Published in final edited form as:

Soc Sci Med. 2011 May ; 72(10): 1667–1673. doi:10.1016/j.socscimed.2011.03.039.

Obesity disparities among disadvantaged men: National adult male inmate prevalence pooled with non-incarcerated estimates, United States, 2002 – 2004

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Abstract

Obesity prevalence among inmates in the United States is unknown. Since incarceration disproportionately affects minorities, excluding inmates from surveys may bias national obesity estimates. Including inmates may also help explain racial obesity disparities among men. This descriptive study summarizes obesity prevalence among US male inmates and analyzes the effect of incarceration on national prevalence estimates. Data for male inmates came from the 2002 Survey of Inmates in Local Jails and the 2004 Survey of Inmates in State and Federal Correctional Facilities. Data for the non-incarcerated US adult male population came from the National Health Interview Survey. Self-reported weight and height data were analyzed from men aged 25 – 59 years for all surveys (obesity equaled $BMI \geq 30.0 \text{ kg/m}^2$). Pooled inmate obesity prevalence was less than non-incarcerated estimates across all race/ethnic-education subgroups. However, unlike non-incarcerated estimates, inmates had obesity disparities between Hispanics and non-Hispanic Whites. Merging inmate and non-incarcerated estimates lowered obesity prevalence among men aged 25 – 39 with lower education levels. Merged estimates showed a positive obesity gradient within Whites by education. This study indicates that the exclusion of inmates from national obesity estimates leads to overestimates in obesity prevalence, particularly for low SES White and Black men.

Keywords

USA; racial disparities; obesity; incarceration; gender disparities; prisons; men

Introduction

The Surgeon General and other national institutes have called for work to eliminate health disparities (USDHHS, 2000; IOM, 2003; AHRQ, 2003). However, there is limited research to understand why disparities exist (AHRQ, 2004). Minority race/ethnic groups and the poor are vulnerable populations; major health disparities among minorities account for premature mortality and disease burden when compared to the national average.

While obesity is a major chronic health issue in the U.S. – with over 30% of adults classified as obese (Ogden et al., 2006) – obesity disparities among groups are not well understood.

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Obesity varies by age, socio-economic status, and race/ethnic group among women, though little systematic variation has been observed among men (Ogden et al., 2006; Ogden et al., 2007; Darmon & Drewnowski, 2008; Drewnowski & Specter, 2004). Studies suggest that for women there is an inverse relationship between SES and obesity, while the pattern is either the opposite or inconsistent for men (Robinson et al., 2009; Zhang & Wang, 2004). It remains largely unclear why the patterns of obesity risk vary by gender among the most disadvantaged groups.

Factors such as incarceration that apply to and affect race/ethnic-education groups differently may help explain the lack of race/ethnic disparities in obesity among men. Recent growth in the U.S. inmate population is staggering. Over the past two decades the prison system has grown almost fourfold – a recent report found that 1 in 100 American adults are now in prison (Pew Center on the States, 2008). Uggen, Manza, & Thompson (2006), in documenting a new “criminal class” cite over 16 million felons and ex-felons presently. Using a life-course perspective, other researchers have documented the lifetime risks of imprisonment by race/ethnic group. Their findings suggest that incarceration has become a frequent and major life event, particularly for young black men (Pettit & Western, 2004).

This study assesses if there are race/ethnic-education disparities in the burden of obesity in incarcerated men, and by their inclusion in national estimates. The specific goals of this descriptive study are to: (1) estimate the prevalence of obesity among male adult inmates within race/ethnic-education subgroups; (2) compare obesity prevalence between male inmates and the non-incarcerated male population; and (3) explore the effects of including inmate obesity prevalence estimates on our understanding of national obesity race and socioeconomic disparities among men.

Incarceration and health

Studies have examined the effects of imprisonment on morbidity and mortality for populations – particularly for communicable diseases (US DOJ, 2002; Greifinger, 2006; NCCHC, 2002) and some chronic health conditions (Greifinger, 2006; James and Glaze, 2006; Maruschak, 2008; 2006; Wilper et al., 2009). Other research suggests that inmates may have better health than their non-incarcerated peers. Patterson (2010) found that mortality among black men in prison was less than among non-incarcerated black men. A study by Schnittker and John (2007) suggested that inmate health might actually improve after admission, particularly for those who were at severe disadvantage beforehand. However, there has yet to be an empirical study of the burden of obesity among prisoners, of relevance since it is a risk factor for other chronic public health burdens (NHLBI, 1998).

Incarceration and national obesity prevalence estimates

The growing incarcerated population may also affect disparities in national obesity prevalence. In particular, incarceration disproportionately affects young, indigent men of color. Nationally, 50% of inmates are Black and 17% are Hispanic (US DOJ, 2000) – these proportions are significantly higher than their proportions in the general population. Studies of SES and race/ethnicity and obesity risk among men find that the most disadvantaged groups have the lowest obesity prevalence (Zhang & Wang, 2004). The disproportionate removal of individuals who vary systematically in their obesity risk from the non-incarcerated population may affect our understanding of obesity disparities since national estimates are derived from the non-incarcerated population.

An emerging literature has already begun to document the effects of excluding inmates on national estimates (e.g., from national household surveys) as a form of sampling bias.

Research suggests that including inmates has implications for public health surveillance, particularly for infectious diseases such as HIV/AIDS that are relatively rare in the non-incarcerated population but prevalent among inmates (Pettit & Sykes, 2008). Another study found that high rates of joblessness due to incarceration explained up to 58% of the perceived increase in black wage gains during the 1990s for young men (Western & Pettit, 2005). As young, indigent men of color represent the majority of current inmates, their exclusion can substantially alter observed national disparities between race/ethnic and education groups.

Methods

This study uses anonymous, publicly available data and received human subjects exemption from the University of Washington Institutional Review Board. Data were self reported by respondents in all surveys. Estimates of inmate obesity prevalence were generated from three sources: (1) the 2002 Survey of Inmates in Local Jails; (2) the 2004 Survey of Inmates in State Correctional Facilities; and (3) the 2004 Survey of Inmates in Federal Correctional Facilities (BJS, 2002; BJS, 2004). All surveys are cross-sectional, nationally representative interviews conducted by the U.S. Census Bureau. The response rates were 84.1% for the 2002 Survey of Inmates in Local Jails; 89.1% for the 2004 Survey of Inmates in State Correctional Facilities; and 84.6% for the 2004 Survey of Inmates in Federal Correctional Facilities. In 2004, the relative proportions of inmates in federal and state correctional facilities, and local jails were 8%, 58%, and 34% respectively.

Prevalence of obesity for the non-incarcerated U.S. adult male population was calculated using the 2004 National Health Interview Survey (NHIS) (NCHS, 2004). The NHIS is a cross-sectional survey of civilian households in the U.S conducted by the National Center for Health Statistics. NHIS is based on a stratified multistage sample, where primary sampling units are based on counties. For each household sampled, a randomly selected adult is interviewed in-person using computer assisted interviews. In 2004, the response rate was 72.5%. Data for analyses were available for a total of 12,572 inmates and 8,899 non-incarcerated men (Table 1).

Inclusion criteria for all surveys were adult men from 25 to 59 years of age with valid height and weight data for calculating body mass index (BMI, calculated as kg/m^2). Participants with a BMI greater than or equal to 30 were categorized as obese. Potentially invalid BMI data was assessed as 1.5 times the interquartile BMI range. Only one case was identified as an outlier. Results excluding this case were not significantly different and are not presented. Age was categorized into two groups: 25 – 39 years and 40 – 59 years. Race was categorized as non-Hispanic White, non-Hispanic Black, or Hispanic. Educational levels were categorized as less than high school, high school diploma or GED, or more than high school.

Data were analyzed with Stata 10 (StataCorp, College Station, TX). All analyses included sample weights to account for non-response and oversampling of certain groups, and accounted for the NHIS complex survey design. Crude obesity estimates were generated for each inmate survey and then direct age standardized (Klein & Schoenborn, 2001) to the 2004 NHIS population and summarized by race/ethnic-education subgroups. These stratifications are similar to recent national estimates (e.g., Ogden et al. 2006) and were done since obesity is confounded by age, race/ethnicity, and education.

Pooled inmate estimates were calculated by combining all inmate surveys and treating each facility-type as a stratum and using the sample weights (Schenker, Gentleman, Rose, et al. 2002). To compare the effects of including inmates on national race/ethnic-education

disparities, weighted averages were computed from the pooled inmate estimate and the NHIS estimate. Weights were made up of two components to reflect the variance of survey estimates as well as the relative proportion of the population in the total population. First, the weights are based on the inverse of the within study variance. Second, to correct for potentially disproportionate contributions of a given sub-population on an estimate, each weight was also multiplied by the proportion of the estimated sub-population to the estimated total population (derived from totaling the survey weights) (Botman and Jack, 1995; Wong et al., 2002). Analyses treating inmates and non-incarcerated civilians as sampling strata, and accounting for weights, stratification, and clustering of each survey were not done since the public-use inmate surveys do not include survey design variables.

Overall differences between race/ethnic-education groups were tested using t tests at the .05 significance level. In specifying logistic regression models, potential interactions were examined between education and race, and age and race. All two-way interaction terms were dropped from the model because they were not statistically significant. No three-way interactions were tested.

Results

Among inmates overall, the crude prevalence estimates of obesity were 27.6% for federal and 24.4% for state correctional facilities, and 18.4% for local jails. Pooling together all three surveys yielded an overall obesity prevalence of 22.8% for the entire inmate population. Specific estimates are presented by race/ethnicity and education in Table 2 for each survey and for the pooled total inmate population.

Tests using logistic regression adjusted for age and education showed a significant difference in obesity prevalence between non-Hispanic Blacks and Hispanics relative to Whites for all inmate surveys (Table 3). The pooled odds ratio for all inmates also showed significant differences across race/ethnic group compared to Whites: non-Hispanic Blacks had 1.50 times the odds of being obese (CI = 1.36 – 1.66); Hispanics had 1.32 times the odds of being obese (CI = 1.14 – 1.54). Results were less consistent across surveys for age and education adjusting for race/ethnic group. For federal and state correctional facilities, older men were significantly more likely to be obese (federal OR = 1.36, CI = 1.05 – 1.75; state OR = 1.23, CI = 1.11 – 1.37). For the pooled total inmate population, older men were significantly more likely to be obese (OR = 1.15, CI = 1.05 – 1.25).

National non-incarcerated estimates were similar to recent studies (Ogden et al. 2006). Non-Hispanic Blacks had 1.25 times the odds of being obese compared to Whites (OR = 1.25, CI = 1.05 – 1.48) (Table 3) (CDC 2005). The most educated men were significantly less likely to be obese than the least educated men (OR = 0.82, CI = 0.69 – 0.98). Older men (ages 40 – 59 years) were significantly more likely to be obese than their younger counterparts (OR = 1.22, CI = 1.09 – 1.37).

To compare the prevalence of obesity among inmates to the non-incarcerated population, crude estimates were age adjusted to the NHIS population (Table 4). Across all race/ethnic-education subgroups the prevalence of obesity is lower among the pooled inmate estimate compared to the non-incarcerated population.

To compare whether national race/ethnic and education subgroup differences are affected by including the incarcerated population, the Figure presents obesity prevalence by age and race/ethnic and education subgroups for the non-incarcerated male population and for the pooled estimate including the incarcerated population. For estimates of obesity prevalence, the inclusion of the incarcerated population lowers the obesity prevalence across all race/ethnic and education subgroups except for Hispanics, and Whites and Blacks with more than

a high school education. For men ages 25 – 39 in the Figure (left column), the most dramatic reduction is among those with less education. For Whites, obesity prevalence reduced from 23.8% to 19.9% for those with less than a high school diploma/GED when including the incarcerated population; for those with a high school diploma/GED obesity prevalence reduced from 25.4% to 21.0%. For Blacks, obesity prevalence reduced from 29.1% to 26.4% for those with less than a high school diploma/GED. For men ages 40 – 59 in the Figure (right column), while obesity prevalence was slightly reduced for some groups, the impact of including inmates was far less dramatic due to the smaller number of older inmates in the sample.

Comparing within race/ethnic subgroups in the Figure, for men ages 25 – 39 including the incarcerated population indicated that higher education was associated with higher obesity prevalence within Whites. For Blacks ages 25 – 39 in the Figure, including the incarcerated population showed those with less than a high school education having the lowest obesity prevalence estimate. For Hispanics, amongst men ages 25 – 39 the significant difference between those with less than a high school education and those with a high school diploma or GED from the non-incarcerated civilian estimate remained by including inmates.

Comparing between race/ethnic subgroups in the Figure, no significant differences were shown by including the incarcerated population. For instance, the estimated obesity prevalence among men ages 25 – 39 with less than a high school education is similar between non-Hispanic Whites, Blacks, and Hispanics.

Discussion

This study estimated the national prevalence of obesity among adult male inmates. Crude prevalence rates summarized the obesity burden among inmates by type of facility and race-education subgroups. Adjusting for age, male inmates (as a pooled population) have lower obesity prevalence than the male civilian population across all race-education subgroups. Controlling for age, education, and race/ethnic group showed similarities and differences in the odds of being obese between inmates and the non-incarcerated population. For both non-incarcerated males and inmates in state and federal facilities, older men were more likely to be obese than their younger counterparts. For both non-incarcerated males and inmates in any facility, non-Hispanic Blacks were more likely to be obese compared to non-Hispanic Whites. However, the most educated men were less likely to be obese compared to the least educated in the non-incarcerated population but not among inmates. Inmates also showed obesity disparities between Hispanics and non-Hispanic Whites across facilities, but these differences did not emerge among non-incarcerated estimates.

This research also explored the effects of excluding inmates from national obesity estimates based solely on the non-incarcerated population. Among younger men with less than a high school education, national obesity prevalence including inmates reduced estimates for non-Hispanic Whites and Blacks. Further, national estimates including inmates showed a positive obesity-education gradient within non-Hispanic Whites but not within other race/ethnic groups. National estimates were not substantially altered for older men by including inmates due to the relatively small size of the older incarcerated population.

Other studies have also found lower obesity prevalence among disadvantaged men (e.g., Zhang & Wang, 2004). However, while pooled inmate estimates suggested lower overall obesity prevalence than the non-incarcerated population, they also indicate that unobserved characteristics of inmates vary systematically by facility type. Further research is needed to understand how exposure to incarceration affects current and later obesity status once inmates are released. For instance, incarceration may be protective due to constrained

lifestyle choices, such as limited eating times and enforced physical activity. These constraints may vary by facility-type (as suggested by this study), length, and frequency of exposure to the penal system.

Limitations

This study has limitations. First, height and weight were self-reported in all surveys, resulting in a likely underestimation of obesity prevalence. Research suggests that men may over report height, leading to systematically lower estimates of obesity prevalence (Mokdad et al., 1999). It is also unknown if incarcerated men may systematically self-report height and weight differently than the non-incarcerated population. For the civilian data, NHIS data were used instead of the National Health and Nutrition Examination Survey (NHANES). While NHANES data may be more accurate since it is based on measured height and weight, NHIS was selected because it is based on self-reported height and weight and has the same reporting approach as the inmate surveys – though it is still unknown if biases in reporting systematically vary between the incarcerated and non-incarcerated populations.

Second, data come from four different surveys that may have systematic differences that affect obesity estimates. However, inter-survey variability is likely reduced since all responses are self-reported and administered by trained interviewers from the Census Bureau. Also, all surveys but the 2002 Survey of Inmates in Local Jails were from 2004. The local jail population grew from 581,411 male inmates in 2002 to 619,908 in 2004 (Harrison & Beck, 2004), meaning that their weight in pooled inmate totals are slightly lower than if data from 2004 were available.

Third, this study is unable to analyze potential mechanisms underlying the observed differences in obesity disparities. Data on the frequency and duration of incarceration have a large non-response bias. Further, the data are cross-sectional and thus unable to address the causal effects of incarceration on male inmates over time or after release. Similarly, due to the cross-sectional data and relatively small sample sizes, this study is unable to explore cohort effects.

Fourth, this study only estimated obesity prevalence among male inmates. Though women represent a rapidly increasing proportion of the inmate population, men remain the overwhelming majority of those currently incarcerated (Pew Center on the States, 2008).

Fifth, the pooled inmate estimate was combined with the non-incarcerated estimate using weights to account for within survey variance, and the proportion of the total population. A more robust approach would be to estimate the combined prevalence by treating inmates and the non-incarcerated population as sampling strata of an overall population and using the study weights (Schenker, Gentleman, Rose, et al. 2002). Variance estimates could then take into account survey weights and other design factors (i.e., stratification, clustering). However, the public-use data for all three inmate surveys do not provide survey design-level variables.

Conclusion

As the inmate population continues to grow this study suggests that greater attention is needed to understand their current health status and racial health inequities among inmates. This research also underscores the importance for public health agencies and researchers to consider omitted groups when understanding health outcomes and inequities, particularly when the groups vary systematically from the national population.

Acknowledgments

Special thanks to Drs. Becky Pettit and Jerald Herting (University of Washington) for their invaluable guidance throughout this research. I would also like to thank two anonymous referees who provided excellent feedback. A preliminary draft of this paper was presented at the Population Association of America Annual Meeting, April 30 – May 2, 2009, Detroit, MI. This research was supported by the Center for Studies in Demography and Ecology, University of Washington, which is funded by the Demographic and Behavioral Science Branch of the National Institute of Child Health and Human Development (EKSnichd) at NIH.

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Research Highlights

- Inmates are not a homogenous group; obesity prevalence varies among local jails, and state and federal facilities.
- Race/ethnic obesity disparities exist among male inmates – a finding not often replicated among the non-incarcerated.
- Excluding inmates from national obesity estimates biases our understanding of obesity among disadvantaged sub-populations.

Figure 1.

Comparison of Obesity Prevalence (BMI ≥ 30) between US Non-Incarcerated Males Only and Combined with Pooled Inmate Totals,^a by Age, Race/Ethnic Group and Education, Ages 25 – 59. Symbols and bars indicate estimate and 95% confidence interval.

^a Combined using weights of the inverse within study variance and population proportions.

Table 1

Sample Size^a of US Male Inmates by Facility and Non-Incarcerated Males by Racial/ Ethnic Group and Education, Aged 25 – 59 Years, 2002 – 2004

Characteristic	Incarcerated			Non-Incarcerated	
	Federal (n = 1,738) [*]	State (n = 7,775) [*]	Local (n = 3,059) [*]	Total (N = 12,572)	All (N = 8,899) [*]
Non-Hispanic White					
All education	622	3,134	1,121	4,877	5,659
Less than high school	235	1,823	329	2,387	492
High school diploma/GED	140	742	593	1,475	1,606
More than high school	247	569	199	1,015	3,561
Non-Hispanic Black					
All education	953	3,710	1,189	5,852	1,134
Less than high school	584	2,450	447	3,481	173
High school diploma/GED	175	794	543	1,512	388
More than high school	194	466	199	859	573
Hispanic					
All education	119	671	580	1,370	1,720
Less than high school	75	518	321	914	732
High school diploma/GED	22	91	203	316	454
More than high school	22	62	56	140	534

^{*} Totals include race/ethnic groups not shown separately above

^a Unweighted sample size is reported

Table 2

Unadjusted (Crude) Prevalence of Obesity (BMI $\geq$ 30) in US Male Inmates Aged 25 – 59 Years, by Facility, Race/Ethnic Group and Education, 2002 – 2004

Prevalence of Obesity, % (95% Confidence Interval)				
	Federal	State	Local	Total ^a
All				
All education	27.6 (25.2, 30.1)	24.4 (23.4, 25.3)	18.4 (17.0, 19.9)	22.8 (22.0, 23.6)
Less than high school	28.9 (25.5, 32.3)	24.2 (23.0, 25.4)	17.3 (15.0, 19.6)	23.1 (22.0, 24.1)
High school diploma/GED	30.1 (24.5, 35.6)	25.9 (23.8, 28.1)	18.5 (16.4, 20.6)	22.6 (21.1, 24.0)
More than high school	22.7 (18.6, 26.8)	23.1 (20.6, 25.5)	21.0 (17.2, 24.9)	22.4 (20.5, 24.3)
Non-Hispanic White				
All education	21.8 (18.1, 25.5)	20.3 (18.9, 21.8)	15.1 (13.0, 17.3)	18.9 (17.8, 20.1)
Less than high school	21.0 (14.9, 27.1)	19.7 (17.8, 21.5)	16.1 (12.0, 20.2)	19.1 (17.5, 20.2)
High school diploma/GED	23.9 (15.9, 31.9)	21.6 (18.7, 24.6)	14.1 (11.2, 16.9)	18.2 (16.2, 20.2)
More than high school	21.2 (15.8, 26.7)	20.8 (17.5, 24.1)	16.6 (11.1, 22.2)	19.7 (17.1, 22.4)
Non-Hispanic Black				
All education	30.4 (27.1, 33.8)	27.1 (25.7, 28.6)	21.1 (18.6, 23.6)	25.8 (24.7, 27.0)
Less than high school	31.2 (26.9, 35.4)	26.7 (24.9, 28.4)	19.6 (15.8, 23.5)	25.9 (24.3, 27.4)
High school diploma/GED	34.1 (26.0, 42.1)	29.3 (26.1, 32.5)	20.8 (17.2, 24.5)	26.0 (23.6, 28.3)
More than high school	24.2 (17.5, 31.0)	25.7 (21.7, 29.8)	25.2 (18.6, 31.8)	25.4 (22.2, 28.6)
Hispanic				
All education	30.3 (21.0, 39.5)	26.9 (23.5, 30.3)	18.9 (15.6, 22.3)	23.3 (20.9, 25.6)
Less than high school	33.7 (21.6, 45.8)	27.6 (23.7, 31.4)	16.6 (12.3, 21.0)	23.4 (20.6, 26.3)
High school diploma/GED	26.7 (6.3, 47.1)	24.0 (15.3, 32.6)	21.7 (15.9, 27.6)	22.5 (17.8, 27.3)
More than high school	22.4 (4.1, 40.6)	25.8 (14.8, 36.8)	22.2 (11.0, 33.3)	23.8 (16.5, 31.2)

^aTotal calculated using survey weights and facilities as strata

Table 3

Logistic Regression of Obesity (BMI ≥ 30) in US Male Inmates by Facility and Non-Incarcerated Males, Aged 25 – 59 Years, 2002 – 2004

Odds Ratio (95% Confidence Interval)					
	Incarcerated	Non-Incarcerated	Non-Incarcerated Combined with Inmate ^b		
	Federal	State	Local	Total ^a	
Age, y					
25 – 39	1.0	1.0	1.0	1.0	1.0
40 – 59	1.36 (1.05, 1.75)	1.23 (1.11, 1.37)	0.85 (0.69, 1.05)	1.15 (1.05, 1.25)	1.22 (1.09, 1.35)
Education					
Less than High School	1.0	1.0	1.0	1.0	1.0
High School Diploma/GED	1.10 (0.80, 1.51)	1.12 (0.98, 1.28)	1.13 (0.91, 1.41)	1.00 (0.90, 1.10)	0.96 (0.80, 1.12)
More than High School	0.75 (0.55, 1.01)	0.96 (0.82, 1.12)	1.34 (1.00, 1.79)	0.99 (0.87, 1.12)	0.82 (0.69, 0.95)
Race/ethnicity					
Non-Hispanic White	1.0	1.0	1.0	1.0	1.0
Non-Hispanic Black	1.64 (1.24, 2.17)	1.48 (1.31, 1.65)	1.51 (1.20, 1.89)	1.50 (1.36, 1.66)	1.28 (1.09, 1.47)
Hispanic	1.67 (1.02, 2.74)	1.49 (1.23, 1.81)	1.35 (1.01, 1.78)	1.32 (1.14, 1.54)	1.03 (0.88, 1.18)

^aTotal calculated using survey weights and facilities as strata

^bCalculated using weights of the inverse within study variance and population proportions

Age-Adjusted Prevalence of Obesity (BMI ≥ 30) in US Male Inmates and Non-Incarcerated Males Aged 25 – 59 Years, by Facility, Race/Ethnic Group and Education, 2002 – 2004

Table 4

		Prevalence of Obesity, % (95% Confidence Interval)			
		Incarcerated		Non-Incarcerated	
		Federal	State	Local	Total ^a
All					
All education		28.2 (25.6, 30.8)	25.0 (23.9, 26.0)	17.9 (16.3, 19.5)	23.2 (22.3, 24.0)
Less than high school		30.5 (26.6, 34.5)	25.7 (24.3, 27.0)	16.4 (13.8, 18.9)	24.2 (23.1, 25.4)
High school diploma/GED		30.0 (24.0, 36.0)	25.3 (23.1, 27.5)	18.2 (15.9, 20.5)	22.2 (20.6, 23.7)
More than high school		2.9 (18.7, 27.0)	22.9 (20.5, 25.4)	20.3 (16.5, 24.2)	24.6 (23.2, 26.0)
Non-Hispanic White					
All education		21.9 (18.2, 25.6)	20.8 (19.4, 22.4)	15.1 (12.8, 17.4)	19.4 (18.2, 20.6)
Less than high school		22.5 (16.1, 28.9)	20.9 (18.9, 22.9)	15.7 (11.0, 20.3)	20.3 (18.5, 22.1)
High school diploma/GED		23.9 (15.9, 31.9)	21.4 (18.3, 24.4)	14.5 (11.4, 17.6)	18.3 (16.2, 20.4)
More than high school		21.1 (15.5, 26.6)	20.8 (17.4, 24.1)	16.2 (10.7, 21.7)	19.7 (17.0, 22.3)
Non-Hispanic Black					
All education		31.8 (27.9, 35.7)	27.9 (26.3, 29.5)	20.0 (17.4, 22.6)	26.2 (24.9, 27.5)
Less than high school		33.6 (28.3, 38.9)	28.5 (26.5, 30.5)	18.9 (14.7, 23.0)	27.3 (25.6, 29.0)
High school diploma/GED		31.7 (22.2, 41.2)	28.3 (25.0, 31.7)	19.7 (15.8, 23.7)	24.9 (22.4, 27.4)
More than high school		25.9 (18.7, 33.2)	25.6 (21.6, 29.7)	23.3 (16.9, 29.7)	25.1 (21.9, 28.3)
Hispanic					
All education		26.1 (14.8, 37.5)	27.3 (23.4, 31.1)	17.8 (13.9, 21.6)	22.9 (20.3, 25.7)
Less than high school		24.6 (11.2, 37.9)	28.7 (24.0, 33.3)	14.8 (10.1, 19.5)	23.4 (20.0, 26.8)
High school diploma/GED		35.4 (9.3, 61.4)	23.7 (14.3, 33.0)	21.0 (13.9, 28.0)	22.3 (16.7, 27.8)
More than high school		16.2 (3.9, 28.5)	24.3 (13.3, 35.2)	22.1 (9.6, 34.6)	22.5 (14.8, 30.1)

^aTotal calculated using survey weights and facilities as strata

Inmate obesity prevalence was standardized to the 2004 National Health Interview Survey population by direct age standardization.