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Long-Term Diet Quality Is Associated with Lower Obesity Risk in Young African American Women with Normal BMI at Baseline[1,2]

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Abstract

The prevalence of obesity [body mass index (BMI) ≥30 kg/m^2] is high among African American women, with most weight gain occurring before middle age. We assessed diet quality, as measured by the Alternate Healthy Eating Index–2010 (AHEI-2010) and the Dietary Approaches to Stop Hypertension (DASH) diet score in relation to incident obesity in the Black Women's Health Study. Prospective data were collected via biennial questionnaires from 1995 to 2011. AHEI-2010 and DASH scores were calculated from food-frequency questionnaire data collected in 1995 and 2001. We restricted the analysis to 19,885 nonobese women aged 21–39 y at baseline. Multivariable Cox regression was used to estimate HRs and 95% CIs. Among women with consistent diet scores in 1995 and 2001, higher diet quality scores were inversely associated with obesity incidence: the multivariable HRs comparing highest with lowest quintiles of the AHEI-2010 and DASH scores were 0.76 (95% CI: 0.58, 0.98) and 0.68 (95% CI: 0.53, 0.88), respectively, among women with a BMI in the normal range (18.5–24.9 kg/m^2) at baseline. There were no significant associations among women who were overweight at baseline. The findings suggest that a high-quality diet that is sustained over time is associated with reduced obesity risk among young African American women with a normal BMI at baseline. J. Nutr. 143: 1636–1641, 2013.

Introduction

The prevalence of obesity (BMI ≥30 kg/m^2) among African American women was estimated to be 59% as of 2009–2010 (1). Better adherence to the 2005 Dietary Guidelines for Americans (2) has been associated with less weight gain in whites but not in African Americans (3,4). The Healthy Eating Index–2005 (5), a measure of adherence to the 2005 Dietary Guidelines for Americans, has been found to be less strongly associated with diabetes and other chronic disease in comparison to other diet quality indices, such as the Dietary Approaches to Stop Hypertension (DASH)[6] score and the Alternate Healthy Eating Index–2010 (AHEI-2010) (6,7). It is unclear whether diets consistent with the DASH and AHEI-2010 indices, originally developed with the aim to reduce the risk of major chronic disease, are effective in terms of weight control and prevention of obesity.

Few studies have prospectively assessed the relation of diet quality to weight gain in African American populations (3,4). The objective of the present study was to examine 2 measures of diet quality, the AHEI-2010 and DASH scores, in relation to obesity risk in a large prospective cohort of African American women. Because most weight gain occurs in young adulthood (8), we restricted the analysis to women aged <40 y at baseline. We examined the association between diet quality and incident obesity separately among normal-weight (BMI: 18.5–24.9 kg/m^2) and overweight (BMI: 25–29.9 kg/m^2) women because of the large difference in baseline risk of obesity.

Participants and Methods

Study population. The Black Women's Health Study (BWHS), an ongoing follow-up study in African American women, was established in 1995 when African American women from across the US were enrolled through mailed health questionnaires. The baseline questionnaire collected information on demographic characteristics, lifestyle factors, and medical history; and usual diet was assessed through an FFQ. A total of 59,001 women aged 21–69 y at baseline have been followed through mailed questionnaires every 2 y. Follow-up questionnaires update exposure information and incident medical conditions. Follow-up of the baseline cohort was ~80% through 2011. The Boston University Medical Campus institutional review board approved the protocol.

We restricted the analysis to women aged 21–39 y with a BMI of 18.5–29.9 kg/m^2 at baseline (n = 22,211). We further excluded women who were pregnant at baseline, had a history of cancer (except for nonmelanoma skin cancer), myocardial infarction, or stroke at baseline; reported a history of gastric surgery on the 1999 questionnaire; left >10

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[6] Abbreviations used: AHEI, Alternate Healthy Eating Index; BWHS, Black Women's Health Study; DASH, Dietary Approaches to Stop Hypertension; SSB, sugar-sweetened beverage.
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items blank on the baseline FFQ; had implausible energy intake values (<400 or >3800 kcal); or were missing weight on all follow-up questionnaires. After all exclusions, the present analysis included 19,885 women.

Dietary assessment. Dietary intake in the previous year was assessed in 1995 and 2001 with a self-administered modified version of the Block-National Cancer Institute FFQ (9). In a validation study of the 1995 FFQ, correlations with responses from 3-d food diaries and 24-h recalls for fat, protein, carbohydrate, fiber, calcium, vitamin C, folate, and β-carotene ranged from 0.5 to 0.8 (10).

Diet quality scores for 1995 and 2001 were computed for each participant on the basis of the 1995 and 2001 FFQ responses. The AHEI-2010 score, derived by Chiuve et al. (7), is a measure of diet quality based on 11 food and nutrient components that have consistently been associated with risk of chronic disease. Each component was scored from 0 to 10, where 10 indicates that dietary recommendations were met and 0 indicates the worst level of intake; intermediate intakes were scored proportionally from 0 to 10. High intakes of vegetables, whole fruit, whole grains, nuts and legumes, long-chain (omega-3) fatty acids (EPA + DHA), and PUFAs received higher scores. Low intakes of sugar-sweetened beverages (SSBs) and fruit juice, red and processed meats, *trans* fat, and sodium also received higher scores. Moderate alcohol consumption received the highest score, whereas heavy alcohol consumption received the lowest score; nondrinkers were given a score of 2.5. Total AHEI-2010 scores ranged from 0 to 110.

We also evaluated a DASH score, created by Fung et al. (11), which ranks participants on the basis of intake of 8 food and nutrient components. Participants were categorized into quintiles in 1995 and 2001 for each component. For fruits (including fruit juice), vegetables, nuts and legumes, whole grains, and low-fat dairy, the lowest quintile was assigned 1 point and the highest quintile was assigned 5 points. For sodium, red and processed meats, and SSBs, scores were reversed such that the lowest quintile was assigned 5 points and the highest quintile was assigned 1 point. Overall DASH scores ranged from 8 to 40.

Assessment of incident obesity. Participants reported height and current weight on the baseline questionnaire in 1995. Current weight was updated every 2 y by follow-up questionnaire. A validation study indicated high correlation between self-reported and measured values for height and weight (r = 0.93 and 0.97, respectively) (12). BMI was calculated as weight in kilograms divided by height in meters squared. Participants with a BMI $\geq$30 kg/m^2 were classified as obese.

Covariate assessment. Information on years of education was ascertained on the 1995 and 2003 questionnaires. Data on vigorous exercise, television watching, smoking status, alcohol intake, parity, and age at first birth were obtained at baseline and have been updated on biennial follow-up questionnaires. In a validation study of physical activity, participants wore actigraphs (activity monitors) during their waking hours for 7 d (12). The correlation between BWHS questionnaire data and actigraph measurements was 0.40 for vigorous activity ($P < 0.05$).

Statistical analysis. Participants contributed to the analysis from the beginning of follow-up in 1995 until the first occurrence of obesity (BMI $\geq$30 kg/m^2), loss to follow-up, or the end of follow-up in 2011, whichever occurred first. Participants who developed cancer (except for nonmelanoma skin cancer) or cardiovascular disease during follow-up were censored at the date of diagnosis. Women who were pregnant during follow-up did not contribute person-time to the 2-y questionnaire cycle in which they gave birth. Cox proportional hazards models were used to estimate HRs and 95% CIs for the association between diet quality and risk of incident obesity.

Diet quality at baseline in 1995 was assessed in relation to obesity risk from 1995 to 2001, and diet quality in 2001 was assessed in relation to obesity risk from 2001 to 2011. Multivariable models were adjusted for age (1-y intervals), time period (2-y intervals), baseline BMI (continuous), vigorous exercise (<1, 1–2, 3–4, 5–6, $\geq$7 h/wk), television watching (<3, 3–4, $\geq$5 h/d), education ($\leq$12, 13–15, $\geq$16 y), geographic region (Northeast, South, Midwest, West), smoking (never; past; current: <15 cigarettes/d, $\geq$15 cigarettes/d), parity (0, 1–2, $\geq$3 births), and age at first birth (<25, $\geq$25 y). Covariates that changed over time (e.g., vigorous activity and smoking status) were updated as time-varying variables in the analysis. Tests for linear trend were conducted by modeling diet quality index scores as continuous variables using the median value for each quintile. All analyses were stratified by baseline BMI (18.5–24.9, 25.0–29.9 kg/m^2). All statistical analyses were performed by using SAS version 9.3 (SAS Institute).

Results

Among 19,885 women aged 21–39 y with a BMI of 18.5–29.9 kg/m^2 at baseline, mean AHEI-2010 and DASH scores were 37.7 (range: 11.1–78.2) and 23.5 (range: 8–38), respectively. Women with higher scores were more likely to be older, live in the Northeast or West, have a college education, be more physically active and less sedentary, be a nonsmoker, and have fewer children (**Table 1**). As expected, women with higher scores had higher intakes of vegetables, fruit, whole grains, nuts and legumes, and ω-3 fatty acids and lower intakes of total energy, SSBs, red and processed meat, and *trans* fat. The Spearman correlation between baseline AHEI-2010 and baseline DASH scores was 0.73.

At baseline, 12,271 (62%) women had normal weight (BMI: 18.5–24.9 kg/m^2) and 7614 (38%) women were overweight (BMI: 25–29.9 kg/m^2). During 16 y of follow-up, 2046 (17%) of initially normal-weight women became obese and 5137 (67%) of overweight women became obese.

AHEI-2010 and DASH scores were not significantly associated with obesity risk in multivariable models (**Table 2**). Among women with normal weight at baseline, the multivariable HRs comparing the highest with the lowest quintile of the AHEI-2010 and DASH scores were 0.95 (95% CI: 0.82, 1.10) and 0.87 (95% CI: 0.74, 1.01), respectively. The corresponding HRs were 0.95 (95% CI: 0.86, 1.04) and 1.02 (95% CI: 0.92, 1.12), respectively, among women who were overweight at baseline.

Among women who completed the 2001 FFQ and had not become obese as of 2001, 7120 (73%) and 7769 (80%) remained within 1 quintile of their 1995 AHEI-2010 and DASH scores, respectively. During follow-up of this subgroup from 2001 to 2011, AHEI-2010 and DASH scores were inversely associated with obesity risk among women with normal weight at baseline (**Table 3**). The multivariable HRs comparing the highest with the lowest quintile of the AHEI-2010 and DASH scores were 0.76 (95% CI: 0.58, 0.98) and 0.68 (95% CI: 0.53, 0.88), respectively. Among women who were overweight at baseline, the multivariable HRs comparing highest with lowest quintiles of AHEI-2010 and DASH scores were 0.85 (95% CI: 0.67, 1.07) and 0.91 (95% CI: 0.73, 1.14), respectively.

We assessed whether the association between diet quality and obesity risk differed by smoking status among women with consistent diet scores. Among women with normal weight at baseline, the association was evident among never smokers (HR: 0.67; 95% CI: 0.50, 0.91, for the highest compared with the lowest AHEI-2010 quintiles); among the 20% of women who were ever smokers, the corresponding HR was 1.15 (95% CI: 0.66, 2.00; P-interaction = 0.46). Among overweight women, the corresponding HRs were 0.80 (95% CI: 0.60, 1.05) among never smokers and 0.96 (95% CI: 0.62, 1.46) among ever smokers (P-interaction = 0.65). The associations did not appreciably differ across strata of vigorous exercise or education (data not shown).

Table 4 presents results for each component of the AHEI-2010 and DASH scores in relation to obesity among women whose diets were consistent over time. A higher score (lower intake) for the red and processed meat component of each index was associated with reduced risk of obesity. The association was significant only among the normal-weight women (HR: 0.74; 95%

TABLE 1 Age-standardized baseline characteristics according to AHEI-2010 and DASH scores: the Black Women's Health Study, 1995[1]

	AHEI-2010			DASH		
Characteristic	Quintile 1 26.1 (11.1–30.0)	Quintile 3 37.2 (35.0–39.5)	Quintile 5 49.8 (45.3–78.2)	Quintile 1 16 (8–18)	Quintile 3 24 (23–25)	Quintile 5 31 (29–38)
n	3968	3980	3985	3565	4200	3553
Age, *y*	29.4 ± 5.2	30.8 ± 5.1	32.2 ± 4.9	29.6 ± 5.2	31.1 ± 5.1	31.7 ± 5.0
BMI, *kg/m*^{2}	24.1 ± 3.0	24.2 ± 2.9	24.1 ± 2.8	24.2 ± 3.1	24.1 ± 2.9	24.1 ± 2.8
Region, *%*						
Northeast	25.8	28.3	33.0	24.7	28.5	33.7
South	35.2	33.0	27.1	38.8	32.0	26.5
Midwest	24.6	20.8	17.4	23.8	20.7	18.2
West	14.4	17.9	22.5	12.7	18.8	21.6
Education ≥16 y, *%*	39.7	50.6	57.4	34.9	50.4	62.8
Vigorous activity ≥5 h/wk, *%*	11.6	16.6	30.3	10.7	16.8	31.7
Television watching ≥5 h/d, *%*	17.9	11.4	7.4	21.4	10.7	6.4
Current smoker, *%*	16.9	13.2	11.4	21.4	13.1	6.6
Parity ≥3 births, *%*	11.9	8.6	6.3	13.0	8.5	5.6
Age at first birth <20 y[2], *%*	30.9	30.1	28.7	34.8	27.6	25.7
Dietary intake						
Total energy, *kcal/d*	1800 ± 630	1330 ± 620	1380 ± 680	1590 ± 690	1380 ± 670	1420 ± 590
Vegetables, *g/d*	54 ± 45	74 ± 61	140 ± 120	42 ± 46	82 ± 72	140 ± 100
Fruit excluding juice, *g/d*	64 ± 74	100 ± 100	210 ± 190	46 ± 66	110 ± 110	220 ± 160
Fruit juice, *g/d*	100 ± 120	110 ± 130	110 ± 130	63 ± 90	110 ± 130	140 ± 140
Sugar-sweetened beverages, *g/d*	600 ± 530	340 ± 350	170 ± 240	680 ± 570	310 ± 330	150 ± 180
Whole grains, *g/d*	15 ± 21	20 ± 24	31 ± 31	7 ± 16	21 ± 24	37 ± 30
Nuts and legumes, *g/d*	13 ± 19	20 ± 30	46 ± 58	11 ± 21	22 ± 32	45 ± 52
Red/processed meat, *g/d*	100 ± 62	43 ± 42	19 ± 29	88 ± 62	48 ± 48	17 ± 24
Low-fat dairy, *g/d*	40 ± 140	56 ± 140	96 ± 180	8 ± 52	50 ± 120	160 ± 220
Long-chain ω-3 fats, *mg/d*	50 ± 67	75 ± 110	150 ± 180	64 ± 93	86 ± 130	120 ± 160
Sodium, *g/d*	2.8 ± 1.0	2.1 ± 1.0	2.3 ± 1.2	2.4 ± 1.1	2.2 ± 1.1	2.4 ± 1.1
Alcohol, *g/d*	2.2 ± 9.6	2.1 ± 6.5	3.4 ± 6.1	3.2 ± 9.0	2.3 ± 6.8	2.0 ± 6.6
PUFAs, *% of energy*	6.9	7.2	7.7	7.1	7.5	6.9
trans Fat, *% of energy*	2.6	2.4	2.2	2.6	2.5	2.1

[1] Values are means ± SDs unless otherwise specified. Values listed below the quintiles in the column heads are medians (ranges in parentheses). AHEI-2010, Alternate Healthy Eating Index–2010; DASH, Dietary Approaches to Stop Hypertension.
[2] Among parous women only.

CI: 0.56, 0.97, for the lowest intake compared with the highest intake of the AHEI-2010 component). An unexpected finding was an increased risk of obesity among overweight women for higher scores (lower consumption) on the SSB component of the AHEI-2010. In a more detailed analysis, the association was largely explained by fruit juice intake (HR: 1.32; 95% CI: 1.04, 1.68, for the lowest relative to the highest intake quintiles). Higher low-fat dairy intake on the DASH score was associated with increased obesity risk among women with normal weight at baseline (Table 4). In detailed analyses, intake of 1% or skim milk was associated with increased obesity risk (HR: 1.47; 95% CI: 1.13, 1.91, for ≥0.5 servings/d compared with none) and yogurt intake was inversely associated with obesity risk (HR: 0.76; 95% CI: 0.61, 0.94, for ≥0.28 servings/d compared with none). The components included in the AHEI-2010 but not in the DASH score—*trans* fat, ω-3 fatty acids, PUFAs, and alcohol—were not materially associated with obesity risk.

Discussion

In this prospective study in young African American women, higher AHEI-2010 and DASH scores were associated with lower risk of obesity during 16 y of follow-up. The risk reduction was most apparent among participants with normal weight at baseline who had consistent diet quality scores at 2 time points.

Few studies have prospectively assessed an index-based measure of diet quality in relation to weight gain among African Americans. In the Multi-Ethnic Study of Atherosclerosis (MESA), HEI scores were inversely associated with BMI after 18 mo of follow-up among whites but not among African Americans (3). In the Coronary Artery Risk Development in Young Adults (CARDIA) study, diet quality scores were inversely associated with 20-y weight gain in white participants, whereas there was a positive association among African American participants (4).

In the present study, AHEI-2010 and DASH scores were not significantly associated with obesity risk in the overall analysis. However, significant inverse associations for both scores were observed when the analysis was confined to women who were normal weight at baseline and maintained similar diet quality scores in 1995 and 2001. We previously reported that a Western dietary pattern, characterized by high consumption of red and processed meat and fried foods, was associated with significantly greater 14-y weight gain among women who maintained a similar dietary pattern over time (13).

A low intake of red and processed meat was significantly associated with lower obesity risk among women who were leaner at baseline. In a long-term study of the relation of diet and other

TABLE 2 HRs and 95% CIs for risk of obesity in relation to AHEI-2010 and DASH scores: the Black Women's Health Study, 1995–2011[1]

	Baseline BMI: 18.5–24.9 kg/m^2				Baseline BMI: 25.0–29.9 kg/m^2			
	Cases	Person-years	HR (95% CI)[2]	HR (95% CI)[3]	Cases	Person-years	HR (95% CI)[2]	HR (95% CI)[3]
AHEI-2010								
Q1	463	29,611	1.00	1.00	1098	10,488	1.00	1.00
Q2	418	29,106	0.94 (0.82, 1.08)	0.98 (0.85, 1.12)	1058	11,074	0.95 (0.87, 1.03)	0.95 (0.87, 1.04)
Q3	389	29,379	0.85 (0.74, 0.98)	0.92 (0.80, 1.06)	1002	10,892	0.90 (0.83, 0.99)	0.91 (0.83, 1.00)
Q4	430	29,698	0.96 (0.84, 1.10)	1.08 (0.94, 1.24)	983	10,543	0.96 (0.87, 1.05)	0.97 (0.89, 1.07)
Q5	346	29,180	0.81 (0.70, 0.94)	0.95 (0.82, 1.10)	996	11,136	0.92 (0.84, 1.00)	0.95 (0.86, 1.04)
P-trend			0.003	0.59			0.13	0.40
DASH								
Q1	417	25,679	1.00	1.00	993	9867	1.00	1.00
Q2	519	37,067	0.85 (0.75, 0.97)	0.91 (0.79, 1.03)	1285	13,573	0.94 (0.86, 1.02)	0.94 (0.87, 1.03)
Q3	438	30,728	0.88 (0.77, 1.00)	0.98 (0.85, 1.13)	1046	11,512	0.95 (0.87, 1.04)	0.96 (0.88, 1.05)
Q4	365	26,555	0.84 (0.72, 0.96)	0.98 (0.84, 1.13)	900	9,474	0.99 (0.90, 1.08)	1.00 (0.91, 1.10)
Q5	307	26,945	0.70 (0.60, 0.81)	0.87 (0.74, 1.01)	913	9,707	0.99 (0.90, 1.09)	1.02 (0.92, 1.12)
P-trend			<0.001	0.23			0.84	0.49

[1] AHEI-2010, Alternate Healthy Eating Index–2010; DASH, Dietary Approaches to Stop Hypertension; Q, quintile.
[2] Adjusted for age, total energy intake, and baseline BMI (continuous).
[3] Adjusted for age, total energy intake, baseline BMI (continuous), vigorous exercise, television watching, education, geographic region, smoking status, parity, and age at first birth.

lifestyle factors to weight gain conducted in 3 large cohorts, unprocessed red meats and processed meats were among the dietary factors that were most strongly associated with increased weight gain (14). The deleterious effect of red and processed meats on weight gain was also observed in a study that included cohorts from 10 European countries and was attributed to the high saturated fat content and high energy density of meat (15).

Whereas fruit juice is included in the fruits component of the DASH score (11), it is included as part of the SSB component in the AHEI-2010 score because positive associations have been observed with diabetes risk (7). We found that a higher score (lower intake) on the AHEI-2010 component for SSBs and fruit juice was associated with increased obesity risk among overweight women, which appeared to be explained by an association between lower fruit juice intake and higher obesity risk. Our results indicate that combining fruit juice with SSBs as a single component may reduce the usefulness of the AHEI-2010 score for evaluating diet quality in relation to obesity.

Low-fat dairy is a component in the DASH score (11) but is not included in the AHEI-2010 (7). We observed a positive association between low-fat dairy intake and obesity risk among normal-weight women; the intake of 1% or skim milk appeared to account for the positive association. A study in African American men found that obese men were more likely than normal-weight men to consume low-fat or skim milk all of the time; furthermore, low-fat milk intake was higher among those who reported

TABLE 3 HRs and 95% CIs for risk of obesity in relation to 2001 AHEI-2010 and DASH scores among women with consistent diet scores: the Black Women's Health Study, 2001–2011[1]

	Baseline BMI: 18.5–24.9 kg/m^2				Baseline BMI: 25.0–29.9 kg/m^2			
	Cases	Person-years	HR (95% CI)[2]	HR (95% CI)[3]	Cases	Person-years	HR (95% CI)[2]	HR (95% CI)[3]
AHEI-2010								
Q1	207	8925	1.00	1.00	206	1998	1.00	1.00
Q2	181	9091	0.87 (0.71, 1.07)	0.92 (0.74, 1.13)	184	2218	0.84 (0.68, 1.03)	0.83 (0.68, 1.03)
Q3	142	8524	0.71 (0.57, 0.89)	0.81 (0.64, 1.01)	166	1978	0.81 (0.66, 1.01)	0.82 (0.66, 1.03)
Q4	162	9070	0.80 (0.65, 0.99)	0.98 (0.78, 1.23)	191	2213	0.88 (0.72, 1.09)	0.94 (0.75, 1.17)
Q5	107	8649	0.58 (0.45, 0.74)	0.76 (0.58, 0.98)	177	2247	0.78 (0.63, 0.97)	0.85 (0.67, 1.07)
P-trend			<0.001	0.08			0.07	0.41
DASH								
Q1	197	8369	1.00	1.00	208	2140	1.00	1.00
Q2	244	12,170	0.83 (0.69, 1.01)	0.90 (0.74, 1.09)	258	2838	0.97 (0.80, 1.16)	0.96 (0.79, 1.16)
Q3	178	9490	0.80 (0.65, 0.98)	0.93 (0.75, 1.14)	209	2419	0.94 (0.77, 1.15)	0.95 (0.78, 1.17)
Q4	167	9049	0.79 (0.64, 0.97)	0.99 (0.79, 1.24)	166	2054	0.88 (0.72, 1.09)	0.91 (0.73, 1.14)
Q5	107	9055	0.51 (0.40, 0.65)	0.68 (0.53, 0.88)	169	2133	0.85 (0.69, 1.05)	0.91 (0.73, 1.14)
P-trend			<0.001	0.03			0.08	0.38

[1] Women with a consistent diet were defined as those who remained within 1 quintile of the specific diet quality index in 1995 and 2001. AHEI-2010, Alternate Healthy Eating Index–2010; DASH, Dietary Approaches to Stop Hypertension; Q, quintile.
[2] Adjusted for age, total energy intake, and baseline BMI (continuous).
[3] Adjusted for age, total energy intake, baseline BMI (continuous), vigorous exercise, television watching, education, geographic region, smoking status, parity, and age at first birth.

TABLE 4 HRs and 95% CIs for risk of obesity in relation to 2001 AHEI-2010 and DASH component scores (Q5 vs. Q1) among women with consistent diet scores: the Black Women's Health Study, 2001–2011[1]

	Baseline BMI	
	18.5–24.9 kg/m^2	25.0–29.9 kg/m^2
AHEI-2010 components		
Vegetables	0.99 (0.75, 1.31)	0.82 (0.62, 1.07)
Whole fruit	1.06 (0.81, 1.37)	1.01 (0.79, 1.30)
SSBs and fruit juice[2]	0.84 (0.67, 1.06)	1.24 (1.01, 1.53)
Whole grains	0.78 (0.61, 1.00)	0.92 (0.72, 1.16)
Nuts and legumes	0.86 (0.67, 1.09)	0.98 (0.77, 1.23)
Red and processed meat[2]	0.74 (0.56, 0.97)	0.86 (0.66, 1.12)
Sodium[2]	0.80 (0.48, 1.33)	1.02 (0.64, 1.63)
trans Fat[2]	1.14 (0.87, 1.50)	1.15 (0.88, 1.49)
ω-3 fatty acids	1.06 (0.84, 1.35)	1.16 (0.91, 1.47)
PUFAs	1.12 (0.87, 1.44)	1.03 (0.81, 1.30)
Alcohol[3]	0.91 (0.68, 1.21)	0.84 (0.65, 1.09)
DASH components		
Vegetables	1.07 (0.83, 1.37)	0.91 (0.71, 1.17)
Whole fruit and juice	1.01 (0.80, 1.29)	0.93 (0.74, 1.18)
SSBs[2]	0.97 (0.75, 1.24)	0.95 (0.75, 1.20)
Whole grains	0.83 (0.66, 1.05)	0.89 (0.71, 1.11)
Nuts and legumes	0.83 (0.66, 1.05)	0.88 (0.70, 1.10)
Red and processed meat[2]	0.77 (0.59, 1.00)	0.89 (0.69, 1.15)
Sodium[2]	0.82 (0.52, 1.30)	0.85 (0.56, 1.29)
Low-fat dairy	1.23 (0.99, 1.51)	1.09 (0.88, 1.35)

[1] Values are HRs (95% CIs) adjusted for age, total energy intake, baseline BMI (continuous), vigorous exercise, television watching, education, geographic region, smoking status, parity, age at first birth, and all other components within the respective diet quality index. Women with a consistent diet were defined as those who remained within 1 quintile of the specific diet quality index in 1995 and 2001. AHEI-2010, Alternate Healthy Eating Index–2010; DASH, Dietary Approaches to Stop Hypertension; Q, quintile; SSB, sugar-sweetened beverage.
[2] HRs comparing low intake relative to high intake.
[3] HRs comparing score of 10 (0.5–1.5 drinks/d) with 2.5 (nondrinkers).

having changed their diet in the past year (16). It may be that some participants switched to low-fat milk in response to weight gain, and therefore the association observed could be explained by reverse causation.

Although the DASH score includes fewer components than the AHEI-2010, both scores were similarly associated with obesity risk. This may be because the additional AHEI-2010 components (*trans* fat, ω-3 fatty acids, PUFAs, alcohol) were not associated with obesity risk. Because the AHEI-2010 and DASH indices were not developed specifically to prevent obesity, they do not include some dietary components that have been strongly associated with weight gain. For instance, in a large long-term study, potato products (including chips and fries) and refined grains were associated with greater weight gain (14). French fries had a high factor loading on the Western dietary pattern in the BWHS, which was found to be associated with greater weight gain (13). It is plausible that a diet quality index that includes components for potatoes and refined grains may have a stronger association with obesity risk. A diet quality index that emphasizes low intake of starches, refined carbohydrates, and other processed foods may better predict weight change.

Strengths of the present study include the prospective design, large size, and long duration of follow-up. Dietary intake was assessed at 2 time points, allowing dietary changes to be updated midway through follow-up and allowing analyses confined to women who reported a consistent dietary pattern in the 2 assessments. We assessed body weight every 2 y, and we also used updated data on important covariates such as physical activity, sedentariness, smoking history, and parity. Study limitations include the use of self-reported measures of body size. Although a validation study indicated high correlation between self-reported and measured anthropometric variables (12), weight tends to be underreported, particularly among obese women (17), and therefore obesity rates may have been underestimated in the present study. Underreporting of dietary intake is also more prevalent among overweight adults (18,19), which may have limited our ability to detect an association with incident obesity in this group of women. In addition, overweight women may be more likely to frequently change their diets; although we assessed diet twice, at baseline and 6 y into follow-up, we may not have captured long-term dietary intake for this group of women. Changes in dietary intake in response to weight gain (i.e., reverse causation) could also have distorted results. However, analyses among women whose dietary patterns were relatively consistent would have reduced this problem. There were few women in the present study with high absolute diet scores, and there was an insufficient range of scores to assess very high levels of diet quality. Although we adjusted for numerous lifestyle factors, there may have been residual confounding from other factors.

In summary, a high-quality diet that was sustained over time was associated with a lower risk of obesity among young African American women with a BMI in the normal range at baseline. Inverse associations were observed for both the AHEI-2010 and DASH scores; each of these indexes emphasizes low intakes of red and processed meat, SSBs, and sodium and high intakes of whole grains, nuts and legumes, vegetables, and whole fruit.

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