TREND IN THE PREVALENCE OF OVERWEIGHT AND OBESITY AMONG URBAN AFRICAN AMERICAN HOSPITAL EMPLOYEES AND PUBLIC HOUSING RESIDENTS

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Introduction: To help understand the impact of socioeconomic status, we examined the current prevalence and age-specific trend in overweight and obesity among two socioeconomically diverse groups of African Americans in the Washington, DC, area.

Materials and Methods: Data on height and weight were collected between March 1995 and December 1996 as a part of nutrition survey to develop a food frequency questionnaire. Gender-stratified multiple logistic regression analyses were used to examine factors related to the current prevalence of overweight and obesity.

Results: Three hundred nine African American public housing residents and 293 African American hospital employees participated in this survey. Overall, hospital workers and public housing residents differed significantly in the distribution of BMI ($p = 0.003$). Among men, the prevalence of overweight and obesity were 34.9% and 29.4% for hospital workers and 27.0% and 18.2% for public housing residents, respectively. For females these rates were 31.3% and 46.3% for hospital employees and 26.1% and 42.9% for public housing residents, respectively.

Conclusion: Overweight and obesity were highly prevalent among all age and socioeconomic groups. Future research should focus on a more in-depth study of the relationship between socioeconomic status and the correlates of obesity among African-Americans, particularly women. (*J Natl Med Assoc.* 2002;94:566–576.)

Key words: obesity ◆ overweight ◆ socioeconomic status ◆ African Americans

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The prevalence of obesity among Americans increased more than 30% over the past 10 years.[1] Nearly 97 million Americans are currently overweight or obese by new federal standards.[2] In general, the prevalence of obesity is higher among women, racial/ethnic minorities, urban populations,[3] and low socioeconomic communities.[4] Data from NHANES III, show that the prevalence of being overweight among African-Americans is among the highest

in the U.S. adult population.[5] In addition, the prevalence of obesity among African-American women is estimated to be between 50–66%.[5,6]

After cigarette smoking, obesity is the second leading cause of preventable death.[2] Overweight and obesity increase the risk of developing hypertension, high serum cholesterol, type 2 diabetes, heart disease, stroke, gallbladder disease, osteoarthritis, sleep apnea, and cancer of the breast, kidney, and endometrium.[7,8] Morbidly obese persons may have a lower quality of life[9] and lower levels of physical function due to bodily pain.[10]

Previous research has shown an inverse association between obesity and socioeconomic status (SES), as measured by education and occupation.[11] More recent evidence, however, suggests that low SES has a differential impact on body mass index (BMI) for racial/ethnic minority women when compared to white women.[12]

The importance of weight change patterns to overall health has also been noted. For example, weight patterns in young adulthood have been found to predict subsequent risk for diabetes.[13] The prevalence of type 2 diabetes among African Americans is considerably higher than the prevalence among the white adult U.S. population.[14,15]

To help understand the impact of socioeconomic status on the prevalence of overweight and obesity among African Americans we examined self reported age-specific trends and current prevalence of overweight and obesity among two socioeconomically diverse groups of African Americans in the Washington, DC, area.

MATERIALS AND METHODS

The study population consisted of African American residents of public housing and hospital employees in Washington, DC. Data on height and weight were collected as a part of nutrition survey to develop a food frequency questionnaire. Individuals with a major chronic medical condition, involved in other nutritional studies, West Indians, and other islanders of African origin were excluded. A remuneration of $10 was given to each participant for their time in providing the data. The data were collected March 1995 through December 1996. A total of 602 subjects participated in the study.

African American interviewers collected information on 24-hour food intake and sociodemographic information, including age, education, marital status, family income and occupation. At the end of the dietary interview, participants were asked to recall their weight when they were in their 20s, 30s, 40s, and so on. Study staff measured current height and weight. Hospital employees were recruited by advertisements in hospital newsletters, communication boards, posters, memoranda to department heads, and staff meeting announcements. Residents of the eight public housing communities in the Washington, DC, area were recruited through advertisements in community newsletters, at community meetings, and through interviewers hired for the study. Prior to beginning the interview, a written consent form was obtained from the participant. The Medatlantic Research Institute institutional review board approved the protocol for this study.

Body mass index (BMI) (weight in kilograms/height in meters) was used to categorize weight.[2] Individuals with a BMI under 25.0 were categorized as "normal" weight, with a BMI between 25.0 and 29.9 as overweight, and with a BMI $\geq$30 as obese, without regard to body frame, musculature, or gender. Class I obesity was defined as a BMI between 30.0 and 34.9, Class II obesity as a BMI between 35.0 and 39.9, and Class III obesity as a BMI of 40 or more. For logistic regression analyses, overweight was identified as a BMI of 25.0 or more and obesity as a BMI of 30 or more.

Changes in reported weight were calculated at each decade by subtracting the weight for the previous decade from the next higher decade. Mean weight changes for an interval were only reported for individuals who had measurements for the previous decade and the next

highest decade. For example, an individual whose current age was 42 was not included in the calculation of mean weight change for the interval between ages 40 and 50.

Occupations were coded using the Standard Occupational Classification (SOC).[16] Occupations were then grouped into 11 major occupational groups (MOG) using categories established in the Occupational Classification System Manual [OSCM] for use in the National Compensation Survey.[17] The MOGs are based on census occupation groupings. For the purpose of analysis of BMI data, the 11 MOGs were collapsed into five categories. These included professional/managerial (MOG A-B), sales and administrative support (MOG C-D), laborers (MOG E-H), service (MOG K-L), and other (MOG I and undetermined occupations).

STATISTICAL ANALYSIS

All data analyses were performed with SAS statistical analysis software.[18] Chi-square tests were used to assess differences in the distribution of categorical variables. Differences in continuous variables were assessed with the T-test. Gender stratified logistic regression analyses were used to examine the association of the independent variables and the current prevalence of overweight and obesity. All variables found to have a significant association with overweight or obesity in univariate analyses were entered in a multiple logistic regression model. Variables were then removed using a backward elimination method. A significance level of 0.05 (two-tailed) was used for all analyses.

RESULTS

Three hundred nine African American public housing residents and 293 African American hospital employees formed two socio-economically diverse groups of participants (see Table 1). Hospital employees had higher educational achievement levels, annual household incomes, and rates of current employment. The median age was 39 for hospital employees and 45 for public housing residents. Nearly 90% of hospital employees were under age 50, compared to about 59% of public housing residents ($p = 0.001$). Eighty percent of public housing residents had total annual household incomes below $20,000, compared to only 7% of hospital employees. Men and women were equally represented in the two study groups (see Table 1).

Only 29.4% of public housing residents were currently employed compared to 100% of hospital workers. Employed public housing residents mainly worked as service providers, support personnel, or production laborers (see Table 1). In contrast, the majority of hospital employees were employed as managerial, professional and support staff. The mean length of employment in the current occupation was 11.6 ± 6.9 years for hospital employees and 11.3 ± 9.3 years for employed public housing residents.

Overall, 35.9% of study participants had current BMIs that were categorized as normal, 29.7% as overweight, and 34.8% as obese. Hospital workers and public housing residents significantly differed in the distribution of BMI ($p = 0.003$) (see Table 1). Seventy-one percent of hospital workers were overweight (BMI ≥ 25.0) compared to 57.6% of public housing residents. Male hospital employees had a current prevalence of obesity that was more than 61% higher than male public housing residents and a prevalence of overweight that was 42% higher. While female hospital employees also had a prevalence of overweight and obesity that was higher than female public housing residents, these differences were smaller than those observed for men (see Table 2). Among obese males, 81.4% of public housing residents were Class I, 7.4% Class II, and 11.1% were Class III, compared to 60.5%, 30.2%, and 9.3% of hospital workers, respectively ($p = 0.076$). Among obese females 36.2% of public housing residents were Class I, 27.5% were Class II, and 36.2% were class III, compared to 45.6%, 33.8%, and 20.6% of hospital workers, respectively ($p = 0.127$).

The prevalence of current overweight

Table 1. Sociodemographic characteristics of hospital workers and public housing residents in Washington, DC, March 1995–December 1996

Variable	Hospital employees N = 293 %	Public housing residents N = 309 %	P-Value*
Gender			
Male	49.8	47.9	0.635
Female	50.2	52.1	
Education			
Less than 8th grade	0.3	6.8	
8th to 11th grade	0.7	44.3	0.001
High school graduate/GED	36.9	37.2	
Vocational/Technical/Jr. College	38.9	9.4	
College graduate/Advanced degree	23.2	1.9	
Age			
30–39	51.5	35.6	
40–49	38.2	23.3	0.001
50–59	7.9	21.0	
>60	2.4	20.1	
Marital status			
Single	40.6	55.7	
Married	40.6	13.9	0.001
Divorced/Separated	17.1	21.7	
Widowed	1.7	7.8	
Employment status			
Employed full time	96.9	18.5	0.001
Employed part time	1.4	11.0	
Full time homemaker	0.3	6.8	
Currently unemployed	0.3	41.1	
Retired	0.7	8.1	
Student	0	0.3	
Other	0	14.2	
Occupation (among participants that worked)			
	n = 293	n = 91	
Professional and Technical	28.0	6.0	
Executive, Administrative, and Managerial	12.0	2.0	
Sales	1.0	5.0	0.001
Administrative Support/Clerical	35.0	13.0	
Precision Production, Craft and Repair	2.0	12.0	
Machine Operators, Assemblers, Inspectors	0	2.0	
Transportation and Material Moving	1.0	3.0	
Handlers, Equipment Cleaners, Helpers and Laborers	1.0	3.0	
Service, except private household	18.0	32.0	
Personal, private household	2.0	6.0	
Other	1.0	15.0	
Mean years employed in this occupation	11.6 ± 6.9	11.3 ± 9.3	
Median years employed in this occupation	10	9	
Household income (participants with known income only)	7.0	86.8	0.001
Less than $20,000	62.7	12.5	
$20,000 to $60,000	30.3	0.7	
Over $60,000			

Note: May not add to 100 due to rounding.
*Test for homogeneity of proportions.

Table 2. Prevalence of overweight and obesity among hospital workers and public housing residents in Washington, DC, March 1995–December 1996, by gender

	Normal BMI <25 %	Overweight BMI ≥25 and <30 %	Obese BMI >30 %
Current prevalence			
Hospital Workers			
Male	35.6	34.9	29.4
Female	22.4	31.3	46.3
Total	29.1	33.1	37.9
Public Housing Residents			
Male	54.7	27.0	18.2
Female	31.0	26.1	42.9
Total	42.4	26.5	31.1
Prevalence at age 20			
Hospital Workers			
Male	73.3	20.6	6.2
Female	76.8	15.7	7.5
Total	75.1	18.1	6.8
Public Housing Residents			
Male	77.7	18.9	3.4
Female	77.0	13.0	9.9
Total	77.4	15.9	6.8
Prevalence at age 30			
Hospital Workers			
Male	51.1	36.4	12.6
Female	45.8	33.3	20.8
Total	48.4	34.8	16.7
Public Housing Residents			
Male	63.0	30.8	6.2
Female	56.6	24.5	18.9
Total	59.7	27.5	12.8

among male hospital employees and public housing residents was 62.0% and 38.1% ($p = 0.001$) for men under 50, and 82% and 58.8% among men age 50 and older ($p = 0.079$), respectively. Similarly for women, the prevalence of current overweight for hospital workers and public housing residents was 76.9% and 64.7% ($p = 0.05$) for women under 50, and 84.6% and 73.7% ($p = 0.506$) for women over 50, respectively.

Weight Over Time

The prevalence of overweight (BMI >25) increased with age (see Figure 1). For the group as a whole, the prevalence of overweight was 25% at age 20, 45% at age 30, and 59% at age 40. There was no significant difference in the prevalence of overweight at age 20 among

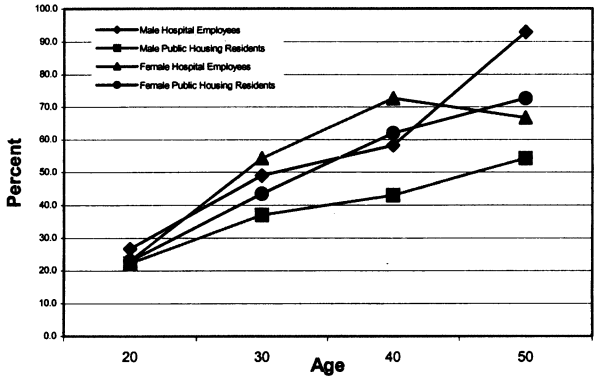

Figure 1. Trend in the prevalence of overweight among hospital workers and public housing residents in Washington, DC, March 1995–December 1996, by gender.

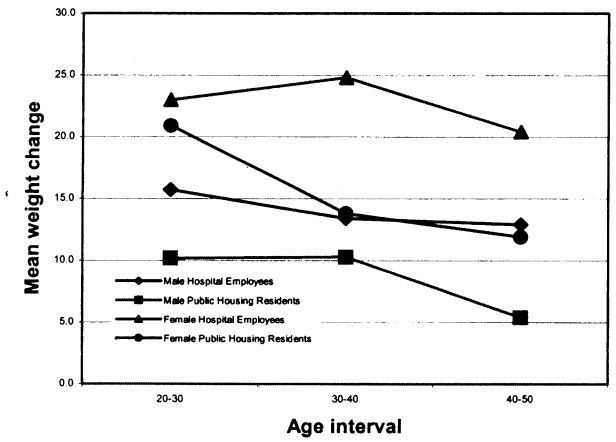

Figure 2. Trend in mean weight change among hospital workers and public housing residents in Washington, DC, March 1995–December 1996, by gender.

men (p = 0.379), however, male hospital employees were significantly more likely to be overweight at age 30 than public housing residents (p = 0.047). In addition, there was no significant difference in the prevalence of overweight among women at age 20 (p = 0.975), but there was a nearly significant difference at age 30 (p = 0.073) (see Table 2). Differences between hospital workers and public housing residents in the prevalence of overweight increased with each age decade. At age 40 and 50 the prevalence of overweight was 65.4% and 82.6% for hospital workers, and 54.0% and 65.3% for public housing residents, respectively.

Both male and female hospital employees had consistently higher mean weight changes over time than did public housing residents (see Figure 2), but differences were only significant for females 30 to 40 years of age (p = 0.023) and males 20 to 30 (p = 0.011) years of age. Weight gains were reported between the ages of 30 and 40 for 88% of female hospital employees and 73% of female public housing residents. Among males, weight gains were reported between the ages of 20 and 30 for 75% of hospital employees and 62% of public housing residents. The mean reported weight gain for hospital employees was 15.7 lbs. for men and 23.0 lbs. for women between ages 20 and 30, while it was 13.4 lbs. for men and 24.8 lbs. for women between the ages of 30 and 40. Among public housing residents, the mean reported weight gain was 10.1 lbs. for men and 20.9 lbs. for women between ages 20 and 30, and 10.3 lbs. for men and 13.8 lbs. for women between ages 30 and 40.

After controlling for gender, age, marital status, and history of overweight, hospital employees were more likely than public housing residents to be currently overweight (O.R. 2.1, C.I. 1.4–3.2). For the sample as a whole, employment status (employed/unemployed) and occupation were not significantly associated with current overweight after controlling for gender, overweight at age 20, marital status, and cohort (hospital employee/public housing resident).

In gender stratified univariate logistic regression analyses, employment status and overweight at ages 20 and 30 were significantly associated with current overweight among women (see Table 3). However, only overweight at ages 20 and 30 were significantly associated with current obesity. For men, cohort overweight at ages 20 and 30, employment and marital status were significantly associated with both current overweight and obesity.

Employed women were more likely to be overweight after controlling for cohort; age and marital status in gender stratified multivariate analyses (O.R. 3.37, C.I. 1.81–6.39). Similarly, women who were overweight at age 20 were more likely to be currently overweight (O.R. 9.38, C.I. 3.62–32.22) or obese (O.R. 8.92, C.I. 4.75–17.91) (see Table 4).

Among men, after controlling for other factors, hospital employees were significantly more likely to be overweight or obese. Overweight at age 20 was associated with an increased risk of current overweight and obesity (OR 4.83, 95% CI 2.56–9.64 and OR 6.35, 95% CI 3.47–11.8). The risk of being overweight increased with each 10-year increase in age after age 30. Marriage was associated with a lower risk of obesity but was not significantly associated with overweight (see Table 4).

Table 3. Univariate logistic regression models of overweight and obesity among hospital workers and public housing residents in Washington, DC, March 1995–December 1996, by gender

Variable	Overweight		Obesity	
	Odds ratio	95% C.I.	Odds ratio	95% C.I.
Men				
Cohort				
Hospital employees	2.19	1.37–3.51	1.87	1.09–3.27
Public housing residents	1.00	–	1.00	–
Current employment status				
Employed	1.71	1.04–2.82	1.85	1.0–3.58
Unemployed	1.00	–	1.00	–
Occupational group				
Professional and Managerial	1.0	–	1.0	–
Sales, administrative support, clerical	0.78	0.33–1.90	0.78	0.33–1.90
Machine operators, laborers, assemblers	0.57	0.24–1.34	0.57	0.24–1.34
	0.70	0.35–1.39	0.70	0.35–1.39
Service occupations	*	–	*	–
Age (continuous)	1.02	1.0–1.05	1.00	0.97–1.03
Marital Status				
Married/living as married	0.50	0.31–0.80	0.49	0.28–0.84
Single, divorced/separated, Widowed	1.00	–	1.0	–
History of overweight				
Overweight at age 20	4.31	2.36–8.32	6.06	3.37–11.03
Overweight at age 30	14.90	8.23–28.45	7.43	4.06–14.3
Women				
Cohort				
Hospital employees	1.56	0.94–2.61	1.15	0.73–1.80
Public housing residents	1.00	–	1.00	–
Current employment status				
Employed	2.06	1.23–3.45	1.25	0.78–2.02
Unemployed	1.00	–	1.0	–
Occupational group				
Professional and Managerial	1.00	–	1.0	–
Sales, administrative support, clerical	1.78	0.97–3.34	1.28	0.76–2.17
Machine operators, laborers, assemblers	*		1.23	0.05–31.50
Service occupations	1.41	0.59–3.79	0.55	0.23–1.27
Age (continuous)	1.02	0.99–1.04	1.0	0.98–1.02
Marital Status				
Married/living as married	0.675	0.41–1.12	1.02	0.65–1.61
Single, divorced/separated, Widowed	1.00	–	1.0	–
History of overweight				
Overweight at age 20	8.34	3.31–28.2	8.92	4.75–17.91
Overweight at age 30	34.44	13.70–115.88	11.69	6.91–20.29

*Too few observations to provide a reliable estimate.

To determine if an age-effect was responsible for study findings, we modeled current overweight stratified by age (under 50/50 and over) and by gender. Among men under age 50, after controlling for cohort, overweight at 20, marital status, education, and employment status, being a hospital worker and overweight at age 30 were the only variables found to be associated with current overweight in multivariate analyses (O.R. 3.09 95% C.I. 1.52–6.56 and

Table 4. Multivariate logistic regression model of overweight and obesity among hospital workers and public housing residents in Washington, DC, stratified by gender, March 1995–December 1996

Variable	Overweight		Obesity	
	Odds ratio	95% C.I.	Odds ratio	95% C.I.
Men				
Cohort				
Hospital employees	2.48	1.50–4.16	1.64	0.90–3.02
Public housing residents	1.00	–	1.00	–
Age (per decade over age 30)	1.34	1.0–1.78	–	–
Marital Status				
Married/living as married	–	–	0.50	0.27–0.90
Single, divorced/separated, Widowed	–	–	1.0	–
History of overweight				
Overweight at age 20	4.83	2.56–9.64	6.35	3.47–11.81
Women				
Current employment status				
Employed	3.37	181–6.39	–	–
Unemployed	1.00	–		
Age (per decade over age 30)	1.53	1.16–2.05	–	–
History of overweight				
Overweight at age 20	9.38	3.62–32.2	8.92	4.75–17.91

O. R. 24.91 95% C.I. 12.04–56.07), respectively. Among men over 50, after controlling for other factors, overweight at age 30 (O.R. 6.37 95% C.I 1.79–30.74) and marital status (O.R. 0.31 95% C.I. 0.10–0.92) were associated with current overweight; however, cohort (hospital worker/public housing resident) was not. For women, age and gender stratified multiple logistic regression analyses differed little from analyses stratified by gender only. After controlling for other factors, for women under age 50 overweight at age 30 (O.R. 95.52 95% C.I. 27.02–614.81) and employment status (employed/not employed) (O.R. 3.57 95% C.I. 1.49–9.29) were associated with current overweight while among women age 50 and over, only overweight at age 30 was associated with current overweight (O.R 6.75 95% C.I. 1.77–44.47).

A review of dietary intake revealed no significant differences between hospital employees and public housing residents in daily total energy intake, total fat consumption, and saturated fat consumption (data not presented). Hospital workers, however, did have a significantly higher carbohydrate intake than did public housing residents ($p<0.001$).

DISCUSSION

We examined trends in the prevalence of overweight and obesity among two socioeconomically diverse groups of African Americans. Although public housing residents represented a lower SES group, hospital workers had a higher prevalence of overweight and obesity after controlling for gender, age, marital status and history of overweight (ages 20 and 30). This finding is consistent with that of Burke et al., who found no difference in the prevalence of overweight among African American women based on educational level.[19] In contrast, Winkleby et al.[12] found that 'high BMI's' were more prevalent among low SES women from each of three ethnic groups. Similarly, findings from NHANES I also show an inverse relationship between SES and the prevalence of overweight and obesity.[20]

In view of the similarities in energy intake between hospital employees and public housing residents, it is unlikely that the observed

differences in the current prevalence of obesity reflect differences in dietary intake. Our findings are more likely the result of differences in lifestyle influences, such as physical activity levels and current cigarette smoking, which were not examined in this study.

Previous studies of public housing residents in the study area,[21] revealed low automobile usage for daily activities and a high prevalence of walking (to grocery shop, to use telephone, and so forth) which, may have contributed to the lower prevalence of overweight and obesity we observed. Also likely, a contributor to the differences in the prevalence of overweight and obesity between hospital workers and public housing residents is the sedentary nature of the jobs performed by hospital workers in this study. An additional factor could be the "no smoking" policies currently in force at many hospitals that may be responsible for a high prevalence of snacking among hospital workers as they substitute food for smoking.

Cigarette smokers have been shown to have lower body weights compared to demographically similar nonsmokers.[22–24] Studies have also demonstrated a higher prevalence of sedentary lifestyle and cigarette smoking among members of lower socioeconomic groups.[25–27] If this were the case in this study, we would expect that, after controlling for other factors, hospital employees would have lower BMIs than public housing residents.

Other research suggests that individuals in physically demanding occupations such as laborers and service staff are less likely to be overweight. We found no difference in the prevalence of overweight by specific occupation, but our sample size for laborers may have been too small to detect statistically significant differences. In a study of British civil servants, increases in BMI were associated with lower employment grades.[28] A previous study of female hospital workers in Germany found that the prevalence of overweight was higher among cleaning staff than nurses and administrative staff.[29] Unfortunately, too few service personnel were included in our sample to evaluate this difference. Employed persons, however, had a higher prevalence of overweight than did unemployed persons.

The prevalence of overweight among female hospital workers is considerably higher than the 50.7% observed from NHANES III for women 20 and older, while for men, the reverse was true.[30] Less social pressure about weight among African Americans[31] may contribute to the high prevalence of overweight irrespective of educational levels or other measures of socioeconomic status examined in this study.

Few studies have examined how the prevalence of overweight and obesity among young adults influence the current prevalence among African Americans. A strength of this study is that we were able to evaluate whether overweight and obesity for each decade starting at age 20 predicted current overweight and obesity. Another strength was the socioeconomic diversity of this sample, which permitted an evaluation of occupation, education, employment status, and income as they relate to the prevalence of overweight and obesity among African Americans.

Several study limitations also warrant comment. First, the nonrandom selection of subjects could have introduced a selection bias. Thus, these findings may not be generalizable to all African Americans in the Washington, DC, area. Second, previous body weight was collected retrospectively and was self-reported. However, recalled past weight has been found to be well correlated with previously measured weight.[32,33] Women tend to underestimate previous weight, while the reverse is true among men.[34] Since we made no cross gender comparisons, gender bias in recall of previous weight would not affect this study's findings. Nevertheless, bias may have been introduced if hospital workers and public housing residents differed with regard to the recall of previous weight. Since we did not verify the accuracy of reported previous weight, we are unable to assess the presence of recall bias.

CONCLUSION

We found a high prevalence of overweight and obesity among all age and socioeconomic groups in this study. Interestingly, the observed association between socioeconomic status and the prevalence of overweight and obesity differed from that observed in other racial/ethnic populations, which warrants further investigation. In spite of the fact that other research has shown high body mass index to have a less deleterious effect on African Americans than whites[35], the high prevalence of overweight and obesity among African Americans cannot be ignored. African Americans, not coincidentally, also have a higher prevalence of obesity-related conditions, including diabetes, cardiovascular disease and osteoarthritis[36], which are major contributors to the morbidity and disability seen in this population. Therefore, there is a need to reduce the prevalence of obesity among African Americans, particularly among women. Future research should focus on a more in-depth study of the relationship between socioeconomic status and the correlates of obesity among African Americans.

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