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ORIGINAL ARTICLE

Overweight/obesity and weight-related treatment among patients in U.S. federally supported health centers

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Received 23 February 2012; received in revised form 17 April 2012; accepted 25 April 2012

KEYWORDS

United States;
Community health
centers;
Obesity;
Overweight;
Primary care

Summary

Background: We obtained the prevalence of overweight/obesity, weight-loss attempts, and weight-related counseling and treatment among U.S. adults who sought care in federally funded community health centers. We investigated whether racial/ethnic and gender disparities existed for these measures.

Methods: Data came from the 2009 Health Center Patient Survey. Measures included body mass index (BMI), self-perceived weight, weight-loss attempts, being told of a weight problem, receipt of weight-related counseling, nutritionist referrals, weight-loss prescriptions, and cholesterol checks. We conducted bivariate analyses to determine distributions by race/ethnicity and gender, then ran logistic regressions to examine the effects of several sociodemographic factors on weight-loss attempts and on being told of a weight problem.

Results: Overall, 76% of adult patients seen in health centers were overweight or obese (BMI ≥ 25.0 kg/m²); 55% of overweight patients, and 87% of obese patients correctly perceived themselves as overweight. There were no racial/ethnic differences in BMI categories or self-perceptions of weight. Females were more likely than males to be obese and also more likely to perceive themselves as overweight. About 60% of overweight/obese patients reported trying to lose weight in the past year. There were no racial/ethnic disparities favoring non-Hispanic White patients in weight-related treatment. Women were more likely than men to receive referrals to a nutritionist or weight-loss prescriptions. Overweight/obese patients had higher adjusted odds of a past-year weight-loss attempt if they perceived themselves as

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overweight (OR = 3.30, $p < 0.0001$), were female (OR = 1.95, $p < 0.05$), African American (OR = 3.34, $p < 0.05$), or Hispanic/Latino (OR = 2.14, $p < 0.05$). Overweight/obese patients had higher odds of being told they had a weight problem if they were Hispanic/Latino (OR = 2.56, $p < 0.05$) or if they had two or more chronic conditions (OR = 2.77, $p < 0.01$).

Conclusions: Patients seen in community health centers have high rates of overweight and obesity, even higher than the general U.S. population. Efforts to address weight problems during primary care visits are needed to reduce the burden of obesity and its sequelae among health center patients.

Published by Elsevier Ltd on behalf of Asian Oceanian Association for the Study of Obesity.

The prevalence of overweight and obesity has become one of the most pressing public health problems in the United States (U.S.) [1–3]. In 2007–2008, 68% of adults were overweight or obese, with 34% considered medically obese [2]. The prevalence of obesity has more than doubled since the mid-1970s, when the rate was 15% [3]. In response to the obesity epidemic, targets related to weight, nutrition, and physical activity have been incorporated into the federal government's decennial Healthy People document, which provides the nation's target goals for various health measures. A review of the Healthy People 2010 guidelines showed that the country made little progress in meeting many of its health targets related to critical areas in obesity as well as health disparities [4,5]. Over the past decade alone, the prevalence of obesity among adults increased by almost 10 percentage points, from 23% to 34% [4,5]. The newly released Healthy People 2020 guidelines also include leading health indicators related to nutrition and weight status, and they are particularly concerned with reducing disparities in these areas.

The prevalence of overweight and obesity varies depending on several sociodemographic factors [2,6,7]. For instance, non-Hispanic White adults have lower rates of obesity, compared with Mexican Americans and non-Hispanic Blacks (31%, 37%, and 45%) [8]. The prevalence of obesity is also slightly lower among adult men than adult women (32% vs. 36%) [2]. In addition to race/ethnicity and gender, higher rates of obesity are also found among populations with lower socioeconomic status [7].

Overweight/obesity is a risk factor for many chronic conditions, including diabetes, hypertension, hypercholesterolemia, stroke, heart disease, certain cancers, asthma, arthritis, and fair or poor health status [2,6,9]. Overweight and obesity also contribute to shortened life expectancy (by as much as 5 years) and lower quality of life [3].

Racial/ethnic minorities appear to be at higher risk for these comorbid conditions since the risk of conditions such as diabetes are higher among Asians, Hispanics, and Blacks than among Whites, even after taking into account differences in weight [10]. Evidence has shown that even a moderate amount of weight loss, even if not to an ideal weight, can reduce some of the risk for these conditions [6].

In the absence of any progress to reduce the prevalence of overweight/obesity, the nation can expect increasing costs and lost productivity due to this public health problem. Direct medical costs include preventive, diagnostic, and treatment services related to obesity, and indirect costs include income lost from decreased productivity, restricted activity and disability, absenteeism, and premature mortality [11]. Between 5% and 10% of all medical spending is attributed to the direct costs of obesity [12]. In addition, estimates of future indirect costs of obesity have been projected at \$208 billion between 2020 and 2050 [13].

The U.S. Department of Health and Human Services is the federal organization charged with protecting the health of the nation, and is comprised of the Office of the Secretary and 11 operating divisions [14]. One of these divisions, the Health Resources and Services Administration (HRSA), is the primary agency tasked with improving access to health care for people who are uninsured, isolated, or medically vulnerable. As part of its activities, HRSA provides funding to community health centers throughout the country to provide primary and preventive care services for medically underserved and vulnerable populations [15]. In 2010, 1124 federally funded health centers provided services to 19.5 million patients of all ages across the U.S., including all 50 states, the District of Columbia, the U.S. Virgin Islands, Guam, American Samoa, Puerto Rico, and the Northern Mariana Islands [16]. Health centers serve diverse

populations, including 38% who are uninsured, 62% who are racial/ethnic minorities, and 93% who are low-income [16].

HRSA has identified overweight/obesity as a top public health priority, given that health centers serve a disproportionate number of minority and lower socioeconomic patients, and national data indicate that these are the groups who are at higher risk of overweight/obesity and related comorbidities. Thus, health centers are well-positioned to serve as agents of change among a vulnerable segment of the country's population [17].

There is limited information available regarding overweight/obesity among health center patients. For example, one study found that prevalence of pediatric overweight is higher among health center patients than among children across the nation in general [18]. Single-site studies of health centers revealed that both pediatric and adult overweight were significantly underdiagnosed; while chart reviews indicated a high prevalence of overweight or obesity (ranging from 35% to 50%, depending on site), a much smaller proportion of patients (0.5–18%) had a formal diagnosis recorded in their medical charts [19,20]. In addition, previous research also concluded that racial/ethnic minorities were less likely than White patients to recognize the damaging health effects of being overweight [21].

The purpose of the study was to determine the current prevalence of overweight and obesity, weight-loss attempts, and weight-related counseling and treatment among adults who sought care in community health centers, and to investigate whether racial/ethnic or gender disparities existed for these measures. We also explored whether several sociodemographic and health-related characteristics were significantly associated with weight, weight-loss attempts, and weight-related counseling and treatment. The results will support HRSA in its mission to improve the health of the vulnerable and medically underserved populations by assuring access to comprehensive, culturally competent, quality primary health care services.

Methods

Data source and study sample

Analyses were conducted utilizing data from the 2009 Health Center Patient Survey. The survey produced cross-sectional, nationally representative data on patients served by HRSA-funded community health centers.

A three-stage sampling design was used to obtain the sampling frame. First-stage sampling units were health centers, second-stage sampling units were eligible clinic sites, and third-stage sampling units were eligible patients with at least one visit in the past year to eligible sites. First stage sampling was stratified by funding stream, health center size, U.S. Census region, urban/rural location, and number of service sites per health center. The second stage selected up to three sites per health center. The third stage selected individual patients within service sites, and a total of 4562 patient interviews were completed between September and December 2009.

A consecutive sample was selected from patients who entered the site and consented to participate in the survey. Among patients who were referred by site receptionists for an interview, 72% agreed to participate; 98% of these patients were confirmed eligible and completed the interviews. Upon interview completion, respondents received \$25 in cash or gift card. Institutional Review Board (IRB) approval was obtained from Research Triangle International (RTI), the organization in charge of data collection. Local IRB or other committee approvals were obtained where necessary.

Survey instrument

Computer-assisted personal interviews were conducted by trained field interviews, and lasted about 50 min. Interview questions were replicated after surveys from other national health surveys in the U.S., including the National Health Interview Survey, the National Ambulatory Medical Care Survey, the Medical Expenditure Panel Survey, and the National Health and Nutrition Examination Survey. Survey items focused on sociodemographic characteristics, health conditions, health behaviors, access to health care, and utilization of services.

Study variables

Weight-related measures. We examined several weight and weight loss-related measures in our sample, including body mass index (BMI), self-perceived weight, weight loss attempts, and method of weight loss attempts. BMI was categorized into three groups: normal or underweight ($\text{BMI} < 25.0 \text{ kg/m}^2$), overweight ($\text{BMI} 25.0\text{--}29.9 \text{ kg/m}^2$), and obese ($\text{BMI} \geq 30.0 \text{ kg/m}^2$). Patients were asked whether they thought they were overweight, about right, or underweight. Weight loss questions included whether the patient tried to lose weight in the past year, and what method of weight loss they used (diet change and

exercise, diet change only, exercise only, neither). We also included weight-related treatment measures, including: whether overweight or obese patients were told by a health care provider that they had a weight problem; whether they received weight management counseling, a referral to a nutritionist, or weight-loss prescription; and whether they had a cholesterol check in the past 5 years. Among overweight or obese patients with hypercholesterolemia, we also examined whether their provider had told them to lose weight, change their diet, or exercise.

Sociodemographic and health characteristics. Sociodemographic variables of interest included self-reported race/ethnicity, gender, age, education level, health insurance coverage, and U.S. Census region [22]. We also looked at several variables regarding health status, medical conditions, health behaviors, and health care utilization. These included general health status, comorbid conditions (including hypertension, diabetes, high cholesterol, cardiovascular disease, and asthma), number of physician visits in the past year, any mental health treatment in the past year, smoking, and binge drinking in the past year (5 or more drinks per day).

Analysis

For the current study, children under the age of 18 years were excluded from the analyses, leaving a final sample size of 3949 adult patients. First, we examined the distributions of various sociodemographic and health-related characteristics for the total sample. We also examined those distributions by race/ethnicity and gender to determine whether there were any significant differences across groups. Group comparisons were made using χ^2 tests for categorical variables and *t*-tests for continuous variables. We also conducted similar bivariate analyses to examine the distribution of weight-related measures, for the total sample and also by race/ethnicity and gender.

Next we examined the distribution of various comorbid conditions according to BMI category to determine whether the burden of disease varied significantly across weight categories. We also examined the distribution of self-perceptions of weight by BMI category to determine how accurately overweight and obese patients perceived their own weight status.

Finally, we conducted multiple logistic regression modeling to examine the effects of several sociodemographic and health factors on two outcomes of interest: (a) weight loss attempt in the past year, among overweight/obese patients; and

(b) overweight/obese patients told by a health care provider that they had a weight problem.

Respondents with missing data, who refused to answer, or who did not know the answers to questions were excluded from the analyses. All analyses were conducted using Stata version 10.0, and accounted for the complex sampling design by incorporating weights as well as variables identifying strata and clusters. Statistics reported in this study are weighted and sample sizes are unweighted. Results were considered statistically significant at the $p < 0.05$ level.

Results

Sociodemographic and health-related characteristics

Table 1 presents a summary of the sociodemographic and health-related characteristics of the sample. The mean age of the overall sample was 39.9 years, with no significant differences by race/ethnicity or gender. The sample age distribution reflected the fact that non-elderly adults (25–64 years) make up the largest proportion (50%) of patients seen by health centers, while younger and older age groups make up smaller proportions. About 42% of the sample had less than a high school education, 30% had a high school diploma, and 28% had more than a high school education. Hispanic/Latino and non-Hispanic African American patients had lower education levels than non-Hispanic White patients. Two-thirds of patients were located in the South and West regions, with the remaining one-third evenly distributed in the Northeast and Midwest regions. This distribution generally reflects the distribution of the U.S. population at large.

Over one-third of patients reported being in fair or poor health, with no racial/ethnic or gender differences. About one-third of patients also reported having 2 or more chronic conditions; non-Hispanic Whites had the heaviest burden of disease, with 40% reporting 2 or more conditions. Hispanic patients were the healthiest, with 47% reporting no chronic conditions.

About 60% of all adult patients had some health insurance coverage; a higher proportion of African American patients had insurance (69%) while a smaller proportion of Hispanic patients had insurance (50%). Male patients were also less likely to have insurance coverage than female patients (52% vs. 48%). About 38% of patients reported having 3 or less physician visits in the past year, another 31%

Table 1 Sociodemographic and health-related characteristics of U.S. Health Center Patients, 18 years and older, weighted % (unweighted n).

	Total (N = 3949)	White (Non- Hispanic) (N = 1075)	African American (Non- Hispanic) (N = 1017)	Hispanic/Latino (N = 1556)	Other (Non- Hispanic) (N = 301)	p-Value	Male (N = 1371)	Female (N = 2578)	p-Value
Age in years, mean (se)	39.9 (0.88)	40.4 (1.06)	39.7 (1.92)	38.2 (0.92)	43.3 (2.01)	>0.05	41.9 (1.33)	38.7 (0.81)	>0.05
Education						0.0002			0.0540
More than high school	28.4 (957)	34.9 (380)	32.3 (255)	15.1 (207)	33.9 (115)		23.5 (316)	31.4 (641)	
High school	29.9 (1058)	34.9 (343)	25.2 (320)	27.9 (321)	25.2 (74)		34.8 (363)	26.9 (695)	
Less than high school	41.7 (1920)	30.3 (349)	42.6 (439)	57.1 (1023)	40.9 (109)		41.7 (687)	41.6 (1233)	
Region						0.0399			0.1213
Northeast	18.5 (832)	18.9 (208)	12.2 (296)	23.6 (289)	14.1 (39)		15.1 (298)	20.5 (534)	
South	31.5 (1053)	34.0 (227)	42.4 (343)	24.1 (443)	18.8 (40)		28.6 (314)	33.3 (739)	
West	31.3 (1501)	26.9 (453)	13.6 (140)	43.3 (724)	54.6 (184)		37.5 (550)	27.6 (951)	
Midwest	18.7 (563)	20.2 (187)	31.9 (238)	9.0 (100)	12.5 (38)		18.8 (109)	18.7 (354)	
General health status						0.1257			0.0629
Fair/poor	36.5 (1761)	34.8 (467)	30.3 (404)	42.0 (750)	41.1 (140)		31.3 (632)	39.7 (1129)	
Excellent/very good/good	63.5 (2184)	65.2 (605)	69.8 (613)	58.0 (805)	58.9 (161)		68.7 (738)	60.3 (1446)	
Number of chronic conditions ^a						0.0086			0.1034
2 or more	35.5 (1594)	40.4 (468)	29.9 (422)	30.2 (560)	43.6 (144)		38.7 (578)	33.5 (1016)	
1	28.5 (1061)	26.9 (293)	35.2 (306)	23.3 (379)	37.4 (83)		30.6 (388)	27.2 (673)	
None	36.0 (1294)	32.6 (314)	34.9 (289)	46.5 (617)	19.1 (74)		30.7 (405)	39.3 (889)	
Insurance coverage						0.0161			0.0025
Yes	59.9 (2314)	60.5 (668)	68.7 (675)	50.4 (773)	67.9 (198)		52.2 (724)	64.5 (1590)	
No	40.1 (1626)	39.5 (406)	31.3 (340)	49.6 (779)	32.1 (101)		47.8 (642)	35.5 (984)	
Number of physician visits, past year					0.1537			0.1428	
7 or more	31.4 (1251)	33.2 (411)	31.6 (290)	26.0 (403)	40.6 (147)		27.7 (397)	33.7 (854)	
4–6	30.7 (1190)	31.5 (331)	32.6 (337)	28.3 (452)	30.3 (70)		29.5 (376)	31.4 (814)	
0–3	37.9 (1458)	35.3 (326)	35.8 (378)	45.7 (674)	29.1 (80)		42.8 (1458)	34.9 (869)	

The bold values are significant p-values.

^a Chronic conditions include hypertension, diabetes, high cholesterol, cardiovascular disease, asthma.

reported having between 4 and 6 visits, and 31% reported having 7 or more visits. There were no differences in patient visit volume by race/ethnicity or gender.

Weight, weight loss, and treatment measures

Table 2 summarizes the measures of BMI, self-perceived weight, weight loss attempts, and weight-related treatment reported by health center patients. Results are presented for the total patient population, and also broken down by race/ethnicity and gender.

About 76% of the overall sample had combined overweight/obesity problems (48% obese and 29% overweight). Overall, 59% of patients perceived themselves as being overweight, while 37% perceived themselves to be "about right" and 4% thought they were underweight.

About 60% of overweight or obese patients reported trying to lose weight in the past year. Among those who tried to lose weight, 46% tried to do so through both diet change and exercise, 33% attempted diet changes but did not exercise, and 16% exercised but did not change their diet; the remaining 6% used other weight-loss methods (e.g., diet pills, herbs or supplements, laxatives, smoking, drinking water, weight loss program).

Overweight/obese patients reported receiving a range of weight-related treatments. Among those patients who tried to lose weight, 37% reported being told by their provider that they had a weight problem; among these, 93% received some weight management counseling. About 46% of patients who received counseling also received a referral to a nutritionist, and 7.4% received a weight-loss prescription.

About 82% of overweight/obese patients had their cholesterol checked at least once during the past 5 years. Among those patients who had high cholesterol, 79% reported being told they should lose weight, 90% were told they should change their diet, and 87% were told to exercise.

There were few racial/ethnic differences in any of the weight-related measures. Specifically, there were no significant differences in distributions of BMI categories, self-perceived weight, weight-loss attempts, or weight-loss methods. In additional analyses which combined the overweight and obesity categories, there were no significant differences in the prevalence of overweight/obesity between non-Hispanic White patients and Hispanic patients (73.0% vs. 76.6%, $p > 0.05$), but non-Hispanic White patients had lower rates

of overweight/obesity than non-Hispanic Black patients (73.0% vs. 83.1%, $p < 0.01$).

There were also few differences in receipt of weight-related treatment, except that overweight or obese Hispanic patients were more likely than non-Hispanic White patients to be told by their provider that they had a weight problem, and Hispanic and African American patients were more likely to receive a nutritionist referral than non-Hispanic White patients. In addition, among overweight/obese patients with high cholesterol, Hispanic patients were more likely than non-Hispanic White patients to be told to lose weight, and Hispanic patients were also more likely than either non-Hispanic White or African American patients to be told to exercise.

There were several gender-based differences in these measures. A higher proportion of female patients were obese than male patients (51% vs. 42%), and a higher proportion of female patients saw themselves as overweight than men (67% vs. 45%). Overweight or obese women were also more likely to have tried losing weight in the past year than their male counterparts (69% vs. 46%). Women were more likely than men to try losing weight through both diet change and exercise (48% vs. 40%), while men were more likely than women to rely on exercise only (25% vs. 12%). In terms of weight-related treatment, overweight/obese female patients were more likely than male patients to receive a referral to a nutritionist or a weight-loss prescription. However, there were no gender-based differences in the receipt of cholesterol-related recommendations.

BMI, comorbidities, and self-perceived weight

Table 3 shows the patterns of comorbid conditions according to BMI category. In addition, the table presents the distribution of self-perceptions of weight according to BMI category. For most chronic conditions listed (with the exception of cardiovascular disease), there was a significantly higher prevalence among overweight and obese patients, relative to normal/underweight patients. Mental health issues were also more prevalent among patients with higher BMI, with more obese patients reporting mental health treatment in the past year relative to patients in other BMI categories. However, the prevalence of smoking and binge drinking was lower among obese and overweight patients, relative to normal/underweight patients.

Table 2 Distribution of weight-related factors among U.S. Health Center Patients, 18 years and older, weighted % (unweighted *n*).

	Total	White (Non- Hispanic)	African American (Non- Hispanic)	Hispanic/Latino	Other (Non- Hispanic)	<i>p</i> -Value	Male	Female	<i>p</i> -Value
Body mass index						0.2787			0.0393
Obese (BMI ≥ 30.0 kg/m ²)	47.5 (1598)	47.1 (472)	54.1 (473)	42.3 (518)	45.7 (135)		42.0 (478)	51.0 (1120)	
Overweight (BMI 25.0–29.9 kg/m ²)	28.8 (1011)	25.9 (280)	29.0 (292)	34.3 (368)	27.9 (71)		33.0 (410)	26.1 (601)	
Normal/underweight (BMI < 25.0 kg/m ²)	23.7 (857)	27.0 (304)	16.9 (234)	23.4 (232)	26.4 (87)		25.0 (352)	22.9 (505)	
Self-perceived weight						0.3671			<0.0001
Overweight	58.6 (2224)	62.8 (660)	53.9 (533)	55.9 (858)	59.2 (173)		44.8 (577)	67.0 (1647)	
About right	37.4 (1446)	32.7 (345)	43.3 (412)	40.3 (590)	35.6 (99)		50.4 (644)	29.5 (802)	
Underweight	4.0 (267)	4.5 (68)	2.8 (72)	3.8 (101)	5.2 (26)		4.8 (144)	3.5 (123)	
Tried to lose weight in past year ^a	60.1 (1674)	58.7 (460)	63.3 (459)	62.1 (626)	52.3 (129)	0.6249	46.4 (448)	68.8 (1226)	0.0001
Weight loss attempt methods ^b			†			0.0558			0.0252
Changed diet AND exercised	45.9 (756)	40.0 (181)	49.3 (212)	50.9 (288)	50.6 (75)		40.1 (196)	48.4 (560)	
Changed diet only	33.0 (571)	40.2 (194)	23.3 (142)	29.4 (199)	39.8 (36)		31.6 (137)	33.6 (434)	
Exercised only	15.5 (263)	13.7 (61)	22.7 (82)	13.0 (104)	8.7 (16)		24.5 (97)	11.7 (166)	
Neither changed diet nor exercised	5.5 (83)	6.2 (24)	4.7 (23)	6.8 (34)	1.0 (2)		3.9 (18)	6.3 (65)	
Weight-related treatment ^a									
Told by provider had weight problem ^b	36.8 (688)	30.1 (161)	37.3 (182)	46.3 (289)‡	40.4 (56)	0.0909	37.8 (193)	36.4 (495)	0.8124
Weight management counseling ^c	92.6 (605)	91.9 (137)	94.4 (164)	92.7 (252)	89.6 (52)	0.7919	91.0 (166)	93.4 (439)	0.3806
Referral to nutritionist ^d	46.1 (288)	26.4 (39)	53.0 (86)†	61.2 (135)‡	47.5 (28)	0.0158	31.3 (73)	52.5 (215)	0.0364
Weight-loss prescription ^d	7.4 (40)	11.6 (11)	7.1 (12)	4.7 (14)	0.9 (3)	0.2788	2.8 (11)	9.4 (29)	0.0459
Cholesterol check, past 5 years	82.1 (2135)	80.9 (607)	82.4 (642)	83.5 (727)	83.5 (159)	0.9096	83.6 (722)	81.1 (1413)	0.4310
Cholesterol-related recommendations ^e									
Told to lose weight	79.0 (789)	74.7 (255)	81.7 (197)	88.4 (268)‡	75.2 (69)	0.0834	78.2 (277)	79.5 (512)	0.8207
Told to change diet	89.6 (874)	92.2 (303)	87.9 (215)	88.4 (285)	78.8 (71)	0.3337	90.0 (320)	89.3 (554)	0.8464
Told to exercise	87.4 (856)	85.0 (281)	83.3 (208)	95.4 (294)‡§	90.8 (73)	0.0148	85.1 (301)	88.8 (555)	0.4394

The bold values are significant *p*-values.

^a Among overweight or obese patients.

^b Among overweight/obese patients who tried to lose weight.

^c Among patients told by provider they had a weight problem.

^d Among patients who received weight management counseling.

^e Among overweight or obese patients with high cholesterol.

† *p* < 0.05 for difference between African American vs. White.

‡ *p* < 0.05 for difference between Hispanic vs. White.

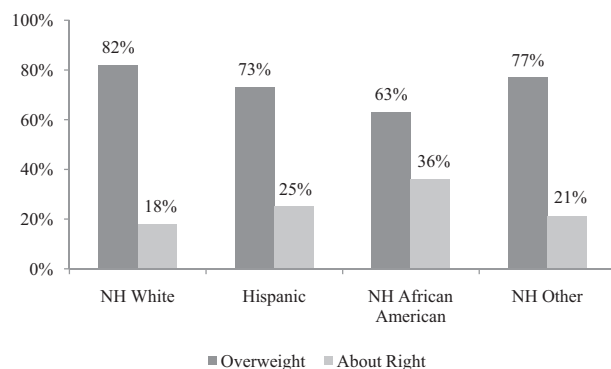
§ *p* < 0.05 for difference between Hispanic vs. African American.

Table 3 Relationship between BMI and other weight-related factors among U.S. Health Center Patients, 18 years and older, weighted % (unweighted *n*).

	Normal/ underweight	Overweight	Obese	<i>p</i> -Value
Comorbid conditions				
Diabetes	11.8 (96)	14.6 (189)	25.8 (521)	0.0002
High cholesterol	28.7 (179)	43.2 (336)	46.8 (667)	0.0062
Hypertension	21.5 (242)	36.3 (427)	54.9 (912)	<0.0001
Cardiovascular disease ^a	9.8 (103)	15.7 (120)	12.0 (244)	0.2913
Asthma	17.6 (180)	19.2 (187)	26.2 (443)	0.0201
Mental health treatment, past year	19.3 (235)	17.2 (261)	28.3 (482)	0.0006
Current smoker	43.9 (416)	32.6 (375)	29.2 (494)	0.0039
Binge drinking, past year	32.4 (272)	20.7 (255)	15.4 (301)	0.0002
Self-perceived weight				
Overweight	11.0 (99)	54.5 (519)	87.0 (1391)	<0.0001
About right	73.8 (576)	44.3 (462)	12.6 (186)	
Underweight	15.2 (181)	1.1 (30)	0.4 (17)	

The bold values are significant *p*-values.

^a Includes congestive heart failure, coronary heart disease, angina pectoris, myocardial infarction, and stroke.

**Figure 1** Self-perceived weight by race/ethnicity, among overweight/obese U.S. Health Center Patients, 18 years and older.

Cross-tabulations between BMI category and self-perceived weight category revealed that 87% of obese patients and 55% of overweight patients correctly perceived themselves as overweight; however, 13% of obese patients and 44% of overweight patients misclassified their own weight and considered themselves to be “about right.” There were also racial/ethnic differences in weight perceptions (Fig. 1). Overweight and obese minority patients, especially non-Hispanic African Americans, were more likely than overweight and obese non-Hispanic White patients to view their weight as “about right.” For instance, 36% of overweight/obese non-Hispanic African Americans viewed their weight as “about right,” compared with 18% of overweight/obese non-Hispanic Whites.

Factors associated with weight-loss attempts and weight counseling among overweight/obese patients

Table 4 presents the odds ratios (ORs) and 95% confidence intervals (CI) for the adjusted effects of various sociodemographic and health-related factors on the two outcomes of interest. After controlling for several sociodemographic and health factors, the adjusted odds of trying to lose weight in the past year were higher among patients who perceived themselves as overweight (OR=3.30, 95% CI: 1.88–5.77), were female (OR=1.95, 95% CI: 1.05–3.64), Hispanic/Latino (OR=2.14, 95% CI: 1.13–4.06), or non-Hispanic African American (OR=3.34, 95% CI: 1.29–8.66). Among overweight/obese patients who had tried to lose weight in the past year, the adjusted odds of being told by their provider that they had a weight problem was higher among patients who were Hispanic/Latino (OR=2.56, 95% CI: 1.21–5.38) or who had 2 or more chronic conditions (OR=2.77, 95% CI: 1.28–6.01).

Discussion

This study provides nationally representative estimates of overweight/obesity and other weight-related factors among patients seen in U.S. community health centers. Overall, 76% of adult patients were overweight or obese (BMI \geq 25.0). This is 8 percentage points higher than the prevalence of overweight/obesity in the general adult population in the U.S., which was estimated to be 68% in 2007–2008 [2]. The burden of this high

Table 4 Multiple logistic regressions, odds ratios (95% confidence intervals).

	Tried to lose weight in past year ^a N = 1567	Told by provider had weight problem ^b N = 1166
Self-perceived weight (Ref: About right)		
Overweight	3.30 (1.88–5.77) ^{****}	...
Underweight	2.76 (0.34–22.34)	...
Age (years)	1.00 (0.97–1.02)	0.99 (0.98–1.01)
Gender (Ref: Male)		
Female	1.95 (1.05–3.64) [*]	0.84 (0.44–1.59)
Race/Ethnicity (Ref: White, non-Hispanic)		
Hispanic/Latino	2.14 (1.13–4.06) [*]	2.56 (1.21–5.38) [*]
African American (non-Hispanic)	3.34 (1.29–8.66) [*]	1.14 (0.59–2.20)
Other (non-Hispanic)	1.32 (0.53–3.28)	1.04 (0.40–2.70)
Education (Ref: Less than high school)		
Associate's degree or higher	1.62 (0.93–2.82)	0.99 (0.50–1.96)
High school	0.85 (0.49–1.46)	1.00 (0.56–1.81)
Insurance coverage (Ref: No)		
Yes	1.34 (0.84–2.15)	1.34 (0.72–2.51)
General health status (Ref: Excellent/very good/good)		
Fair/poor	1.37 (0.92–2.04)	1.01 (0.58–1.76)
Number of chronic conditions (Ref: None)		
2+	1.47 (0.72–2.98)	2.77 (1.28–6.01) ^{**}
1	1.03 (0.42–2.52)	1.62 (0.79–3.30)
Region (Ref: Midwest)		
Northeast	1.34 (0.61–2.92)	1.13 (0.50–2.56)
South	0.98 (0.51–1.90)	1.12 (0.51–2.45)
West	1.24 (0.63–2.43)	1.15 (0.51–2.55)
Number of physician visits, past year (Ref: 0–3)		
7 or more	0.88 (0.46–1.69)	1.45 (0.75–2.80)
4–6	1.13 (0.56–2.29)	1.75 (0.82–3.74)

* $p < 0.05$.** $p < 0.01$.**** $p < 0.0001$.^a Among patients who were obese or overweight.^b Among obese or overweight patients who tried to lose weight in the past year.

prevalence among health center patients is especially worrisome given that their age distribution is relatively young (mean age under 40 years) and that over one-third of them suffer from two or more chronic conditions. Health centers will need additional support services to proactively address the disproportionately higher rates of overweight/obesity and concomitant diseases among their patient populations.

Female health center patients were more likely to be obese than male patients, which is consistent with national findings. However, we found fewer racial/ethnic differences in the distribution of BMI categories in our sample of health center patients than what has been reported in the general U.S. population. Specifically, while analyses of national data have revealed that both Hispanics and non-Hispanic Blacks have higher rates of overweight/obesity than non-Hispanic Whites [2],

our health center data showed disparities between non-Hispanic White and Black patients but not between non-Hispanic White and Hispanic patients. The reduced disparities appeared to stem from a higher rate of overweight/obesity among non-Hispanic White patients in health centers than in the nation at large. Previous analyses have also failed to find racial/ethnic disparities in overweight among pediatric health center patients [18].

There were also few racial/ethnic disparities in the weight-related treatment measures we examined among overweight/obese health center patients, including weight management counseling, weight-loss prescriptions, and cholesterol checks. However, minorities were more likely to recall receiving referrals to a nutritionist, and Hispanic/Latinos were more likely to report being told they had a weight problem, compared with non-Hispanic White patients. These findings are

consistent with previous national analyses on hypertension-related counseling [23,24]. Nationally, Hispanics and non-Hispanic Blacks have higher rates of overweight/obesity than non-Hispanic Whites, so these treatment differences could be a reflection of greater physician awareness about obesity disparities affecting minorities.

There were some discrepancies between BMI categories and self-perceived weight: 55% of overweight patients, and 87% of obese patients correctly perceived themselves as overweight, with the remainder misclassifying themselves. There were also racial/ethnic differences in self-perceptions of weight, with overweight/obese minority patients misclassifying themselves more frequently than non-Hispanic White patients. This inappropriate self-perception of weight has been documented in national samples [1,25], although the phenomenon appears to occur more frequently in health center patients, especially among those who are overweight [26]. Previous analyses have found that several factors are associated with self-perceptions of weight [1,7]. Specifically, White individuals are more likely to perceive themselves as overweight, compared with African American or Hispanic individuals; individuals with higher incomes or education levels are also more likely to see themselves as overweight relative to individuals with lower socioeconomic status [1,7,27]. The higher rates of misclassification in our sample may be due to higher proportions of racial/ethnic minorities and low-income individuals among health center patients, who may have different normative standards for healthy weight [28–32].

About 60% of overweight/obese patients reported trying to lose weight in the past year. Among these, less than half of these (46%) tried to do so through both diet change and exercise. Additional patient education efforts may be needed to increase awareness that weight is related to both energy intake and energy expenditure, and to support dual weight-loss strategies which combine both diet change and exercise. However, this rate of weight-loss attempts is still higher than the rates observed in a national sample of overweight/obese women and men (39% and 32%, respectively) [25].

Our adjusted model also found that patients were more likely to try to lose weight if they perceived themselves as overweight, so it is especially important to increase counseling and education efforts among health center patients to raise awareness about healthy weight standards. Other analyses have also identified the link between weight control strategies and overweight perception [25,33]. Diagnosis of overweight/obesity and

counseling about weight reduction and healthy lifestyles by primary care providers have also been associated with weight-loss attempts, actual reductions in weight, and positive weight-related behaviors [25,34–37]. In health center patients, specifically, provider communication about weight has been linked to increased understanding about the impact of being overweight on one's health [21].

Health care professionals should take note of evidence from a national sample of ambulatory care providers suggesting that physicians may be less likely to provide weight-related counseling to overweight racial/ethnic minorities than overweight White patients, and should strive for equitable delivery of counseling [38]. Our analyses revealed minimal racial/ethnic disparities in weight-related treatment among health centers, and in fact found evidence of treatment favoring minority patients. In addition, patients with two or more chronic conditions were more likely to report that their provider told them they had a weight problem, indicating that health centers may be appropriately targeting the sickest patients who could benefit the most from weight loss. While focusing on this particularly vulnerable population is warranted, providers should also be mindful of the importance of counseling even normal weight or mildly overweight individuals to maintain a healthy weight, in order to prevent future comorbidities.

Adjusted analyses also indicated that female patients are more likely to attempt to lose weight than male patients, and thus males may need additional support in their attempts to lose weight. In both our study and the previous literature, men were less likely to perceive themselves as overweight than women, which may explain the lower rates of weight-loss attempts [1,7,25,33]. Hispanic/Latino patients and non-Hispanic African American patients were also more likely to report weight-loss attempts than non-Hispanic White patients. One possible explanation for this is that physician encouragement may be more effective in encouraging preventive behaviors among Black or Hispanic individuals than among White individuals [39].

About 40% of overweight/obese patients who tried to lose weight recalled being told by their health care provider that they had a weight problem; among these patients, 93% received some weight management counseling and 46% received a referral to a nutritionist. Health centers are performing better on these measures relative to other primary health care providers in the nation. Recent analyses of the 2007–2008 National Ambulatory Medical Care Survey found that only about 30% of

office-based primary care visits with obese patients included any weight counseling, down from 40% in 1995–1996 [40,41]. Another study of primary care visits at the Mayo Clinic found that only 20% of obese patients had a documented diagnosis of obesity and only 23% had a documented obesity management plan [42]. And among family practices in a Midwestern state, 17% of visits by overweight patients included a discussion of excess weight and only 11% of visits by overweight adults included any weight counseling [43].

In response to the nationwide obesity epidemic, the U.S. Department of Health and Human Services has launched several initiatives to reduce and prevent obesity and to promote healthy living by targeting multiple levels, contexts, and populations. Recent efforts include, among others, working collaboratively with the U.S. Departments of Education and Agriculture to improve children's nutrition and physical activity in schools and child care settings; promoting resources which help workplaces design obesity prevention and control programs to support employees in making healthy choices while at work; launching initiatives to implement interventions to improve physical activity and nutrition within numerous communities; and developing new guidance and requirements regarding nutritional menu and package labeling [44,45]. These efforts align with the President's Task Force on Childhood Obesity, which was established to coordinate interagency work across multiple sectors, identify benchmarks, and recommend an action plan to solve the problem of childhood obesity, as well as the First Lady's Let's Move! campaign, a comprehensive initiative which includes educating parents about healthy eating and exercise, fostering healthier environments, providing healthier foods in schools, encouraging children to be more physically active, and partnering with community leaders, local officials, health care providers, and chefs to promote healthy living [46,47].

As one of the several agencies within the federal health department, HRSA is actively pursuing several avenues to increase its capacity to track and address weight problems specifically among vulnerable populations served by community health centers. Beginning in 2011, all HRSA-funded health centers are now required to report weight-related data on an annual basis to the agency. Specifically, they report data on two measures: [1] proportion of children and adolescents whose BMI percentile was documented in their medical record *and* who received counseling on nutrition and physical activity, and [2] proportion of adults whose BMI was documented in their medical record *and* who

received a follow-up plan *if* the BMI was outside healthy parameters. By tracking these measures over time, health centers will be encouraged to explicitly address weight-related counseling and treatment for all their patients.

In recent years, HRSA has supported health centers in participating in learning collaboratives to improve care for specific chronic diseases which disproportionately affect their vulnerable patient populations, including diabetes, hypertension, and asthma. These collaboratives emphasized teamwork, data systems development, standards of care, decision-making supports, and patient self-management [48–51]. This approach is now being applied to a new initiative targeting obesity, the Healthy Weight Collaborative, which applies evidence-based strategies to target factors outside the clinical setting, such as the availability of healthy food and safe spaces for physical activity [52].

Electronic health records (EHRs) present another potential opportunity to address obesity in primary care among medically underserved communities, through the consistent collection of patient information, computerized BMI chart prompts, and tracking of patients over time (at the individual or population level) [53]. Documented overweight/obesity computerized prompts have been shown to increase the likelihood of obesity diagnoses, weight counseling, and treatment referrals [54,55]. HRSA has been supporting health centers to adopt EHRs for over a decade. Currently, 65% of health centers use EHRs, and there are numerous efforts to reach 100% EHR use in the next few years, as well as to promote meaningful use of EHRs to improve quality of care [56].

HRSA has also launched efforts to support health centers in obtaining recognition as "patient-centered medical homes," which emphasize a team-based approach to patient care and a focus on prevention. There are numerous examples of health centers throughout the country applying this model to addressing obesity among patients, by integrating nutritionists and dietitians, fitness trainers, psychologists, case managers, and community health workers into their primary care teams [17,57–61]. Health centers have also focused on creating culturally and linguistically appropriate programs that target different populations to promote obesity prevention and treatment.

Individual health centers are also spearheading their own initiatives to address obesity beyond the four walls of their clinics to engage the larger community, including increasing the availability of healthy foods through farmers' markets or community gardens, and providing facilities for

physical activities [17,58,62]. These local, innovative programs have the potential to inform effective obesity management on a broader scale.

There are several limitations with this study. First, the 2009 Health Center Patient Survey contains cross-sectional data and findings should only be used to infer association, not causation. In addition, survey responses were based on self-report and therefore subjected to recall and social desirability biases, especially regarding sensitive topics like weight and weight loss. About 9% of adult patients had missing BMI information and were excluded from analyses, introducing the possibility of biased findings if nonrespondents had a different BMI distribution than respondents. In addition, there were no corroborating data (e.g., medical chart reviews) available to confirm whether or not patients actually followed through with their referrals to nutritionists or whether they actually filled their weight-loss prescriptions.

Only patients who reported trying to lose weight in the past year were asked whether they were told by their provider about a weight problem. Therefore, we cannot report any information about patients who were told they had a weight problem but did not try to lose weight. In addition, we have no information regarding patients who were at a healthy weight, but should still have received weight counseling to maintain that weight. Finally, we used BMI as measure of obesity, which may be less accurate than other more direct measures. Although it is a commonly used metric and is easy to compute, it does not directly measure body fat mass or percentage, and cannot distinguish between fat and lean tissue [63–66]. Future research efforts should include surveys which ask all patients about their weight-loss efforts and receipt of weight counseling, regardless of weight category. Ideally, medical chart reviews would also be conducted to verify patient-reported BMI classifications and receipt of services, and to determine whether receipt of certain weight-related diagnoses, referrals, and treatments actually led to changes in weight or other health outcomes.

With these limitations in mind, this is the most recent national study describing weight-related information among health center patients, who often come from medically underserved communities and are members of vulnerable populations. We found that this patient population has alarmingly high rates of overweight and obesity, even higher than the general American population. Within the larger U.S. Department of Health and Human Services, HRSA-funded health centers play a key role in providing quality primary care to racial/ethnic minorities and other medically underserved

populations. Thus, health centers are uniquely positioned to address the obesity epidemic among a vulnerable segment of the population. In addition to ongoing HRSA initiatives, future efforts to promote weight counseling during primary care visits, and patient education on healthy weight, diet, and physical activity will have the potential to reduce the burden of obesity and its sequelae among health center patients.

References

- [1] Chang VW, Christakis NA. Self-perception of weight appropriateness in the United States. *Am J Prev Med* 2003;24(4):332–9 [Epub ahead of print; 3 May 2003].
- [2] Flegal KM, Carroll MD, Ogden CL, Curtin LR. Prevalence and trends in obesity among US adults, 1999–2008. *JAMA* 2010;303(3):235–41 [Epub ahead of print; 15 January 2010].
- [3] Wyatt SB, Winters KP, Dubbert PM. Overweight and obesity: prevalence, consequences, and causes of a growing public health problem. *Am J Med Sci* 2006;331(4):166–74 [Epub ahead of print; 18 April 2006].
- [4] Centers for Disease Control and Prevention. Healthy People 2010 final review. In: Prevention CfDca, editor. Atlanta, GA; 2011.
- [5] Moyer CS. Healthy People 2010 misses targets on obesity and health disparities. *Am Med News* 2011;(October).
- [6] Ogden CL, Yanovski SZ, Carroll MD, Flegal KM. The epidemiology of obesity. *Gastroenterology* 2007;132(6):2087–102 [Epub ahead of print; 15 May 2007].
- [7] Paeratakul S, White MA, Williamson DA, Ryan DH, Bray GA. Sex, race/ethnicity, socioeconomic status, and BMI in relation to self-perception of overweight. *Obes Res* 2002;10(5):345–50 [Epub ahead of print; 15 May 2002].
- [8] Ogden CL, Carroll MD, Curtin LR, McDowell MA, Tabak CJ, Flegal KM. Prevalence of overweight and obesity in the United States, 1999–2004. *JAMA* 2006;295(13):1549–55 [Epub ahead of print; 6 April 2006].
- [9] Mokdad AH, Ford ES, Bowman BA, Dietz WH, Vinicor F, Bales VS, et al. Prevalence of obesity, diabetes, and obesity-related health risk factors, 2001. *JAMA* 2003;289(1):76–9 [Epub ahead of print; 31 December 2002].
- [10] Shai I, Jiang R, Manson JE, Stampfer MJ, Willett WC, Colditz GA, et al. Ethnicity, obesity, and risk of type 2 diabetes in women: a 20-year follow-up study. *Diabetes Care* 2006;29(7):1585–90 [Epub ahead of print; 28 June 2006].
- [11] Wang Y, Beydoun MA, Liang L, Caballero B, Kumanyika SK. Will all Americans become overweight or obese? Estimating the progression and cost of the US obesity epidemic. *Obesity (Silver Spring)* 2008;16(10):2323–30 [Epub ahead of print; 23 August 2008].
- [12] Tsai AG, Williamson DF, Glick HA. Direct medical cost of overweight and obesity in the USA: a quantitative systematic review. *Obes Rev* 2011;12(1):50–61 [Epub ahead of print; 12 January 2010].
- [13] Lightwood J, Bibbins-Domingo K, Coxson P, Wang YC, Williams L, Goldman L. Forecasting the future economic burden of current adolescent overweight: an estimate of the coronary heart disease policy model. *Am J Public Health* 2009;99(12):2230–7 [Epub ahead of print; 17 October 2009].

- [14] U.S. Department of Health and Human Services. About HHS. [April 9, 2012], Available from: <http://www.hhs.gov/about/>.
- [15] Health Resources and Services Administration. About HRSA. [April 9, 2012], Available from: <http://www.hrsa.gov/about/index.html>.
- [16] Health Resources and Services Administration. 2010 Uniform Data System national report.
- [17] Ferguson C, David S, Leonard J, Divine L, Stoto A. Improving obesity management in primary care and community health centers. Washington, DC: The George Washington University School of Public Health and Health Services; 2011.
- [18] Stettler N, Elliott MR, Kallan MJ, Auerbach SB, Kumanyika SK. High prevalence of overweight among pediatric users of community health centers. *Pediatrics* 2005;116(3):e381–8.
- [19] Lemay CA, Cashman S, Savageau J, Fletcher K, Kinney R, Long-Middleton E. Underdiagnosis of obesity at a community health center. *J Am Board Fam Pract* 2003;16(1):14–21.
- [20] Noy L, Walter M, Matsunaga DS, Maddock JE. Pediatric obesity: are we under-diagnosing? Assessing pediatric obesity at an urban community health clinic. *Hawaii Med J* 2006;65(4):102–4.
- [21] Durant NH, Bartman B, Person SD, Collins F, Austin SB. Patient provider communication about the health effects of obesity. *Patient Educ Couns* 2009;75(1):53–7 [Epub ahead of print; 29 November 2008].
- [22] U.S. Census Bureau, cartographer Map of the United States, showing census regions and divisions.
- [23] Mellen PB, Palla SL, Goff Jr DC, Bonds DE. Prevalence of nutrition and exercise counseling for patients with hypertension. United States, 1999–2000. *J Gen Intern Med* 2004;19(9):917–24 [Epub ahead of print; 31 August 2004].
- [24] Zhao G, Ford ES, Mokdad AH. Racial/ethnic variation in hypertension-related lifestyle behaviours among US women with self-reported hypertension. *J Hum Hypertens* 2008;22(9):608–16 [Epub ahead of print; 23 May 2008].
- [25] Yaemsiri S, Slining MM, Agarwal SK. Perceived weight status, overweight diagnosis, and weight control among US adults: the NHANES 2003–2008 Study. *Int J Obes (Lond)* 2011;35(8):1063–70 [Epub ahead of print; 3 November 2010].
- [26] Moore SE, Harris C, Wimberly Y. Perception of weight and threat to health. *J Natl Med Assoc* 2010;102(2):119–24.
- [27] Sivalingam SK, Ashraf J, Vallurupalli N, Friderici J, Cook J, Rothberg MB. Ethnic differences in the self-recognition of obesity and obesity-related comorbidities: a cross-sectional analysis. *J Gen Intern Med* 2011;26(6):616–20 [Epub ahead of print; 12 January 2011].
- [28] Becker DM, Yanek LR, Koffman DM, Bronner YC. Body image preferences among urban African Americans and whites from low income communities. *Ethn Dis* 1999;9(3):377–86 [Epub ahead of print; 22 December 1999].
- [29] Kemper KA, Sargent RG, Drane JW, Valois RF, Hussey JR. Black and white females' perceptions of ideal body size and social norms. *Obes Res* 1994;2(2):117–26 [Epub ahead of print; 1 March 1994].
- [30] Malpede CZ, Greene LE, Fitzpatrick SL, Jefferson WK, Shewchuk RM, Baskin ML, et al. Racial influences associated with weight-related beliefs in African American and Caucasian women. *Ethn Dis* 2007;17(1):1–5 [Epub ahead of print; 6 February 2007].
- [31] Stevens J, Kumanyika SK, Keil JE. Attitudes toward body size and dieting: differences between elderly black and white women. *Am J Public Health* 1994;84(8):1322–5 [Epub ahead of print; 1 August 1994].
- [32] Thomas AM, Moseley G, Stallings R, Nichols-English G, Wagner PJ. Perceptions of obesity: Black and White differences. *J Cult Divers* 2008;15(4):174–80 [Epub ahead of print; 11 February 2009].
- [33] Lemon SC, Rosal MC, Zapka J, Borg A, Andersen V. Contributions of weight perceptions to weight loss attempts: differences by body mass index and gender. *Body Image* 2009;6(2):90–6 [Epub ahead of print; 4 February 2009].
- [34] Christian JG, Bessesen DH, Byers TE, Christian KK, Goldstein MG, Bock BC. Clinic-based support to help overweight patients with type 2 diabetes increase physical activity and lose weight. *Arch Intern Med* 2008;168(2):141–6.
- [35] Post RE, Mainous 3rd AG, Gregorie SH, Knoll ME, Diaz VA, Saxena SK. The influence of physician acknowledgment of patients' weight status on patient perceptions of overweight and obesity in the United States. *Arch Intern Med* 2011;171(4):316–21 [Epub ahead of print; 2 March 2011].
- [36] Rodondi N, Humair JP, Ghali WA, Ruffieux C, Stoianov R, Seematter-Bagnoud L, et al. Counselling overweight and obese patients in primary care: a prospective cohort study. *Eur J Cardiovasc Prev Rehabil* 2006;13(2):222–8 [Epub ahead of print; 1 April 2006].
- [37] Sciamanna CN, Tate DF, Lang W, Wing RR. Who reports receiving advice to lose weight? Results from a multistate survey. *Arch Intern Med* 2000;160(15):2334–9 [Epub ahead of print; 6 August 2000].
- [38] Bleich SN, Simon AE, Cooper LA. Impact of patient–doctor race concordance on rates of weight-related counseling in visits by Black and White obese individuals. *Obesity (Silver Spring)* 2011 [Epub ahead of print; 15 January 2011].
- [39] Mochari-Greenberger H, Mills T, Simpson SL, Mosca L. Knowledge, preventive action, and barriers to cardiovascular disease prevention by race and ethnicity in women: an American Heart Association national survey. *J Womens Health (Larchmt)* 2010;19(7):1243–9 [Epub ahead of print; 26 June 2010].
- [40] Neale T. Obesity: weight counseling by PCPs found lacking. *Medpage Today* 2011;(October).
- [41] Sciamanna C, Kraschnewski JL, Stuckey H, Hwang KO. Decline in US physician lifestyle counseling during the obesity epidemic. *Obesity* 2011;19(Suppl. 1):S53.
- [42] Bardia A, Holtan SG, Slezak JM, Thompson WG. Diagnosis of obesity by primary care physicians and impact on obesity management. *Mayo Clinic Proc* 2007;82(8):927–32 [Epub ahead of print; 4 August 2007].
- [43] Scott JG, Cohen D, DiCicco-Bloom B, Orzano AJ, Gregory P, Flocke SA, et al. Speaking of weight: how patients and primary care clinicians initiate weight loss counseling. *Prev Med* 2004;38(6):819–27 [Epub ahead of print; 15 June 2004].
- [44] U.S. Department of Health and Human Services. About the secretary: strategic plan & priorities – help Americans achieve and maintain healthy weight. [April 12, 2012], Available from: <http://www.hhs.gov/secretary/about/help.html>.
- [45] Hair E. Quarterly report: evaluation and analytic support for HHS healthy weight and obesity initiative. NORC at the University of Chicago; 2011.
- [46] Let's Move! America's move to raise a healthier generation of kids. [April 12, 2012], Available from: <http://www.letsmove.gov/>.
- [47] The White House OotPS. Presidential memorandum – establishing a task force on childhood obesity; 2010.
- [48] Candib LM. Obesity and diabetes in vulnerable populations: reflection on proximal and distal causes. *Ann Fam Med* 2007;5(6):547–56.
- [49] Chin MH, Cook S, Drum ML, Jin L, Guillen M, Humikowski CA, et al. Improving diabetes care in midwest community health

- centers with the health disparities collaborative. *Diabetes Care* 2004;27(1):2–8.
- [50] Chin MH, Drum ML, Guillen M, Rimington A, Levie JR, Kirchoff AC, et al. Improving and sustaining diabetes care in community health centers with the health disparities collaboratives. *Med Care* 2007;45(12):1135–43.
- [51] Landon BE, Hicks LS, O'Malley AJ, Lieu TA, Keegan T, McNeil BJ, et al. Improving the management of chronic disease at community health centers. *N Engl J Med* 2007;356(9):921–34 [Epub ahead of print; 3 March 2007].
- [52] National Initiative for Children's Healthcare Quality. Collaborate for healthy weight. 2011.
- [53] Ferguson C, Langwith C, Muldoon A, Leonard J. Improving obesity management in adult primary care. Washington, DC: The George Washington University School of Public Health and Health Services; 2010.
- [54] Schriefer SP, Landis SE, Turbow DJ, Patch SC. Effect of a computerized body mass index prompt on diagnosis and treatment of adult obesity. *Fam Med* 2009;41(7):502–7.
- [55] Waring ME, Roberts MB, Parker DR, Eaton CB. Documentation and management of overweight and obesity in primary care. *J Am Board Fam Med* 2009;22(5):544–52 [Epub ahead of print; 8 September 2009].
- [56] Wittie MA, Segebrecht J, Ngai H. Health IT in community health centers and health center-controlled networks: advancing meaningful use for quality. In: CDC Public Health Informatics Conference. 2011.
- [57] Anand SG, Adams WG, Zuckerman BS. Specialized care of overweight children in community health centers. *Health Aff (Millwood)* 2010;29(4):712–7.
- [58] Bradley S, Beckham S, Washburn A. The Hawai'i Community Resource Obesity Project: results from the Lifestyle Enhancement Program. *Hawaii Med J* 2009;68(4):80–4.
- [59] Clark D, Chrysler L, Perkins A, Keith NR, Willis DR, Abernathy G, et al. Screening, referral, and participation in a weight management program implemented in five CHCs. *J Health Care Poor Underserved* 2010;21(2):617–28.
- [60] Drieling RL, Ma J, Stafford RS. Evaluating clinic and community-based lifestyle interventions for obesity reduction in a low-income Latino neighborhood: Vivamos Activos Fair Oaks Program. *BMC Public Health* 2011;11:98.
- [61] McClaskey EL. A childhood obesity program in federally qualified community health centers. *J Health Care Poor Underserved* 2010;21(3):774–9.
- [62] Beckham S, Bradley S, Washburn A. One health center's response to the obesity epidemic: an overview of three innovative, culturally appropriate, community-based strategies. *Hawaii Med J* 2005;64(6), 151-5, 68.
- [63] Romero-Corral A, Somers VK, Sierra-Johnson J, Thomas RJ, Collazo-Clavell ML, Korinek J, et al. Accuracy of body mass index in diagnosing obesity in the adult general population. *Int J Obes (Lond)* 2008;32(6):959–66 [Epub ahead of print; 20 February 2008].
- [64] Evans EM, Rowe DA, Racette SB, Ross KM, McAuley E. Is the current BMI obesity classification appropriate for black and white postmenopausal women? *Int J Obes (Lond)* 2006;30(5):837–43 [Epub ahead of print; 19 January 2006].
- [65] Kyle UG, Genton L, Pichard C. Body composition: what's new? *Curr Opin Clin Nutr Metab Care* 2002;5(4):427–33 [Epub ahead of print; 11 July 2002].
- [66] Prentice AM, Jebb SA. Beyond body mass index. *Obes Rev* 2001;2(3):141–7 [Epub ahead of print; 18 July 2002].

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