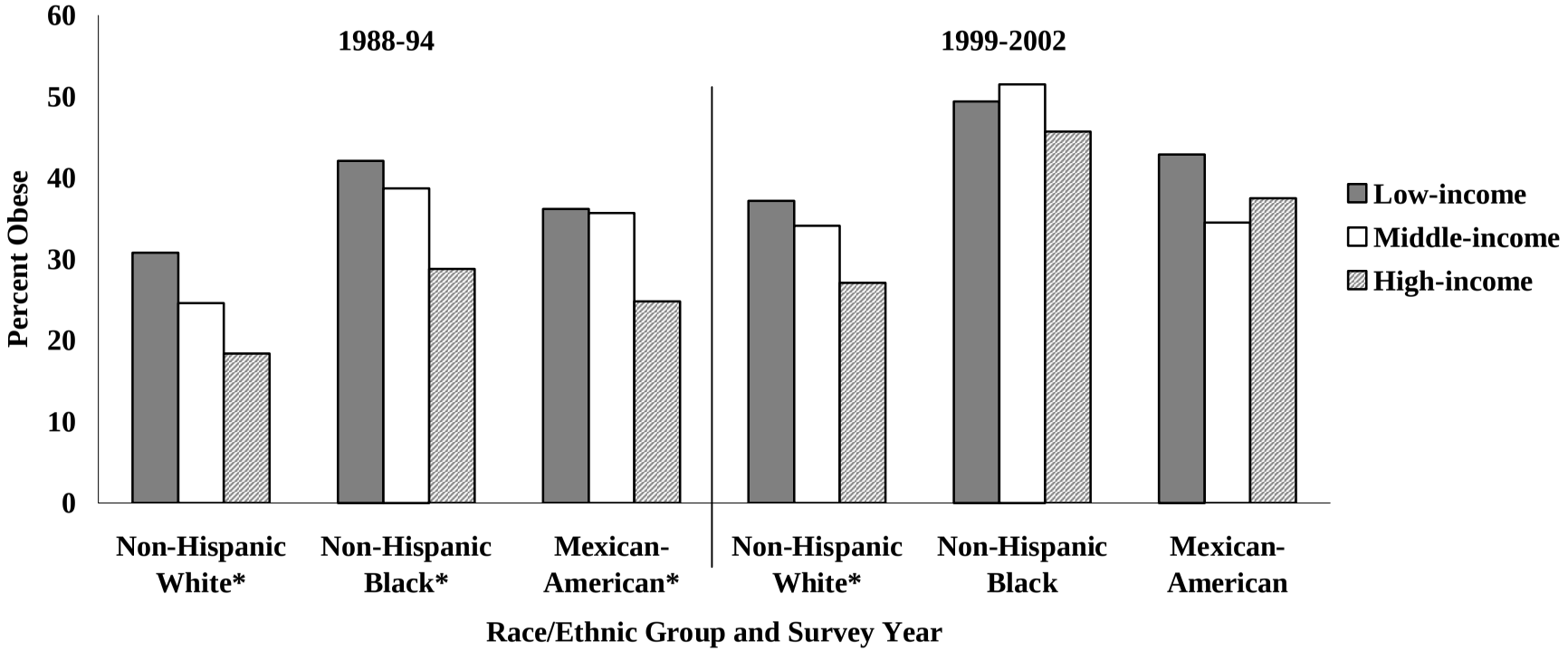
‡ significantly different from high-income group

Figure 1. Prevalence of Obesity Among Men by Income and Race/Ethnic Group, NHANES 1988-94, 1999-2002



* Significant difference between low-income and high-income group

Figure 2. Prevalence of Obesity Among Women by Income and Race/Ethnic Group, NHANES 1988-94, 1999-2002



* Significant difference between low-income and high-income group