

RESTAURANT FOODS, SUGAR-SWEETENED SOFT DRINKS, AND OBESITY RISK AMONG YOUNG AFRICAN AMERICAN WOMEN

Background: The prevalence of obesity is disproportionately high in African American women, and consumption of fast foods and sugar-sweetened soft drinks is also especially high among African Americans.

Objective: We investigated the relation of intakes of sugar-sweetened soft drinks and specific types of restaurant foods to obesity in the Black Women's Health Study.

Design: In this prospective cohort study, 19,479 non-obese women aged 21–39 years at baseline were followed for 14 years (1995–2009). Dietary intake was assessed by validated food frequency questionnaire in 1995 and 2001.

Main outcome measures: Cox regression models were used to estimate hazard ratios (HR) and 95% confidence intervals (CI) for the association of intakes of restaurant foods and sugar-sweetened soft drinks with incident obesity.

Results: Higher intakes of burgers from restaurants and sugar-sweetened soft drinks were associated with greater risk of becoming obese. The associations were present in models that included both factors and adjusted for overall dietary pattern. The HR of obesity in relation to restaurant burger consumption of ≥ 2 times/week compared with < 5 times/year was 1.26 (95% CI: 1.14–1.40; P -trend $< .001$). For sugar-sweetened soft drink intake, the HR was 1.10 (95% CI: .99–1.23; P -trend = .14) for ≥ 2 drinks/day compared with < 1 drink/month. The associations were stronger among women younger than age 30 with normal weight at baseline.

Conclusions: Frequent consumption of burgers from restaurants and sugar-sweetened soft drinks contribute to obesity among young African American women. (*Ethn Dis.* 2013;23[4]:445–451)

Key Words: Fast Food, Sugar-Sweetened Beverages, Obesity, African American Women

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INTRODUCTION

In recent decades, increases in body mass index (BMI) have been highest among African American women,¹ 59% of whom were obese (BMI ≥ 30 kg/m²) as of 2009–2010.² Intakes of meals prepared away from home and of sugar-sweetened beverages (SSBs) have also increased,^{3,4} and consumption is particularly high among African Americans.^{4–8}

Consumption of meals from restaurants is associated with higher energy intake and poor diet quality,^{6,9} leading to greater weight gain.¹⁰ A few large long-term follow-up studies of adults have reported a positive association of restaurant food consumption with weight gain,^{11–15} but there has been almost no research examining the effect of specific types of restaurant foods (eg, burgers, pizza) on obesity risk.

Sugar-sweetened beverage consumption is associated with increased weight gain, partly due to low satiety of liquid calories and incomplete compensation of energy intake at subsequent meals.^{16–18}

Most studies of the relation between SSBs and weight gain have been cross-sectional or had short-term follow-up, with inconsistent effect sizes by study design.^{16–22}

To our knowledge, no prospective studies have assessed specific types of restaurant foods in relation to obesity risk. Frequent fast-food consumption is associated with greater SSB consumption,^{5,6} but little research has investigated their independent effects on obesity incidence. The objective of our study was to prospectively examine the relation of intakes of sugar-sweetened soft drinks and specific categories of restaurant foods to obesity risk over 14 years

of follow-up among African American women who were aged 21–39 years and not obese at baseline. We previously found that a Western dietary pattern, high in consumption of red meat and fried foods, was associated with greater 14-year weight gain.²³ Therefore, we also sought to assess whether the associations for sugar-sweetened soft drinks and restaurant burgers were modified by overall dietary pattern.

METHODS

Study Population

The Black Women's Health Study (BWHS), an ongoing follow-up study of African American women, was established in 1995 when African American women from across the United States were enrolled through mailed health questionnaires. The baseline questionnaire collected information on demographic characteristics, lifestyle factors,

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and medical history, and usual diet was assessed through a food frequency questionnaire (FFQ). A total of 59,001 women aged 21–69 years at baseline have been followed through mailed questionnaires every two years. Follow-up questionnaires update exposure information and incident medical conditions. Follow-up of the baseline cohort was 80% through 2009. The Boston University Medical Campus Institutional Review Board approved the protocol.

We restricted the analysis to women aged 21–39 years with a BMI of 18.5–29.9 kg/m² at baseline ($n=22,879$). After the exclusion of women who were pregnant at baseline, had a history of cancer (except nonmelanoma skin cancer) or cardiovascular disease at baseline, had a history of gastric surgery as ascertained on the 1999 questionnaire, left more than 10 items blank on the baseline FFQ, had implausible energy intake values (<400 or >3800 kcal), or were missing weight on all follow-up questionnaires, the analysis included 19,479 women.

Assessment of Incident Obesity

Participants reported height and current weight on the baseline questionnaire in 1995. Current weight was updated every 2 years by follow-up questionnaire. A validation study indicated excellent correlation between self-reported and measured values for height and weight ($r=.93$ and $r=.97$, respectively).²⁴ Body mass index was calculated as weight in kilograms divided by squared height in meters. Participants with a BMI ≥ 30 kg/m² were classified as obese.

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.²⁵ In a validation study, correlations of responses on the 1995 FFQ with responses from 3-day food diaries and 24-hour recalls for fat, protein, carbohydrate, fiber, calcium, vitamin C, folate, and beta-carotene ranged from .5–.8.²⁶

Participants were asked how often they had eaten 6 specific types of foods (burgers, fried chicken, fried fish, pizza, Chinese food, and Mexican food) from a restaurant or fast-food establishment: never in the past year, 1–4 times/year, 5–11/year, 1–3/month, 1/week, 2–4/week, or about every day.

Participants were asked how often they drank regular soft drinks (not diet soda): never or <1/month, 1–3/month, 1/week, 2–4/week, 5–6/week, 1/day, 2–3/day, 4–5/day, or ≥ 6 /day. A medium serving size was defined as a 12 oz. can or bottle, and participants were asked to specify a small, medium, large, or super-size portion (weighted as .5, 1, 1.5, and 2 times a medium serving size, respectively). The frequency and portion size were used to calculate the number of medium servings consumed. Participants were also asked how often they ate hamburgers, cheeseburgers, meatloaf, beef burritos, or tacos, with 9 frequency responses ranging from never or <1/month to ≥ 2 /day.

Covariate Assessment

Data on vigorous exercise, walking for exercise, smoking status, alcohol intake, and parity were obtained at baseline and updated on biennial follow-up questionnaires. In a validation study of physical activity, participants wore actigraphs (activity monitors) during their waking hours for 7 days.²⁴ Correlations between BWHS questionnaire data and actigraph measurements were .40 for vigorous activity and .26 for walking for exercise. Information on education was ascertained on the 1995 and 2003 questionnaires.

Statistical Analysis

Participants contributed to the analysis from the beginning of follow-up in 1995 until the first occurrence of obesity, loss to follow-up, or the end of follow-up in 2009, whichever occurred first. Participants who developed cancer (except nonmelanoma skin cancer) or cardiovascular disease during

follow-up were censored at the date of diagnosis. Cox proportional hazards models were used to estimate hazard ratios (HR) and 95% confidence intervals (CI) for the association between intakes of sugar-sweetened soft drinks and restaurant foods and obesity risk.

Dietary intake at baseline was assessed in relation to obesity risk from 1995–2001, and dietary intake in 2001 was assessed in relation to obesity risk from 2001–2009. Multivariable models were adjusted for age, baseline BMI, vigorous exercise (none, 0–1, 1–2, 3–4, 5–6, ≥ 7 hours/week), walking for exercise (none, 0–1, 1–2, 3–4, 5–6, ≥ 7 hours/week), education (<12, 13–15, ≥ 16 years), geographic region (Northeast, South, Midwest, West), smoking status (never; past; current, <15 cigarettes/day; current, ≥ 15 cigarettes/day), alcohol intake (<1, 1–3, 4–6, ≥ 7 drinks/week), parity (0, 1, 2, ≥ 3 births), and dietary patterns (quintiles). Based on a factor analysis described previously,²³ we identified a prudent and a Western dietary pattern in the BWHS, characterized by high intake of vegetables and fruit and by high intake of meat and fried foods, respectively.²⁷ In further models, consumption of sugar-sweetened soft drinks was adjusted for intake of restaurant burgers, and vice versa. Covariates that changed over time (eg, vigorous exercise and smoking) were treated as time-dependent variables in the analysis. Tests for trend were conducted by using an ordinal value for each level of consumption modeled as a continuous variable.

We conducted subgroup analyses within strata of Western dietary pattern (below median, above median), baseline age (21–29, 30–39 years), baseline BMI (18.5–24.9, 25.0–29.9 kg/m²), vigorous exercise (<1, ≥ 1 hour/week), smoking status (never, ever), education (<16, ≥ 16 years), and neighborhood socioeconomic status (tertiles).²⁸ Tests for interaction were performed using the likelihood ratio test comparing models with and without cross-product terms

Table 1. Baseline characteristics according to intakes of sugar-sweetened soft drinks and restaurant burgers in the Black Women's Health Study, 1995^a

Characteristic	Sugar-Sweetened Soft Drinks				Restaurant Burgers			
	<1/mo	1-7/mo	2-6/wk	≥1/d	<5/yr	5-11/yr	1-3/mo	≥1/wk
n (%)	4,749 (24)	6,760 (35)	4,825 (25)	3,145 (16)	6,286 (32)	3,886 (20)	5,160 (27)	4,147 (21)
Age, years, mean (SD)	31.4 (5.1)	30.7 (5.1)	30.7 (5.2)	30.4 (5.1)	30.9 (5.2)	30.9 (5.2)	30.8 (5.1)	30.8 (5.2)
BMI, kg/m ² , mean (SD)	24.0 (2.9)	24.1 (2.9)	24.2 (2.9)	24.4 (3.0)	23.9 (2.8)	24.2 (3.0)	24.3 (2.9)	24.3 (3.0)
Region, %								
Northeast	31.8	27.0	25.9	31.3	37.2	29.2	24.2	20.5
South	28.3	33.2	34.4	32.8	28.1	30.6	33.7	38.1
Midwest	19.1	20.4	22.2	22.5	16.7	20.2	22.8	25.5
West	20.8	19.4	17.5	13.4	18.0	20.0	19.3	15.9
Education ≥16 years, %	57.9	51.2	46.7	38.9	53.0	49.6	50.9	43.8
Vigorous exercise ≥5 hours/wk, %	26.0	18.6	13.9	13.4	24.3	19.0	15.3	12.8
Walking for exercise ≥5 hours/wk, %	16.1	13.3	11.3	10.7	16.3	12.9	11.1	10.8
Current smoker, %	9.5	10.6	16.0	20.0	11.2	13.3	13.1	16.4
Current drinker ≥7 drinks/wk, %	3.9	3.9	4.9	6.0	3.8	4.3	4.3	5.9
Parity ≥3 births, %	6.7	8.2	9.5	12.0	7.5	9.3	9.0	9.9
Sugar-sweetened soft drink intake ≥1/d, %	—	—	—	—	8.7	12.7	17.1	29.2
Restaurant burger intake ≥1/wk, %	9.9	16.3	28.2	38.3	—	—	—	—
Prudent dietary pattern Q5, %	38.1	21.6	10.3	3.3	34.8	19.1	12.7	7.0
Western dietary pattern Q5, %	11.7	19.5	26.2	24.0	11.7	17.6	21.3	33.0

^a Values are means and proportions standardized to the age distribution of the study population at baseline.

between the covariate and intake of soft drinks or restaurant foods. All statistical analyses were performed using SAS version 9.3 (SAS Institute Inc., Cary, NC).

RESULTS

Among 19,479 women aged 21–39 years with a BMI of 18.5–29.9 at baseline, 16% drank at least one sugar-sweetened soft drink per day, and 21% ate burgers from a restaurant at least once per week. Women who frequently drank soft drinks or frequently ate restaurant burgers were heavier, less educated and physically active, and more likely to live in the South or Midwest, smoke, drink alcohol, and have a Western dietary pattern (Table 1). The correlation coefficient between sugar-sweetened soft drink and restaurant burger consumption was .31.

Over 14 years of follow-up, 6,947 women became obese (BMI ≥30). Frequent sugar-sweetened soft drink consumption was associated with increased obesity incidence (Table 2): the

multivariable HR for intake of ≥2 drinks/day compared with <1 drink/month was 1.12 (95% CI: 1.00–1.25; *P*-trend=.07). Among types of foods from restaurants, burger consumption was most strongly associated with increased risk of obesity: the multivariable HR for consumption ≥2 times/week relative to <5 times/year was 1.27 (95% CI: 1.14–1.41; *P*-trend<.001). Significant but weaker positive associations were observed for fried chicken, pizza, and Chinese food. Restaurant meals of fried fish and Mexican food were not significantly associated with obesity incidence.

The association of sugar-sweetened soft drink intake with obesity risk was not materially different after adjustment for restaurant burger consumption; the HR for ≥2 drinks/day relative to <1 drink/month was 1.10 (95% CI: .99–1.23; *P*-trend=.14). The association between restaurant burger consumption and obesity risk persisted after adjustment for sugar-sweetened soft drink intake, with a HR of 1.26 (95% CI: 1.14–1.40) for ≥2 times/week compared with <5 times/

year (*P*-trend<.001). After adjustment for consumption of sugar-sweetened soft drinks and restaurant burgers, intakes of restaurant meals of fried chicken, pizza, and Chinese food were no longer significantly associated with obesity incidence. Further adjustment for consumption of French fries (as measured on the main FFQ) had little effect on the estimates. Subsequent analyses are confined to intakes of sugar-sweetened soft drinks and restaurant burgers.

The associations were similar within strata of Western dietary pattern score. The HRs for sugar-sweetened soft drink consumption of ≥2 drinks/day compared with <1 drink/month, adjusted for restaurant burgers, were 1.08 (95% CI: .91–1.29) for women with a Western dietary pattern score below the median and 1.07 (95% CI: .92–1.23) for those with a score above the median. The HRs for restaurant burger consumption ≥2 times/week relative to <5 times/year, adjusted for sugar-sweetened soft drinks, were 1.27 (95% CI: 1.04–1.56) and 1.18 (95% CI: 1.04–1.34) for women with a Western

Table 2. Intakes of sugar-sweetened soft drinks and restaurant foods in relation to obesity risk in the Black Women's Health Study, 1995–2009^a

	Cases	Person-Years	HR (95% CI) ^b	HR (95% CI) ^c
Sugar-sweetened soft drinks				
<1 drink/mo	1616	49,640	1.00	1.00
1–7/mo	2436	69,282	1.08 (1.02–1.15)	1.05 (.98–1.12)
2–6/wk	1731	46,339	1.15 (1.07–1.23)	1.03 (.95–1.11)
1/d	614	15,104	1.25 (1.14–1.38)	1.08 (.98–1.20)
≥2/d	550	12,444	1.36 (1.24–1.50)	1.12 (1.00–1.25)
<i>P</i> -trend			<.001	.07
Restaurant foods				
Burgers				
<5/yr	2087	67,075	1.00	1.00
5–11/yr	1417	37,753	1.20 (1.13–1.29)	1.07 (1.00–1.15)
1–3/mo	1902	50,596	1.21 (1.14–1.29)	1.11 (1.04–1.19)
1/wk	996	25,030	1.28 (1.19–1.38)	1.14 (1.05–1.24)
≥2/wk	545	12,355	1.43 (1.30–1.57)	1.27 (1.14–1.41)
<i>P</i> -trend			<.001	<.001
Fried chicken				
<5 times/yr	2647	79,693	1.00	1.00
5–11/yr	1556	44,132	1.06 (.99–1.13)	.97 (.91–1.03)
1–3/mo	1701	44,383	1.16 (1.09–1.23)	1.04 (.98–1.11)
1/wk	696	16,738	1.26 (1.15–1.37)	1.10 (1.01–1.20)
≥2/wk	347	7,863	1.33 (1.19–1.49)	1.08 (.96–1.21)
<i>P</i> -trend			<.001	.02
Fried fish				
<5 times/yr	3864	111,084	1.00	1.00
5–11/yr	1225	34,311	1.03 (.96–1.09)	.98 (.92–1.05)
1–3/mo	1290	33,600	1.11 (1.04–1.18)	1.01 (.95–1.08)
1/wk	463	11,127	1.20 (1.09–1.32)	1.04 (.94–1.15)
≥2/wk	105	2,687	1.13 (.93–1.38)	.92 (.75–1.12)
<i>P</i> -trend			<.001	.78
Pizza				
<5/yr	1932	54,330	1.00	1.00
5–11/yr	1761	50,599	.98 (.92–1.04)	1.00 (.94–1.07)
1–3/mo	2318	62,554	1.04 (.98–1.11)	1.04 (.98–1.11)
1/wk	773	21,061	1.03 (.95–1.12)	1.08 (.99–1.18)
≥2/wk	163	4,265	1.08 (.92–1.27)	1.08 (.92–1.27)
<i>P</i> -trend			.10	.04
Chinese food				
<5/yr	2248	61,586	1.00	1.00
5–11/yr	1664	49,900	.91 (.86–.97)	.98 (.92–1.04)
1–3/mo	2087	57,625	.99 (.93–1.05)	1.01 (.95–1.08)
1/wk	688	18,218	1.03 (.95–1.13)	1.04 (.95–1.13)
≥2/wk	260	5,480	1.30 (1.14–1.48)	1.20 (1.05–1.37)
<i>P</i> -trend			.01	.05
Mexican food				
<5/yr	4486	122,860	1.00	1.00
5–11/yr	1031	30,743	.92 (.86–.98)	1.00 (.94–1.08)
1–3/mo	1080	29,760	.99 (.93–1.06)	1.03 (.96–1.10)
1/wk	261	7,185	.99 (.87–1.12)	1.02 (.89–1.16)
≥2/wk	89	2,261	1.08 (.88–1.34)	.92 (.74–1.14)
<i>P</i> -trend			.74	.78

^a HR, hazard ratio.

^b Adjusted for age.

^c Additionally adjusted for baseline BMI, vigorous physical activity, walking for exercise, education, geographic region, smoking status, alcohol intake, parity, and prudent and Western dietary patterns.

dietary pattern score below and above the median, respectively.

The association between sugar-sweetened soft drink intake and risk of obesity was most evident among women who were ages 21–29 years with BMI 18.5–24.9 at baseline (Table 3). The HR for consumption of ≥2 drinks/day relative to <1 drink/month was 1.41 (95% CI: 1.02–1.94; *P*-trend=.003); after further adjustment for restaurant burgers, the HR was 1.32 (95% CI: .96–1.83; *P*-trend=.01).

The association between restaurant burger consumption and obesity incidence was also strongest in younger, normal-weight women (Table 4). The HR for consumption of burgers from restaurants ≥2 times/week relative to <5 times/year was 1.67 (95% CI: 1.29–2.17; *P*-trend=.002) before adjustment for sugar-sweetened soft drinks and 1.60 (95% CI: 1.23–2.08; *P*-trend=.008) after adjustment.

The positive associations for intakes of soft drinks and restaurant burgers with risk of becoming obese did not appreciably differ within strata of vigorous exercise, smoking status, education level, or neighborhood socioeconomic status (data not shown).

To determine whether consumption of burgers prepared at home was also associated with obesity risk, we examined ground beef consumption reported on the FFQ among women who reported eating burgers from restaurants less than once per month: compared with ground beef consumption <1/month, the multivariable HRs for risk of becoming obese for ground beef consumption of 1/month, 2–3/month, 1/week, and ≥2/week were 1.19 (95% CI: 1.09–1.31), 1.14 (95% CI: 1.03–1.26), 1.16 (95% CI: 1.02–1.33), and 1.20 (95% CI: 1.04–1.39), respectively (*P*-trend=.009). Ground beef consumption and restaurant burger consumption were highly correlated (*r*=.63). Of women with ground beef consumption at least once a week, 46% reported eating burgers from restaurants at least once a week.

Table 3. Intakes of sugar-sweetened soft drinks in relation to obesity risk, jointly stratified by baseline BMI and age, in the Black Women's Health Study, 1995–2009^a

	Baseline Age 21–29 y			Baseline Age 30–39 y		
	Cases	HR (95% CI) ^b	HR (95% CI) ^c	Cases	HR (95% CI) ^b	HR (95% CI) ^c
Baseline BMI 18.5–24.9 kg/m ²						
<1 drink/mo	178	1.00	1.00	247	1.00	1.00
1–7/mo	367	1.31 (1.09–1.58)	1.29 (1.07–1.56)	326	.95 (.80–1.13)	.95 (.80–1.13)
2–6/wk	251	1.44 (1.17–1.77)	1.40 (1.14–1.73)	216	.99 (.81–1.21)	.97 (.80–1.19)
1/d	87	1.50 (1.14–1.97)	1.45 (1.10–1.92)	55	.84 (.61–1.14)	.80 (.59–1.10)
≥2/d	61	1.41 (1.02–1.94)	1.32 (.96–1.83)	48	1.10 (.78–1.55)	1.06 (.75–1.50)
<i>P</i> -trend		.003	.01		.93	.68
Baseline BMI 25.0–29.9 kg/m ²						
<1 drink/mo	382	1.00	1.00	809	1.00	1.00
1–7/mo	643	.99 (.87–1.13)	.98 (.86–1.12)	1100	1.03 (.94–1.13)	1.03 (.93–1.13)
2–6/wk	484	.99 (.85–1.14)	.98 (.84–1.13)	780	.97 (.87–1.08)	.96 (.86–1.07)
1/d	190	1.11 (.91–1.34)	1.08 (.89–1.31)	282	1.03 (.89–1.20)	1.03 (.89–1.19)
≥2/d	195	1.17 (.95–1.43)	1.14 (.93–1.40)	246	1.02 (.87–1.20)	1.02 (.87–1.20)
<i>P</i> -trend		.11	.19		.96	.99

^a HR, hazard ratio.

^b Adjusted for age, baseline BMI, vigorous physical activity, walking for exercise, education, geographic region, smoking status, alcohol intake, parity, and prudent and Western dietary patterns.

^c Additionally adjusted for restaurant burgers.

DISCUSSION

In this large prospective study of young African American women, intakes of burgers from restaurants and sugar-sweetened soft drinks were independently associated with increased risk of becoming obese over 14 years of

follow-up. The association with burgers was stronger than that with sugar-sweetened soft drinks. The positive associations were most evident among women aged <30 years with normal weight at baseline. The positive associations for restaurant burgers and sugar-sweetened soft drinks persisted after

adjustment for overall diet quality as measured by Western dietary pattern, and the associations were present within strata of dietary pattern.

To our knowledge, this is the first prospective study to assess the relation between specific types of restaurant meals and obesity risk. A cross-sectional

Table 4. Intakes of restaurant burgers in relation to obesity risk, jointly stratified by baseline BMI and age, in the Black Women's Health Study, 1995–2009^a

	Baseline Age 21–29 y			Baseline Age 30–39 y		
	Cases	HR (95% CI) ^b	HR (95% CI) ^c	Cases	HR (95% CI) ^b	HR (95% CI) ^c
Baseline BMI 18.5–24.9 kg/m ²						
<5 times/yr	253	1.00	1.00	328	1.00	1.00
5–11/yr	177	1.25 (1.03–1.52)	1.22 (1.00–1.49)	176	1.02 (.84–1.23)	1.03 (.85–1.24)
1–3/mo	272	1.19 (.99–1.43)	1.14 (.95–1.38)	213	1.02 (.84–1.23)	1.03 (.85–1.24)
1/wk	136	1.20 (.95–1.51)	1.14 (.91–1.44)	127	1.25 (.99–1.56)	1.26 (1.00–1.58)
≥2/wk	106	1.67 (1.29–2.17)	1.60 (1.23–2.08)	48	1.33 (.96–1.84)	1.35 (.97–1.88)
<i>P</i> -trend		.002	.008		.05	.04
Baseline BMI 25.0–29.9 kg/m ²						
<5 times/yr	492	1.00	1.00	1014	1.00	1.00
5–11/yr	367	1.08 (.94–1.24)	1.08 (.94–1.24)	697	1.03 (.93–1.14)	1.03 (.93–1.14)
1–3/mo	546	1.12 (.98–1.27)	1.12 (.98–1.27)	871	1.10 (.99–1.21)	1.10 (.99–1.21)
1/wk	300	1.13 (.96–1.33)	1.13 (.96–1.33)	433	1.07 (.95–1.22)	1.08 (.95–1.22)
≥2/wk	189	1.32 (1.09–1.59)	1.30 (1.08–1.57)	202	1.07 (.91–1.26)	1.07 (.91–1.26)
<i>P</i> -trend		.007	.01		.13	.12

^a HR, hazard ratio.

^b Adjusted for age, baseline BMI, vigorous physical activity, walking for exercise, education, geographic region, smoking status, alcohol intake, parity, and prudent and Western dietary patterns.

^c Additionally adjusted for sugar-sweetened soft drinks.

...intakes of burgers from restaurants and sugar-sweetened soft drinks were independently associated with increased risk of becoming obese over 14 years of follow-up.

study of young adults found that frequent consumption at burger-and-fries fast-food restaurants was associated with a higher prevalence of obesity, whereas consumption at sandwich shops or full-service restaurants was unrelated to weight status.⁵ In our study, control for the consumption of French fries did not alter the observed associations. The few long-term prospective studies of adults that have examined the association between consumption of food away from home and weight gain or obesity risk did not differentiate between types of foods (eg, burgers, pizza).¹¹⁻¹⁵ In the Coronary Artery Risk Development in Young Adults (CARDIA) study, fast-food consumption was positively associated with 15-year weight gain among both Blacks and Whites.¹¹ Subsequent research in the CARDIA cohort found that only meals from fast-food establishments, and not meals from other restaurants, were associated with weight gain.^{12,13} In our study, we did not differentiate between meals eaten at fast-food establishments or full-service restaurants, but there is evidence from other studies that young adults are much more likely to consume fast food when eating meals away from home.⁵ Meals eaten from restaurants, particularly fast-food outlets, tend to be higher in calories and saturated fat. Furthermore, portion sizes have also increased in recent decades, more so for fast-food restaurants than other restaurants.²⁹ Our findings confirm the association

between intake of restaurant meals and obesity in young African American women, and provide the first prospective data that burger consumption contributes largely to this association.

Although many studies have examined the relation of SSB consumption to weight gain and obesity risk,¹⁶⁻¹⁸ few have been large long-term follow-up studies.¹⁹⁻²² A previous BWHS report showed that women who increased their sugar-sweetened soft drink intake over 6 years experienced the most weight gain in that time period, and women who decreased their consumption gained the least weight.²⁰ In a long-term study of the relation of changes in diet and other lifestyle factors to weight gain conducted in three large cohorts, SSBs were one of the dietary factors that was most strongly associated with increased weight gain.²¹

We found that associations with restaurant burgers and sugar-sweetened soft drinks were strongest among women who were younger and leaner at baseline. We previously showed that the association between overall dietary patterns and 14-year weight gain in the BWHS was most pronounced among younger women, who experienced the greatest amount of weight gain over follow-up.²³ Weight gain is highest in young adulthood relative to older ages, particularly in African American women.³⁰ In addition, national data have indicated that intakes of SSBs^{4,8} and fast food^{6,7} are higher among young adults than among older adults and among African Americans than among other ethnic groups.

In the present study, the positive association between burger consumption and obesity risk was not limited to burgers from restaurants, given that ground beef consumption as measured on the main FFQ was positively associated with obesity among women who reported eating burgers from restaurants infrequently. Our study indicates that a large proportion of burger consumption tends to occur at

restaurants. A long-term study in three large cohorts found that red meat was one of the food groups that was most strongly associated with increased weight gain.²¹

Strengths of our study include the prospective design, large size, and long duration of follow-up. Dietary intake was assessed at two time points, allowing dietary changes to be updated midway through follow-up. We used repeated reports of body weight every two years, and we also used updated data on important covariates such as physical activity, 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,²⁴ weight tends to be under-reported, particularly among obese women,³¹ and therefore weight gain and obesity rates may have been underestimated in the present study. We adjusted for dietary pattern and numerous lifestyle factors, but residual confounding from other factors is possible.

In summary, intakes of burgers from restaurants and sugar-sweetened soft drinks were independently associated with increased obesity risk among young African American women. These associations were independent of overall diet quality and were strongest among women who were aged <30 years and who had normal weight at baseline. The identification of individual foods or beverages that are associated with weight gain provides a basis for specific and straightforward recommendations to help prevent obesity. Awareness needs to be raised that even young women who have healthy weights are at risk of becoming obese if they frequently consume these food items.

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