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Geographical Variation in the Prevalence of Obesity and Metabolic Syndrome Among U.S. Adolescents

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Abstract

Background: Among adolescents, obesity and the metabolic syndrome (MetS) contribute to adult cardiovascular disease (CVD) risk. By parent report, obesity prevalence in the U.S. was highest in the South.

Objectives: Determined the prevalence of obesity and MetS by U.S. division and region.

Methods: In-person assessment of 4,600 U.S. adolescents age 12–19 years participating in the National Health and Nutrition Examination Survey, 1999–2014.

Results: Prevalence of obesity was highest in the East North Central division (21.3%) and the 3 census divisions in the South (all >20%), compared to lower prevalence in the Mountain and New England divisions (both <15%). MetS was most prevalent in the 2 divisions in the Midwest (both >10%), and lowest in the Mountain and New England divisions (both <6%). For the amount of obesity in each division, there was a relatively higher prevalence of MetS in the West North Central division (obesity 17.1%, MetS 13.6%) and lower prevalence in the East South Central (obesity 23.5%, MetS 6.6%) and South-Atlantic divisions (obesity 20.4%, MetS 6.7%).

Conclusions: The degree of obesity- and MetS-related risk among adolescents in the Midwest is higher than suggested from previous parent-reported weight data. The Midwest and South may warrant particularly strong CVD prevention efforts.

Keywords

Pediatric; adolescent; obesity; metabolic syndrome; geography

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INTRODUCTION

Over the past 30 years there has been an alarming rise in pediatric obesity, placing the current generation at high risk for health problems related to future type 2 diabetes mellitus (T2DM) and cardiovascular disease (CVD).¹ However, not all obese children and adolescents are at high risk for future disease, with lower risk for those whose adipose tissue is almost entirely stored in subcutaneous depots²—making it difficult to assess risk based on BMI alone.

A more specific means of estimating future disease risk is via assessment of the metabolic syndrome (MetS).³ MetS is a cluster of cardiovascular risk factors that appear to be linked by underlying insidious processes including adipocyte dysfunction, systemic inflammation and oxidative stress.^{4, 5} In childhood and adolescence MetS is classified using criteria such as those based on the Adult Treatment Panel III (ATP-III), assessing for obesity, high blood pressure (BP), high triglycerides, low HDL cholesterol and high fasting glucose.⁶ Individuals are determined to have MetS if they have abnormalities in three of these five components of MetS. The severity of MetS can additionally be determined using continuous scores, such as a sex- and race/ethnicity-specific MetS severity Z-score that we formulated from nationally-representative data.⁷ Both modified ATP-III MetS^{6, 8} and the MetS severity score in childhood^{9–11} are strongly associated with risk of CVD and T2DM in adulthood, much more so than is obesity. Odds ratios (OR's) for future T2DM and CVD in the presence of pediatric obesity (vs. normal weight) were 1.7¹² and 1.33,¹³ respectively, but for pediatric MetS (vs. no MetS) were 11.5⁶ and 14.6,⁸ demonstrating a dramatically higher degree of specificity in risk prediction.

Unfortunately, prevention and treatment of obesity and MetS has proven elusive, with prevalence among U.S. adolescents continuing at 17% for obesity¹ and 9.8% for MetS¹⁴ over the past 12 years, while there has been a slight decrease in the severity of MetS recently.¹⁴ There remains a need for increased awareness of these risks and focus on lifestyle change. To make these efforts more efficient, the Institute of Medicine has recommended targeting efforts to areas particularly affected.¹⁵ While the IOM recommendations focused on geographic distribution of obesity, an estimate of geographical prevalence of MetS is likely to provide a more accurate glimpse of future CVD and diabetes risk for the current generation of adolescents.

Singh et al reported geographic distribution of obesity for children and adolescents age 10–17 years, based on parentally-reported height and weight;¹⁶ however, this method is prone to recall bias.¹⁷ In addition, to our knowledge, no one has reported the geographic distribution of MetS among US adolescents. Our goal in the current study was to assess for geographic variation in a national sample of adolescents for measured obesity, MetS and MetS severity. We hypothesized that we would note variation in regions with high prevalence of obesity and those with high prevalence of MetS in ways that may help focus preventative efforts to reduce future CVD.

METHODS

Data were obtained from National Health and Nutrition Examination Survey (NHANES) 1999–2014, a complex, multistage probability sample of the U.S. population. These annual cross-sectional surveys are conducted by the National Center for Health Statistics (NCHS) of the Centers for Disease Control; the NCHS ethics review board approved the survey and participants provided informed consent. Participants answered questionnaires and underwent measures of WC, and blood pressure (BP); laboratory measures of fasting triglycerides, HDL-C, and fasting glucose were obtained using standardized protocols and calibrated equipment (<http://www.cdc.gov/nchs/nhanes.htm>). Analyses were performed at a NCHS Research Data Center due to use of geographic variables. Survey procedures in SAS were used to estimate prevalence across the nine U.S. census divisions (New England, Mid-Atlantic, East North Central, West North Central, South Atlantic, East South Central, West South Central, Mountain and Pacific); due to sample size restrictions, prevalence by sex and race/ethnicity were reported across the four census regions (Northeast, Midwest, South, West). The groupings of the U.S. census divisions into regions are shown in Supplementary Figure 1. Adolescents 12–19 years of age were included in the analysis; participants were excluded if reporting they were pregnant or if they were missing any variables related to MetS, diabetes status, BMI, or geographic location (Supplementary Figure 2).

Obesity was defined as BMI ≥95 percentile for age and sex. MetS was defined using a commonly-used pediatric/adolescent adaptation of traditional adult criteria.^{18, 19} Participants had to meet ≥3 of the following 5 criteria: concentration of triglycerides ≥110 mg/dL, HDL-C ≤40 mg/dL, WC ≥90th percentile for age/sex,²⁰ glucose concentration ≥100 mg/dL, and systolic or diastolic BP ≥90th percentile (age, height, and sex-specific).²¹

MetS severity Z-scores were calculated using sex- and race-based formulas. As described elsewhere,^{7, 22, 23} these scores were derived using a confirmatory factor analysis approach for the 5 traditional MetS components (WC, triglycerides, HDL-cholesterol, systolic BP, fasting glucose) to determine the weighted contribution of each component to a latent MetS “factor” on a sex- and race/ethnicity-specific basis. Confirmatory factor analysis was previously performed among adolescents 12–19 years from NHANES 1999–2010 with categorization into six sub-groups based on sex and race/ethnicity (non-Hispanic white, non-Hispanic black and Hispanic). For each of these six population sub-groups, loading coefficients for the 5 MetS components were transformed into a single MetS factor and used to generate equations to calculate a standardized MetS severity score for each sub-group (<http://met.health-outcomes-policy.ufl.edu/calculator/>). The resulting MetS severity scores are Z-scores (normally distributed and ranging from theoretical negative to positive infinity with mean=0 and SD=1) of relative MetS severity on a sex- and race/ethnicity-specific basis. These scores correlate strongly with other markers of MetS risk, including hsCRP, uric acid and the homeostasis model of insulin resistance,⁷ with future adiponectin²⁴ and with long-term risk of CVD⁹ and T2DM.¹⁰

Statistical Analysis

Survey procedures using SAS 9.4 (Cary, NC) were used to account for the complex survey design of NHANES. These procedures were used to estimate prevalence of obesity, ATP-III

MetS, and diabetes, along with mean MetS Z-scores and BMI, by various demographic subgroups as well as by U.S. Census Division and Region. For easier comparison, the MetS Z-scores were then converted to their corresponding percentile rankings (e.g., Z score of 0=50th percentile; Z-score of 0.5=69th percentile, etc.).

RESULTS

Demographic distribution by US census division and region

Table 1 displays demographic characteristics for the 4,600 adolescents included in the analytic sample by census division and region. Compared to other regions, there was a higher proportion of non-Hispanic whites in the Midwest, a higher proportion of non-Hispanic blacks in the South and a higher proportion of Hispanics in the West.

Obesity, MetS and MetS severity by US census division

Figure 1 displays proportion of adolescents with obesity and MetS and mean MetS severity percentile by US division. Prevalence of measured adolescent obesity was highest in the East North Central and the three divisions comprising the South, all of which had obesity prevalence >20%. Obesity prevalence was lowest in the Mountain and New England divisions, both with prevalence <15%. The separation of these was such that the East South Central (23.5%) had nearly twice the obesity prevalence seen in the Mountain division (12.3%).

The prevalence of ATP-III-based MetS in adolescents (Figure 1B) was highest in the two divisions comprising the Midwest, both with MetS prevalence >10%. MetS was lowest in the New England and Mountain divisions, each of which were <6%. Despite having the highest prevalence of obesity, the East South Central division had a modest prevalence of MetS at 6.6%.

Figure 1C provides mean MetS severity Z-scores expressed as a percentile of the US population of adolescents at the time the score was derived (NHANES '99-'10). The East North Central had the highest degree of MetS severity, at the 54.3 percentile, followed by the East South Central, West North Central and West South Central (all 51.3–52.9). The Pacific division was the lowest, with a mean MetS Z-score at the 45.8 percentile.

Prevalence of obesity, ATP-III, MetS Z, BMI by sex and race/ethnicity

Table 2 provides prevalence of obesity, ATP-III-based MetS, MetS Z, and BMI by the four US regions and by sex and race/ethnicity. Compared to other regions, the South had the highest overall prevalence of measured obesity (21.6%). This was related at least in part to the South having the highest prevalence among all regions for obesity among non-Hispanic white (22.3%) and non-Hispanic black (21.4%) males. Among females, the Midwest (compared to other regions) had the highest prevalence of obesity, both overall (22.1%) and in each of the racial/ethnic groups (non-Hispanic whites 27.8%, non-Hispanic blacks 20.0%, Hispanics 27.8%). The West had the lowest prevalence of obesity overall (15.8%), led largely by exhibiting the lowest prevalences among all regions for non-Hispanic white males (11.6%) and females (13.7%) and non-Hispanic black females (14.6%).

The prevalence of ATP-III-based MetS was by far highest in the Midwest at 11.4%, which compared to the next closest regions was 38% higher among males and 80% higher among females (Table 2). The Northeast and West had similar lower prevalence of ATP-III MetS at 6.3%. We were unfortunately not able to break these numbers down by race/ethnicity because some cells had insufficient numbers by CDC guidelines

Mean MetS severity Z-scores were highest of all regions in the Midwest, both among males (0.24) and females (−0.08) and among 5 out of the 6 sex- and racial/ethnic subgroups (all except non-Hispanic white males). MetS Z-scores were lowest in the West among males (0.03) and females (−0.21) and among all sex- and racial/ethnic subgroups.

Abnormalities in individual MetS components

Supplementary Table 1 provides prevalence of abnormalities in the individual MetS components by the four US regions and by sex- and racial/ethnic group. Prevalence of elevated systolic blood pressure was greatest in the South, both among adolescent males (10.7%) and females (7.6%), driven by high prevalence among non-Hispanic-black males (15.3%) and females (9.8%). Prevalence of elevated fasting glucose was greatest in the West (17.1%), followed by the Midwest (16.9%). Prevalence of elevated triglycerides was much higher in the Midwest (26.5%) compared to all other regions (all <21.5%). Prevalence of low HDL cholesterol was highest in the South (16.9%), followed by the Midwest (16.1%) and lowest in the West (11.8%).

DISCUSSION

In this assessment of obesity, MetS and MetS severity among U.S. adolescents, we found consistently higher risk in the South and Midwest. While higher prevalence of obesity has been noted previously among adolescents in the South using parent-reported height and weight,¹⁶ our data provide updated prevalence based on measured BMI and to our knowledge is the first report of geographical differences in the prevalence of MetS, a much more specific marker of risk for future T2DM⁶ and CVD.⁸ We were particularly struck by risk in the East North Central division, which was at or close to being the highest-risk geographical area for obesity, ATP-III-based MetS and MetS severity percentile. Because of strong associations between childhood MetS and MetS severity with future T2DM^{6, 10} and CVD,^{8, 9} these data have implications for a potentially greater burden of CVD in the South and Midwest in the coming years, as these adolescents become adults. Given recommendations by the Institute of Medicine to target prevention efforts to areas at highest risk, a higher degree of effort should be considered for these areas.¹⁵

These estimates of the prevalence of adolescent obesity based on in-person measurements reflect a higher degree of obesity in the Midwest than reported in the prior survey based on parent-reported heights and weights.¹⁶ A similar geographical discrepancy was previously seen among adults,²⁵ who exhibited a prevalence of measured obesity that was higher in the Midwest than reported via phone surveys.²⁶ This is not surprising given that self-reported and parent-reported height and weight estimates can result in up to 20–40% misclassification,^{17, 27} highlighting the need for more accurate data such as these.

Systematic measurement of MetS variables, requiring fasting blood draw, is even more difficult to achieve but assists in risk identification.

While we noted similarities in how obesity and MetS were distributed geographically, there were also contrasts by area, including higher degree of MetS relative to obesity in the West North Central and a lower degree of MetS relative to obesity in the East South Central. In the case of the East South Central, this may be due to the higher proportion of the population who are non-Hispanic blacks. As a group, non-Hispanic-black individuals have been noted to have a lower prevalence of MetS relative to other groups,²⁸ despite having a higher degree of insulin resistance²⁹ and greater risk for T2DM³⁰ and death from CVD³¹—which are both strongly associated with MetS. Prior studies have implicated a lower prevalence of lipid abnormalities among non-Hispanic blacks as a contributing factor.^{28, 32} Indeed, we noted that non-Hispanic black adolescents in the South had very low prevalence of elevated triglycerides (11.3% in males and 4.6% in females) and low HDL (10.0% in males and 7.7% in females) relative to other groups (all >20.1% in males and 11.1% in females)(eTable 1). It was because of these types of racial/ethnic differences in MetS that we formulated the MetS Z-score on a race/ethnicity-specific basis.⁷ Interestingly, in looking at geographical distribution of mean MetS severity percentile levels (based on these race/ethnicity-specific estimates), the East South Central division had the second highest of all divisions—which is overall closer to risk suggested by the obesity prevalence there.

By contrast, the West North Central division appeared to have the highest MetS prevalence in part because of a high proportion of lipid abnormalities among non-Hispanic white males, who made up 43% of the population in the division and among whom 35% had elevated triglycerides and 34% had low HDL cholesterol. These findings by geographic area have not previously been reported and warrant further investigation, as they may be related to differences in lifestyle factors—including both dietary intake and physical activity,³³ both of which represent modifiable risk factors that could be targeted via division-specific initiatives.¹⁵

Compared to a similar geographical survey of MetS among adults,²⁵ we noted a wider difference for adolescents in MetS prevalence between the Midwest region and the South compared to other areas. Among adults, the difference in the divisions with the lowest and highest MetS prevalence was the Pacific at 29% and the West North Central at 40% (i.e. 37% higher in absolute terms), whereas in adolescents the biggest difference was between New England at 4.6% and the West North Central at 13.6% (i.e., 196% higher in absolute terms), further emphasizing the potential for targeting certain divisions for public health efforts such as increases in physical education funding in schools other school-based health promotion efforts,³⁴ and advertising campaigns against obesogenic foods such as sugar sweetened beverages.³⁵

It is important to note that there has not been a consensus regarding the criteria for classifying MetS among adolescent. We used a set of modified ATP-III criteria REF-Ford, but multiple other options exist that would have likely resulted in slightly different prevalence estimates across these geographical areas. These include the adolescent criteria proposed by the International Diabetes Federation,³⁶ which emphasized the importance of

central adiposity by making these a necessary component and the criteria by Jolliffe et al,³⁷ which emphasized the normal shift in MetS components over the course of adolescent development by determining cut-offs for individual components that correspond to the age of the adolescent, up to where adult cut-offs apply at age 20 years. In one survey of data from NHANES 1999–2006,¹⁹ when MetS prevalence using multiple criteria was compared, the criteria we used estimated at 8.1%, while the IDF criteria was 4% and the ATP-III-based Jolliffe criteria was 6.8%—suggesting that the MetS prevalence reported in the current study may have been slightly lower across geographical areas if one of these sets of criteria had been used. The emphasis of the Jolliffe criteria on normal changes in MetS component values during adolescence underscores the effects that puberty has on these values over time. In the current analysis, we lacked data regarding pubertal status of these adolescents. The effect of these changes in MetS over the course of puberty and how these changes affect future risk for adult disease remain an area for further investigation.

While these data represent the recent measured differences of obesity and MetS, they do have some limitations. NHANES data are cross-sectional, restricting conclusions regarding causative relationships between measures of obesity and MetS. Additionally, as a survey, NHANES is designed to be nationally-representative overall and not necessarily by individual division. At least in part because of this, these data involve wide confidence intervals, limiting some conclusions regarding differences between divisions and regions. Finally, the data we used in this geographical assessment (NHANES 1999–2014) overlaps with the data that we used in deriving the MetS severity Z-score (NHANES 1999–2010); nevertheless, the current analysis is not presented as further validation of this score but merely as a report of differences geographical area.

In conclusion, we found that divisions in the Midwest had a higher prevalence of measured obesity than previously published using self-reported data and had the highest prevalence of MetS overall, driven largely by lipid abnormalities. These data bode poorly for future risk of CVD in the center of the country, emphasizing a need for division-specific interventions toward improved health for adolescence and beyond.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Figure 1: Prevalence of Obesity and Metabolic Syndrome (MetS) and Percentile of MetS Severity by U.S. Census Division from National Health and Nutrition Examination Survey, 1999–2014.

Data shown for prevalence of A. obesity and B. metabolic syndrome and C. mean percentile of MetS severity among U.S. adolescents age 12–19 years.

Table 1.

Demographic Distributions within U.S. Census Divisions and U.S. Census Regions among Adolescents 12–19 years old in the National Health and Nutrition Examination Survey, 1999–2014.

	n	Sex: Male		Age (years)		Non-Hispanic White		Non-Hispanic Black		Hispanic	
		% [†]	95 CI	Mean	95 CI	% [†]	95 CI	% [†]	95 CI	% [†]	95 CI
US Census Division											
New England	110	50.2	(35.4, 65.0)	15.6	(15.1, 16.2)	82.6	(71.2, 94.1)	5.9	(0.0, 12.1)	11.5	(5.8, 17.2)
Mid Atlantic	499	49.1	(44.3, 54.0)	15.4	(15.0, 15.7)	68.9	(56.0, 81.8)	14.8	(7.9, 21.7)	16.3	(6.6, 26.0)
East North Central	623	53.7	(47.6, 59.8)	15.4	(15.2, 15.7)	77.1	(70.6, 83.6)	15.5	(10.1, 20.9)	7.4	(4.6, 10.1)
West North Central	213	46.1	(39.4, 52.9)	15.3	(15.1, 15.5)	94.0	(90.3, 97.6)	5.1	(1.7, 8.5)	0.9	(0.1, 1.7)
South Atlantic	877	51.0	(45.7, 56.2)	15.6	(15.3, 15.8)	53.1	(45.1, 61.1)	32.0	(25.6, 38.3)	14.9	(10.1, 19.8)
East South Central	149	51.5	(44.4, 58.6)	15.9	(15.4, 16.3)	65.2	(47.9, 82.5)	32.1	(15.4, 48.8)	2.7	(0.2, 5.3)
West South Central	766	52.5	(46.6, 58.5)	15.4	(15.2, 15.6)	55.0	(43.7, 66.3)	13.7	(9.0, 18.5)	31.3	(19.9, 42.7)
Mountain	343	55.6	(49.3, 61.9)	15.5	(15.3, 15.8)	74.0	(62.0, 86.1)	2.1	(0.4, 3.8)	23.9	(12.8, 35.0)
Pacific	1020	52.1	(47.3, 57.0)	15.5	(15.2, 15.7)	51.6	(41.5, 61.7)	9.5	(5.9, 13.0)	38.9	(30.8, 47.0)
US Census Region[‡]											
Northeast	609	49.3	(43.9, 54.8)	15.4	(15.1, 15.7)	71.9	(62.2, 81.6)	12.8	(7.6, 18.1)	15.2	(7.7, 22.7)
Midwest	836	51.0	(45.8, 56.1)	15.4	(15.2, 15.6)	83.1	(78.4, 87.9)	11.8	(8.2, 15.4)	5.1	(2.9, 7.2)
South	1792	51.6	(47.9, 55.3)	15.5	(15.4, 15.7)	54.9	(49.1, 60.6)	24.8	(20.7, 28.9)	20.3	(15.1, 25.5)
West	1363	53.4	(49.5, 57.2)	15.5	(15.3, 15.6)	59.8	(52.0, 67.7)	6.8	(4.2, 9.3)	33.4	(27.0, 39.8)

* Unweighted (n) presented

[†] Weighted percentages and weighted 95% Confidence Intervals presented

[‡] Regions are comprised of U.S. census divisions as follows: Northeast; New England and Mid-Atlantic; Midwest; East North Central; South; East South Central; West South Central; West; Mountain and Pacific.

Abbreviations: CI = confidence interval

Table 2:

Obesity, MetS and MetS Z Distributions by Sex, Race/Ethnicity and US Region, among Adolescents 12–19 years in the National Health and Nutrition Examination Survey, 1999–2014.

			Obesity			ATP-III MetS			MetS Z-Score	
		n	%	95 CI		%*	95 CI*		Mean	95 CI
MIDWEST (West North Central, East North Central)										
Overall		836	20.79	(17.56, 24.02)		11.42	(8.11, 14.72)		0.08	(0.01, 0.16)
Male		441	19.57	(13.72, 25.42)		13.75	(9.04, 18.47)		0.24	(0.11, 0.37)
HISP		75	32.08	(17.83, 46.33)		--	--		0.51	(0.25, 0.7)
NHW		212	18.93	(12.21, 25.65)		--	--		0.26	(0.12, 0.39)
NHB		154	18.18	(12.05, 24.30)		--	--		-0.05	(-0.23, 0.14)
Female		395	22.05	(16.98, 27.12)		8.99	(4.83, 13.15)		-0.08	(-0.17, 0.02)
HISP		72	27.84	(14.66, 41.02)		--	--		0.02	(-0.19, 0.22)
NHW		192	19.98	(13.53, 26.43)		--	--		-0.10	(-0.22, 0.01)
NHB		131	33.87	(27.07, 40.67)		--	--		0.04	(-0.07, 0.15)
NORTHEAST (New England, Mid-Atlantic)										
Overall		609	18.24	(13.08, 23.40)		6.25	(4.14, 8.36)		0.00	(-0.06, 0.05)
Male		326	18.79	(11.82, 25.77)		7.56	(3.42, 11.69)		0.12	(0.00, 0.23)
HISP		65	19.62	(10.27, 28.97)		--	--		0.12	(-0.09, 0.33)
NHW		133	18.29	(8.85, 27.73)		--	--		0.17	(0.01, 0.34)
NHB		128	20.58	(12.17, 28.99)		--	--		-0.20	(-0.41, 0.01)
Female		283	17.70	(11.99, 23.41)		4.99	(3.28, 6.70)		-0.12	(-0.24, 0.00)
HISP		65	24.34	(11.52, 37.17)		--	--		0.19	(-0.09, 0.47)
NHW		111	14.82	(8.91, 20.73)		--	--		-0.20	(-0.34, -0.07)
NHB		107	26.04	(13.93, 38.14)		--	--		0.00	(-0.26, 0.25)
SOUTH (West South Central, East South Central, South Atlantic)										
Overall		1792	21.63	(18.51, 24.75)		7.57	(5.80, 9.33)		0.02	(-0.04, 0.08)
Male		952	23.21	(18.93, 27.49)		9.99	(7.09, 12.89)		0.17	(0.09, 0.24)
HISP		316	28.06	(22.18, 33.95)		--	--		0.27	(0.16, 0.39)
NHW		209	22.30	(15.24, 29.36)		--	--		0.25	(0.14, 0.36)
NHB		427	21.35	(16.78, 25.92)		--	--		-0.10	(-0.20, 0.00)
Female		840	19.95	(15.50, 24.40)		4.98	(2.71, 7.24)		-0.14	(-0.23, -0.05)
HISP		306	19.18	(13.12, 25.24)		--	--		0.06	(-0.09, 0.22)
NHW		182	16.38	(9.98, 22.78)		--	--		-0.23	(-0.36, -0.09)
NHB		352	28.06	(22.92, 33.19)		--	--		-0.10	(-0.19, -0.02)
WEST (Pacific, Mountain)										
Overall		1363	15.83	(12.61, 19.06)		6.31	(4.73, 7.89)		-0.08	(-0.14, -0.03)
Male		710	15.61	(11.52, 19.70)		8.24	(5.46, 11.01)		0.03	(-0.06, 0.11)
HISP		474	21.97	(17.59, 26.36)		--	--		0.10	(-0.03, 0.23)

			Obesity			ATP-III MetS			MetS Z-Score	
		n	%	95 CI		%*	95 CI*		Mean	95 CI
NHW		162	11.58	(5.60, 17.56)		--	--		0.02	(-0.11, 0.16)
NHB		74	19.56	(9.61, 29.50)		--	--		-0.32	(-0.59, -0.05)
Female		653	16.09	(11.52, 20.66)		4.11	(2.03, 6.18)		-0.21	(-0.30, -0.12)
HISP		461	20.72	(15.04, 26.40)		--	--		-0.10	(-0.23, 0.03)
NHW		141	13.71	(7.18, 20.23)		--	--		-0.24	(-0.38, -0.10)
NHB		51	14.58	(4.61, 24.55)		--	--		-0.46	(-0.68, -0.23)

* Due to sample size restrictions we were unable to calculate prevalence of MetS by race/ethnicity and census region.