

Racial and Ethnic Differences in Health Behaviors Among Cancer Survivors



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Introduction: Previous studies of health behaviors of adult cancer survivors have not adequately examined racial and ethnic differences because of small sample sizes. A national data set was used to examine differences in health behaviors between cancer survivors and controls and between racial and ethnic groups among survivors.

Methods: The study analyzed 2009 Behavioral Risk Factor Surveillance System survey data in 2012–2014. Descriptive statistics were used to examine differences in health behaviors between cancer survivors and controls aged 20–64 years. Multivariable analysis was conducted to examine associations between race/ethnicity (white, African American, Hispanic, Asian, or Native American) and health behaviors (BMI, fruit and vegetable consumption, physical activity, and smoking status) while adjusting for demographic and medical characteristics. Significance was set at $p < 0.01$.

Results: Compared with controls ($n=245,283$), cancer survivors ($n=17,158$) had higher prevalence rates for overweight/obese status (67% vs 65%); not meeting physical activity recommendations (53% vs 49%); and current smoking status (22% vs 20%). In the multivariable model, diet and smoking behavior differed across cancer status. African American (AOR=1.95) and Hispanic (AOR=2.06) survivors were more likely to have higher BMI than white survivors. African American survivors (AOR=1.6) were less likely to meet physical activity guidelines. Native American (AOR=3.08) and multiracial (AOR=1.74) survivors were more likely to be current smokers than non-Hispanic white survivors.

Conclusions: This study suggests that racial and ethnic differences exist in the adoption of recommended health behaviors; future research should identify factors to reduce these differences. (Am J Prev Med 2015;48(6):729–736) © 2015 American Journal of Preventive Medicine

Introduction

Cancer survivors (CS) face an increased risk of developing comorbid conditions such as cardiovascular disease, diabetes, and second cancers, leading to premature mortality and morbidity compared with age- and sex-matched controls.^{1,2} This burden is higher for Hispanic and African American survivors than for non-Hispanic white survivors.³ Engaging in recommended health behaviors (e.g., recommended diet and

physical activity [PA]) may prevent adverse cancer sequelae.^{4–6} However, limited data exist on engagement of CS in these behaviors.^{7,8} This study used data from the 2009 Behavioral Risk Factor Surveillance System (BRFSS) to examine racial and ethnic differences that may exist for these health behaviors. The findings of this study suggest opportunities for improving adherence to health behaviors and reducing racial and ethnic disparities among CS and the general population.

Methods

Study Sample

The BRFSS⁹ is an annual, random-digit-dial telephone survey that estimates the health behaviors of non-institutionalized U.S. residents aged 20–64 years.¹⁰ Respondents reporting a history of cancer were selected as CS ($n=17,158$), and respondents with no history of cancer served as controls ($n=245,283$). Those diagnosed with cancer <1 year prior and those diagnosed with non-melanoma skin cancer were excluded.

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Table 1. Characteristics of Cancer Survivors and Controls Aged 20–64 Years

Characteristic	Cancer survivors		Controls		p-value
	Sample size	Population estimate (%)	Sample size	Population estimate (%)	
Total	17,158	7,449,459	245,283	158,169,193	
Age (years)					< 0.0001
20–44	2,791	1,992,723 (26.75)	93,251	92,408,596 (58.42)	
45–64	14,367	5,456,735 (73.25)	152,032	65,760,597 (41.58)	
Sex					< 0.0001
Male	4,648	2,524,226 (33.88)	97,270	79,321,919 (50.15)	
Female	12,510	4,925,232 (66.12)	148,013	78,847,274 (49.85)	
Education					0.3609
≤ High school	10,881	4,657,218 (62.52)	151,030	97,830,440 (61.85)	
> High school	6,277	2,792,240 (37.48)	94,253	60,338,753 (38.15)	
Race/ethnicity					< 0.0001
White	14,447	5,865,448 (78.76)	192,082	108,138,785 (68.38)	
African American	1,060	623,956 (8.38)	20,944	16,288,405 (10.30)	
Hispanic	700	538,691 (7.23)	17,508	22,658,948 (14.33)	
Asian	114	85,484 (1.15)	4,762	5,513,280 (3.49)	
Native American	314	94,516 (1.27)	3,815	1,653,068 (1.04)	
Multiracial	520	239,045 (3.21)	6,117	3,879,572 (2.45)	
Comorbidity count					< 0.0001
0	4,143	2,138,196 (28.70)	104,619	82,304,792 (52.04)	
1–2	9,193	3,867,043 (51.91)	110,821	62,781,734 (39.69)	
> 2	3,822	1,444,220 (19.39)	29,841	13,081,665 (8.27)	
BMI					< 0.0001
Normal	5,465	2,376,861 (32.87)	79,099	52,946,699 (34.73)	
Overweight	5,736	2,462,764 (34.06)	84,411	55,214,481 (36.22)	
Obese	5,339	2,390,553 (33.06)	72,035	44,291,121 (29.05)	
Fruit and vegetable intake					< 0.0001
Meets recommendations	4,464	1,986,995 (26.67)	56,708	36,394,961 (23.02)	
Does not meet recommendations	12,691	5,462,068 (73.33)	188,441	121,695,767 (76.98)	
Physical activity					< 0.0001
Meets physical activity guidelines	7,811	3,430,802 (47.27)	119,023	78,980,713 (51.02)	
Does not meet physical activity guidelines	8,832	3,827,286 (52.73)	120,007	75,810,366 (48.98)	
Smoking status					0.0047
Former/never smoker	13,277	5,782,713 (78.03)	196,513	125,653,921 (79.75)	
Current smoker	3,836	1,628,508 (21.97)	47,956	31,907,286 (20.25)	

Note: Boldface indicates statistical significance ($p < 0.01$).

Table 2. Prevalence of Health Behaviors Among Cancer Survivors by Race and Ethnicity

Health behavior	White		African American		Hispanic		Asian		Native American		Multiracial		p-value
	Sample size	Population estimate (%)	Sample size	Population estimate (%)	Sample size	Population estimate (%)	Sample size	Population estimate (%)	Sample size	Population estimate (%)	Sample size	Population estimate (%)	
BMI													< 0.0001
Normal	4,799	1,994,889 (35)	194	121,568 (20)	185	114,046 (22)	59	54,287 (64)	94	31,691 (34)	134	60,380 (26)	
Over-weight	4,844	1,983,387 (35)	344	197,120 (33)	243	164,754 (31)	38	19,547 (23)	88	25,364 (28)	176	70,275 (31)	
Obese	4,286	1,710,775 (30)	482	286,849 (47)	241	248,331 (47)	15	11,487 (13)	125	34,686 (38)	190	98,426 (43)	
Fruit and vegetable intake													0.6698
Meets recommendations	3,745	1,531,706 (26)	239	165,406 (27)	199	157,472 (29)	33	27,133 (32)	80	27,083 (29)	166	76,923 (32)	
Does not meet recommendations	10,699	4,333,346 (74)	821	458,550 (73)	501	381,219 (71)	81	58,351 (68)	234	67,434 (71)	354	162,123 (68)	
Physical activity													0.0002
Meets physical activity guidelines	6,767	2,806,469 (49)	318	204,581 (34)	303	228,632 (43)	46	31,168 (39)	126	36,022 (39)	248	121,611 (52)	
Does not meet physical activity guidelines	7,272	2,913,829 (51)	698	397,123 (66)	376	300,811 (57)	64	47,888 (61)	174	56,150 (61)	248	111,485 (48)	

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Table 2. Prevalence of Health Behaviors Among Cancer Survivors by Race and Ethnicity (continued)

Health behavior	White		African American		Hispanic		Asian		Native American		Multiracial		p-value
	Sample size	Population estimate (%)	Sample size	Population estimate (%)	Sample size	Population estimate (%)	Sample size	Population estimate (%)	Sample size	Population estimate (%)	Sample size	Population estimate (%)	
Smoking status													< 0.0001
Former/never smoker	11,290	4,556,935 (78)	827	514,928 (83)	550	432,286 (84)	100	80,398 (94)	169	45,343 (48)	338	150,505 (63)	
Current smoker	3,127	1,294,851 (22)	226	106,763 (17)	145	84,802 (16)	14	5,086 (6)	143	48,599 (52)	181	88,407 (37)	

Note: Boldface indicates statistical significance ($p < 0.01$).

Measures

BMI was used to determine whether participants were overweight (25–29.9) or obese (≥ 30).¹¹ Consuming more than five servings of fruits and vegetables (F&V) per day was considered meeting F&V intake recommendations.^{12–14} Those who engaged in vigorous PA for at least 20 minutes on at least 3 days per week or moderate PA for at least 30 minutes on at least 5 days per week were considered to have met PA guidelines.^{14–16} Smoking status was grouped into two categories: current smokers and former or never smokers.¹⁴ The comorbidity score was a summative score calculated from the presence of diabetes, hypertension, arthritis, hyperlipidemia, and coronary vascular disease¹⁴ and was divided into three categories: 0, 1–2, or > 2 .¹⁷ Self-reported demographic information was included for age, sex, education, and race and ethnicity. The Strengthening of Reporting of Observational Studies in Epidemiology guidelines¹⁸ were used in reporting this cross-sectional study.

Statistical Analysis

All analyses were performed in SAS, version 9.3, with significance set at $p < 0.01$ a priori. The data were summarized within each group using descriptive statistics that included chi-square tests (i.e., PROC SURVEYFREQ) and ANOVA. Multivariable logistic regression (i.e., PROC SURVEYLOGISTIC) models were used to examine differences in health behaviors between racial and ethnic groups, and another model was used among CS while adjusting for age, sex, educational attainment, time since diagnosis, comorbidity score, and BMI (except in the model where BMI was the outcome of interest). Analyses were conducted in 2012–2014.

Results

Participant Characteristics

A greater number of CS compared to controls were aged between 45 and 64 years, were female, identified as non-Hispanic white, and reported having one or more comorbid condition (Table 1). Compared to controls, CS had slightly higher rates of meeting F&V recommendations, but lower rates for meeting PA, weight status, and smoking recommendations (all $p < 0.01$).

Differences Between Racial and Ethnic Groups in Health Behaviors

The prevalence of health behaviors among CS by racial and ethnic groups is shown in Table 2. Rates for being overweight or obese were higher in African Americans and Hispanics. Among all CS, 73% did not meet F&V intake recommendations, with no racial and ethnic differences. About 66% of African Americans did not meet PA guidelines, followed by Asians (61%); Native Americans (61%); and Hispanics (57%). Multiracial survivors had the highest prevalence rates for meeting PA guidelines (52%), and Native Americans (52%) had the highest smoking rates.

Racial and ethnic differences were significant across all four health behaviors (Table 3, Model 1). Compared to

Table 3. Multivariable Logistic Regression Models for Health Behaviors Among Cancer Survivors and Controls

Characteristic	Overweight/ obese BMI ^a (AOR [99% CI])	Did not meet fruit and vegetable intake recommendations ^b (AOR [99% CI])	Did not meet physical activity guidelines ^b (AOR [99% CI])	Current smoker ^b (AOR [99% CI])
Model 1 Multivariable logistic regression models examining adherence to health behaviors (BMI, diet, physical activity, and smoking) among cancer survivors and participants with no history of cancer				
Cancer diagnosis				
No	ref	ref	ref	ref
Yes	0.94 (0.86, 1.02)	0.88 (0.81, 0.97)*	1.05 (0.97, 1.14)	1.13 (1.02, 1.24)**
Race/ethnicity				
White	ref	ref	ref	ref
African American	1.64 (1.48, 1.82)***	0.95 (0.86, 1.05)	1.39 (1.28, 1.51)***	0.92 (0.83, 1.01)
Hispanic	1.51 (1.37, 1.66)***	0.89 (0.81, 0.98)**	1.26 (1.16, 1.37)***	0.60 (0.53, 0.67)***
Asian	0.45 (0.39, 0.53)***	0.85 (0.71, 1.02)	1.89 (1.61, 2.23)***	0.61 (0.42, 0.89)***
Native American	1.29 (1.01, 1.64)**	0.85 (0.68, 1.07)	0.91 (0.75, 1.10)	1.92 (1.56, 2.34)***
Multiracial	0.95 (0.81, 1.11)	0.73 (0.62, 0.86)***	0.89 (0.77, 1.03)	1.36 (1.14, 1.62)***
Model 2 Multivariable logistic regressions comparing the health behaviors (BMI, diet, physical activity and smoking) among cancer survivors across racial groups				
Age (years)				
20–44	ref	ref	ref	ref
45–64	0.89 (0.71, 1.12)	0.82 (0.65, 1.04)	1.10 (0.88, 1.37)	0.47 (0.37, 0.60)***
Sex				
Female	ref	ref	ref	ref
Male	1.97 (1.61, 2.41)***	1.75 (1.44, 2.14)***	0.85 (0.71, 1.03)	0.83 (0.65, 1.05)
Education				
≤ High school	ref	ref	ref	ref
> High school	0.70 (0.59, 0.84)***	0.51 (0.43, 0.61)***	0.76 (0.64, 0.89)***	0.28 (0.22, 0.36)***
Time since diagnosis				
1–2	ref	ref	ref	ref
2–5	0.95 (0.71, 1.26)	0.96 (0.72, 1.29)	0.88 (0.67, 1.15)	0.92 (0.67, 1.27)
5–10	0.99 (0.76, 1.29)	1.04 (0.78, 1.37)	1.08 (0.84, 1.41)	1.37 (1.00, 1.87)
> 10	0.87 (0.69, 1.10)	1.05 (0.82, 1.36)	0.97 (0.77, 1.22)	1.44 (1.10, 1.88)***

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Table 3. Multivariable Logistic Regression Models for Health Behaviors Among Cancer Survivors and Controls (continued)

Characteristic	Overweight/ obese BMI ^a (AOR [99% CI])	Did not meet fruit and vegetable intake recommendations ^b (AOR [99% CI])	Did not meet physical activity guidelines ^b (AOR [99% CI])	Current smoker ^b (AOR [99% CI])
Comorbidity count				
0	ref	ref	ref	ref
1–2	2.01 (1.65, 2.44)***	0.98 (0.79, 1.21)	1.26 (1.03, 1.53)**	1.48 (1.14, 1.92)**
>2	5.37 (4.09, 7.05)***	0.98 (0.75, 1.29)	1.79 (1.38, 2.31)***	2.11 (1.56, 2.86)***
BMI				
Normal	—	ref	ref	ref
Overweight	—	1.17 (0.96, 1.44)	1.35 (1.11, 1.63)***	0.73 (0.58, 0.92)**
Obese	—	1.33 (1.06, 1.67)**	2.01 (1.62, 2.49)***	0.55 (0.43, 0.72)***
Race/ethnicity				
White	ref	ref	ref	ref
African American	1.95 (1.24, 3.07)**	0.87 (0.59, 1.28)	1.60 (1.08, 2.38)**	0.68 (0.46, 1.00)
Hispanic	2.06 (1.30, 3.26)***	0.76 (0.50, 1.15)	1.14 (0.76, 1.72)	0.62 (0.37, 1.04)
Asian	0.37 (0.12, 1.12)	1.08 (0.30, 3.82)	1.99 (0.58, 6.77)	0.29 (0.09, 0.91)**
Native American	0.93 (0.51, 1.70)	0.81 (0.42, 1.56)	1.36 (0.75, 2.46)	3.08 (1.62, 5.87)***
Multiracial	1.31 (0.70, 2.43)	0.60 (0.34, 1.05)	0.77 (0.46, 1.31)	1.74 (1.08, 2.82)**

Note: Boldface indicates statistical significance.

^aAdjusted for age, sex, education, race/ethnicity, and number of comorbidities.

^bAdjusted for age, sex, education, race/ethnicity, number of comorbidities, and BMI.

* $p < 0.01$; ** $p < 0.001$; *** $p < 0.0001$.

controls, CS were more likely to meet F&V recommendations but were less likely to meet smoking recommendations. No differences were observed for being overweight or obese and for meeting PA guidelines.

Among CS, African Americans and Hispanics were more likely to report higher BMI than non-Hispanic whites (all $p < 0.01$, Table 3). African Americans were also less likely to follow PA guidelines than non-Hispanic whites ($p < 0.01$). Native American and multiracial survivors were more likely to be current smokers than non-Hispanic whites. Asians were less likely to be current smokers than non-Hispanic whites. Health behaviors differed by demographic and medical characteristics (Table 3). Attaining more than a high school education was positively associated with normal BMI, meeting F&V intake recommendations, meeting PA guidelines, and non-current smoking status. Obese survivors were less likely to follow PA guidelines than overweight survivors. Importantly, the time since diagnosis was not associated with BMI, F&V intake, or PA. However, those who survived beyond 10 years after their cancer diagnosis were more likely to be current smokers.

Discussion

This study indicates that racial and ethnic groups vary in their adherence to health behavior recommendations, and unhealthy behaviors are not limited to a racial or ethnic group. Although racial and ethnic minorities were less likely than non-Hispanic whites to engage in some preventive health behaviors, the reverse was true for other health behaviors. Thus, racial and ethnic minorities are heterogeneous with respect to these associations.^{8,19,20} CS and individuals in the general population indicated similar behavioral patterns for BMI and PA guidelines but varied in F&V and smoking behaviors. Perhaps having cancer encourages individuals to improve certain behaviors, but long-term abstinence from smoking presents a more difficult challenge.

African American and Hispanic survivors were more likely to be overweight or obese than non-Hispanic white survivors, which is consistent with previous research.^{7,21,22} Obesity significantly impacts physical function, which may influence future risks for disease

recurrence or premature death^{23–25}; therefore, African Americans and Hispanics may be at greater risk for adverse outcomes than non-Hispanic whites.^{26,27} In addition, fewer African Americans than non-Hispanic whites followed PA guidelines, consistent with previous studies.^{7,8} There is a need to identify the correlates of these behaviors to understand how best to intervene. Such interventions may improve functional status, reduce high BMI, and improve cancer-specific outcomes.^{4,6}

Smoking rates were highest among Native Americans, which is consistent with the findings of other studies from the general population^{28,29} and concurs with a prior study showing low smoking-cessation rates among Native Americans.³⁰ More research is needed to examine why racial and ethnic differences exist in smoking behaviors of CS and what types of tailored interventions will be most effective for these populations.

Limitations

Some limitations were noted. These data are cross-sectional; therefore, they cannot be used to infer causal relationships. All data are self-reported, with potential recall and reporting biases. Income was not included in the multivariable model, owing primarily to a large number of missing observations (9%); however, education served as a suitable proxy.

Conclusions

An important strength of this study was that these data are representative of the U.S. population and provide population estimates of racial and ethnic differences in the adoption of recommended health behaviors. This study suggests that surviving cancer does not eliminate the significant racial and ethnic differences in the adoption of preventive behaviors that exist in the general population. Future research should focus on gaining a better understanding of these differences in the adoption of health behaviors among racial and ethnic minorities as well as among CS to reduce smoking.

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