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## Racial/Ethnic Disparities in Health Care Receipt Among Male Cancer Survivors

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### Abstract

**Objectives**—We examined racial/ethnic disparities in healthcare receipt among a nationally representative sample of male cancer survivors.

**Methods**—We identified adult men (age 18+) from the 2006–2010 National Health Interview Survey who reported a history of cancer. Four self-reported measures assessed healthcare receipt: primary care visit, specialist visit, flu vaccination, and pneumococcal vaccination. We used hierarchical logistic regression modeling, stratified by age (younger: <65, older: 65+), to examine racial/ethnic disparities in healthcare receipt.

**Results**—In adjusted models, older African American and Hispanic survivors were approximately twice as likely as non-Hispanic Whites to not see a specialist (OR 1.78, CI 1.19–2.68 and OR 2.09, CI 1.18–3.70, respectively), not receive the flu vaccine (OR 2.21, CI 1.45–3.37 and OR 2.20, CI 1.21–4.01, respectively) and not receive the pneumococcal vaccine (OR 2.24, CI 1.54–3.24 and OR 3.10, CI 1.75–5.51, respectively).

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**Contributor Statement:** N.R.A. Palmer was responsible for the study concept and design, with input from K.E. Weaver, A.M. Geiger, and T.M. Felder. L.D. Case and L. Lu conducted data analyses and all authors assisted with the interpretation of the data. N.R.A. Palmer wrote the initial draft of the article and all co-authors participated in reviewing and revising drafts of the article.

**Human Participant Protection:** This study was reviewed and granted exemption status from the Wake Forest School of Medicine Institutional Review Board, as a secondary data analysis of de-identified publicly available data.

**Conclusions**—Racial/ethnic disparities in healthcare receipt were evident among older, but not younger survivors, despite access to Medicare. This may have implications for their health and receipt of follow-up care if these survivors are less likely to see specialists, including oncologists, and get basic preventive care.

### Keywords

cancer; men; health care disparities; long-term survivors; health services

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Gender and racial/ethnic disparities in health care utilization are prevalent. Men are less likely to use health care services compared to women, including physician office visits and preventive care visits<sup>1,2</sup>. Minorities are also less likely to use health care services compared to non-Hispanic Whites<sup>3–6</sup>. Contributors to these disparities include low socioeconomic status (SES)<sup>7–10</sup> and lack of health insurance<sup>7,8,11,12</sup>. Even after controlling for SES and health insurance coverage, racial/ethnic disparities in health care utilization still persist<sup>4</sup>. These disparities are associated with poorer health and higher mortality rates among minorities, and have important implications for survival and well-being for men with serious and chronic health conditions like cancer<sup>5</sup>.

While numerous studies have documented racial/ethnic disparities in cancer screening, diagnosis, treatment and mortality<sup>10,13–18</sup>, little is known about how racial/ethnic disparities in health care among post-treatment cancer survivors influences follow-up care. Such care includes monitoring and managing late and long-term effects, and follow-up tests to monitor for recurrence and detect second cancers. Management of non-cancer co-morbidities (e.g., diabetes), and preventive health care<sup>19</sup>, such as vaccinations, are also recommended for cancer survivors<sup>20–22</sup>. Follow-up care may include visits to both primary care and specialist providers<sup>13,23–25</sup>. It is strongly recommended that cancer survivors receive lifelong follow-up care due to increased risk of recurrence, morbidity and mortality<sup>19</sup>.

Prior studies have used administrative data to explore this issue<sup>13,24,26,27</sup>, but few of these studies have focused on male cancer survivors and none included younger survivors who are not covered by Medicare. Additionally, it is not known how patterns of health care receipt might differ among men with and without a history of cancer.

In this study we assessed racial/ethnic disparities in health care receipt among adult male cancer survivors and men without cancer, using the National Health Interview Survey (NHIS)<sup>28</sup>. We first wanted to compare cancer survivors to a non-cancer group to shed light on whether the disparities are specific to cancer or reflect underlying disparities. We explored (1) racial/ethnic disparities in health care receipt among cancer survivors compared to men with no cancer history, (2) racial/ethnic disparities within cancer survivors, and (3) to what extent *predisposing*, *enabling*, and *need* factors explain racial/ethnic disparities in health care receipt among male cancer survivors.

## METHODS

### Data Source & Sample

We used data from the NHIS, combining years 2006 through 2010 to obtain a larger population of male cancer survivors. The NHIS is a nationally representative annual cross-sectional in-person survey of non-institutionalized civilian households in the United States (US) that collects demographic and health information. The NHIS has a complex, multistage sample design that oversamples African Americans, Hispanics, and Asians to allow for subgroup analyses. The overall response rate for sample adults in the years studied ranged from 60.8% to 70.8%<sup>28</sup>. We excluded respondents under 18 years of age, or with a diagnosis of

“unknown”, squamous, or non-melanoma skin cancers (because their treatment and prognosis is very different and they are excluded in Surveillance Epidemiology and End Results [SEER] estimates). These exclusions are consistent with other NHIS-based studies of cancer survivors<sup>29,30</sup>.

## Outcome Variables

**Health Care Service Receipt**—We examined four measures of health care service receipt that are relevant to cancer-related follow-up care: (1) primary care (seen or talked to a general doctor/internist in past 12 months); (2) specialist (seen or talked to a specialist in past 12 months); (3) influenza (flu) vaccination (seasonal flu vaccine shot in past 12 months); and (4) pneumococcal vaccination (ever had pneumonia shot/pneumococcal vaccine). Both flu vaccination and pneumococcal vaccination are considered to be important markers of quality of preventive care<sup>31,32</sup>.

## Independent Variables

We used Andersen’s Behavioral Model for utilizing medical care<sup>33</sup> to identify factors that might play a role in racial/ethnic disparities in health care receipt. This model includes *predisposing* factors (individual tendency to use services), *enabling* factors (ability or means to access services), and *need* factors (illnesses that lead to health care utilization).

*Predisposing Factors* included race/ethnicity, age, and marital status. We collapsed separate questions for Hispanic ethnicity and race into three categories: non-Hispanic African American (African American), non-Hispanic White, and Hispanic. Respondents from other racial/ethnic groups were excluded from our analyses due to small numbers of male cancer survivors. “Married” status included married couples and couples living together, while “not married” status included people who were divorced, separated, widowed, or never married.

*Enabling Factors* included education, health insurance coverage, and health care access. We used education as a proxy for SES because annual household income had a large percentage of missing data (30%) and was strongly correlated with education ( $p < 0.0001$ ). Education was categorized as less than high school, high school graduate/general equivalency diploma, some college, and college graduate or more. Health insurance coverage was categorized as private, public or none. Private insurance includes health maintenance organization or preferred provider organization with or without Medicare coverage. Public insurance includes Medicare only, Medicaid, military, other government health care coverage, and other state sponsored health care. No insurance was defined as not reporting any private or public health insurance coverage and pertained only to those younger than 65 years because a very small number of males 65 years and older reported no health insurance. Health care access was assessed with the question: “Do you have a usual place for health care (yes, more than one place, or no)?”.

*Need Factors* included non-cancer comorbidities, health status, functional limitations, time since cancer diagnosis, and the number of cancer diagnoses. Non-cancer comorbidities was a count of five conditions: hypertension, diabetes, heart disease, lung disease, and stroke<sup>34</sup>. Health status was assessed with a single question asking respondents to rate their overall health (excellent to poor). We assessed functional limitations by combining multiple measures of limitations (carry, climb, etc.) into a dichotomous variable of any functional limitation (yes/no)<sup>35</sup>. Finally, we assessed number of cancer diagnoses by calculating the total number of cancer diagnoses.

## Statistical Analyses

We stratified all analyses by age <65 years old and ≥65 years old, due to differences in health insurance access. Pneumococcal vaccination analyses were restricted to those ≥65 years of age and older due to vaccination guidelines<sup>36</sup>. Hereafter, we refer to men <65 years old as “younger” and ≥65 years old as “older”. As a sensitivity analysis, we also further stratified models for the younger survivors (age 18–39 and 40–64). Odds ratios (OR) were similar, therefore we report models for these combined.

After tabulating descriptive statistics, we used multiple, hierarchical logistic regression models to assess predictors of health care service utilization among cancer survivors and men with no cancer history. We included the interaction between cancer history and race/ethnicity to determine if the differences between the races/ethnicities were consistent for cancer survivors and men with no cancer history. Race/ethnicity was entered into the model first, followed by predisposing, enabling, and need factors, to see if the race/ethnicity coefficients changed by adding other variables in the model. Preliminary analyses showed a main effect for age, so we controlled for age continuously within each age group in the multivariate models. All of our statistical analyses were conducted using the SURVEY procedures in SAS, version 9.2<sup>37</sup>, which incorporated strata and cluster information and sampling weights to account for the complex survey design of the NHIS.

## RESULTS

### Sample Characteristics

We identified 51,033 adult men, 2,714 of whom reported a history of cancer and 48,319 who did not. Table 1 shows the weighted distribution of predisposing, enabling and need factors for the sample, stratified by age group and cancer history. Relative to men with no cancer history, cancer survivors were more likely to be older, non-Hispanic White, married, college educated, privately insured, and have a usual place for health care. They were also more likely to have more comorbidities and more functional limitations. Prostate cancer was the most common cancer in both groups, with approximately 10% of survivors reporting more than one cancer diagnosis. More than half (54%) of younger survivors were 5 years or less post-diagnosis, while more than half (55%) of older survivors were more than 5 years post-diagnosis.

### Cancer Survivors versus Men with No Cancer History

Having a history of cancer was associated with lower prevalence of no health care receipt in all age and racial/ethnic subgroups (Table 2). For younger men, differences in primary and specialist care amongst the racial/ethnic subgroups differed between those with and without a history of cancer (overall interaction p-values=0.005 and p=0.019, respectively). In general, there were no significant differences in health care receipt by race/ethnicity among younger survivors, but significant differences were noted in men with no cancer history, with African Americans and Hispanics more likely to report lack of care. More specifically, for younger men with no cancer history, African Americans were more likely than non-Hispanic Whites to not see a primary care provider (PCP) (OR=1.25), while for cancer survivors, African Americans were less likely to not see a PCP (OR=0.52) (interaction p-value=0.008). Similarly, Hispanics with no cancer history were more likely than non-Hispanic Whites to not see a PCP (OR=2.10), while there was little difference between Hispanic and non-Hispanic White cancer survivors (OR=0.99) (interaction p-value=0.028). Additionally, younger Hispanic men with no cancer history were more likely not to see a specialist compared to non-Hispanic Whites (OR=2.38), while there was little difference between Hispanic and non-Hispanic White cancer survivors (OR=1.04) (interaction p-

value=0.008). No other differences in racial/ethnic disparities were noted between younger survivors and non-survivors.

In contrast to the pattern observed in the younger age group, significant racial/ethnic differences were observed in both older survivors and men with no cancer history. There was a significant interaction between cancer history and race/ethnicity among older survivors only for primary care (overall interaction p-value=0.044). Older African American men with no cancer history were more likely than non-Hispanic Whites to not see a PCP (OR=1.53); however, there was no statistically significant difference between African American and non-Hispanic White cancer survivors (OR=0.62) (interaction p-value=0.013). The difference in primary care between Hispanics and non-Hispanic Whites was similar for those with and without a cancer history (OR=1.76 and 1.77, respectively, interaction p-value=0.99). No other significant differences in racial/disparities were found between older survivors and non-survivors.

### **Racial/Ethnic Disparities among Male Survivors**

Different patterns of racial/ethnic disparities were observed in younger and older survivors (see Table 2). There were no racial/ethnic differences in any health care receipt outcome among younger survivors. For older survivors, non-Hispanic White men were least likely and Hispanic men were most likely to report lack of health care receipt in all outcomes, except for primary care receipt. Among older survivors, approximately 39% of African American and 42% of Hispanic survivors did not see a specialist in the past year, compared to 26% of older non-Hispanic White cancer survivors. Likewise, about 40% of African American and Hispanic cancer survivors did not receive the flu vaccination in the past year, compared to 22% of non-Hispanic White cancer survivors. Similarly, 51% of African American and 59% of Hispanic cancer survivors did not report receiving a pneumococcal vaccination, compared to 29% of non-Hispanic White cancer survivors.

### **Multivariable Models of Racial/Ethnic Disparities among Cancer Survivors**

Regression analyses examined the collective effect of predisposing, enabling, and need factors on the racial/ethnic disparities in health care receipt outcomes among male cancer survivors, stratified by age (Table 3A and 3B). Among younger survivors (Table 3A), adding sets of the predisposing, enabling, and need factors to the crude model marginally increased the odds ratios for lack of specialist care receipt comparing African Americans to Non-Hispanic Whites from 1.29 to a high of 1.92. The enabling and need factors accounted for the greatest increase. The statistically significant difference did not emerge until adding the need factors. Younger African American cancer survivors were more likely (OR=1.92) not to see a specialist in the past year, compared to younger non-Hispanic White cancer survivors. Adjusting for predisposing, enabling, and need factors had little impact on racial/ethnic differences in flu vaccination.

Among older survivors (Table 3B), adding sets of the predisposing, enabling, and need factors to the crude model had little effect on the ORs for specialist care, while slightly decreasing the ORs for flu vaccination and pneumococcal vaccination, with significant racial/ethnic differences remaining. Relative to non-Hispanic White survivors, African American and Hispanic survivors were more likely not to see a specialist (OR=1.78 and OR=2.09, respectively), not to receive the flu vaccine in the past year (OR=2.21 and OR=2.20, respectively), and not ever receive the pneumococcal vaccine (OR=2.24 and OR=3.10, respectively).



## DISCUSSION

This study expands our current knowledge about health care utilization after cancer by exploring racial/ethnic disparities in health care receipt among cancer survivors compared to men with no cancer history. We found that racial/ethnic disparities observed among non-survivors are greater than that among cancer survivors, specifically for primary care receipt among both age groups, and specialist care receipt among the younger group. Although male cancer survivors have higher rates of health care receipt compared to men with no cancer history, a surprisingly high number do not report use of important health care services such as care by a specialist or receiving the flu vaccination. The finding that survivors are using health services more than men with no cancer history is consistent with other population-based studies<sup>27,38</sup>. However, it is concerning that nearly 20% of younger male survivors reported they did not see a primary care provider in the past year. Almost 40% of younger survivors and 30% of older survivors did not see a specialist, presumably including oncologists. Despite pertinent vaccination guidelines, 24% of older cancer survivors did not receive the flu vaccine and 32% did not receive the pneumococcal vaccine. These findings are consistent with other reports of health care use among cancer survivors<sup>13,39</sup>. The reported lack of health care receipt raises questions about adequacy of cancer-related follow-up care for male cancer survivors. While cancer survivors need screening and treatment for recurrence and second cancers, they also merit regular medical care for non-cancer comorbidities, such as diabetes and heart disease, and preventive care<sup>19</sup>. Prior studies have demonstrated that colorectal cancer survivors are more likely to receive preventive care services when they see both oncology and primary care providers<sup>13,24,26</sup>.

Our second aim was to assess racial/ethnic disparities within cancer survivors. We identified few racial/ethnic disparities among younger cancer survivors. Having cancer at a younger age is less common, and therefore may enhance both need and motivation to seek health care services, whether driven by patients' or physician's diligence. Racial/ethnic disparities were evident among older survivors, such that non-Hispanic Whites consistently reported more health care receipt than African Americans and Hispanics, except for primary care receipt. Racial/ethnic differences may not exist in primary care receipt because of greater availability of primary care services and the need to access primary care as the first point of contact with specialized health care services<sup>40</sup>. Previous studies have reported similar racial/ethnic differences in health care use in the general US population<sup>3-6</sup>, and among cancer survivors in SEER-Medicare studies<sup>13,24,26,27</sup>.

Our third aim was to determine whether the racial/ethnic disparities could be explained by predisposing, enabling, and need factors. Racial/ethnic disparities among older male survivors remained even after adjusting for factors related to health care receipt. This finding is consistent with previous reports of racial/ethnic differences in health care use in the general US population<sup>4,41</sup>. Although older men in this analysis were largely covered by Medicare, there may be differences in types of Medicare health plans and supplemental insurance (e.g., different copays). Weaver and colleagues<sup>29</sup> reported that African Americans (survivors and adults without a history of cancer) are more likely than non-Hispanic whites to forgo medical care due to cost, with larger disparities in adults over 65 years of age. This suggests that out-of-pocket expenses may be a barrier for this population.

Moreover, racial/ethnic disparities in health care receipt may also be attributed to factors not measured in this study, including, but not limited to: patient-level factors, provider-level factors, and health-system factors<sup>5,33</sup>. Future in-depth studies focused on survivors are needed to further investigate the influence of these factors on disparities. Patient-level factors may include patients' health beliefs (i.e., attitudes, values and knowledge), perceived need for health care services, patients' views about physicians, and their preference. For

example, minority patients' may choose not to tolerate discomfort from an injection or have a mistrust of vaccinations<sup>42,43</sup>, thereby contributing to health care disparities. Future studies should examine differences in survivors' perceptions about the importance of various preventive health services after cancer and preferences for cancer-related follow-up care delivery by primary or specialty providers. Provider-level factors may include physician biases, patient-provider communication, and a lack of clarity on who should be responsible for follow-up care for cancer survivors. Even when patients present with the same condition, race/ethnicity is associated with negative evaluations or lower rates of referral for clinical services<sup>5</sup>. Studies with diverse populations of survivors should examine racial/ethnic differences in perceived patient-provider communication in the follow-up care setting, perceptions of care coordination, and perceived quality of follow-up care. Finally, health system factors may include policy, resources, and organization. Fragmentation of health care can contribute to disparities, such that patients encounter different levels of coverage that influences the kinds and quality of services received<sup>5</sup>. Beneficiaries of public insurance (e.g., Medicare) may be subject to health care systems that are financially strained, which may influence clinical practice norms. Likewise, this disparity may reflect that providers treating African American patients may be less trained, and less likely to recommend appropriate care compared to providers treating non-Hispanic White patients<sup>44</sup>. It will be important for future studies to examine more subtle differences in health insurance coverage among survivors (e.g., differences in supplemental Medicare coverage, or enrollees in Medicare Managed Care) to determine how coordination and co-pay differences may impact health care utilization after cancer. It will also be important to explore potential racial/ethnic differences in which health care providers provide cancer-related follow-up care to survivors.

The primary limitation of this study is that the NHIS is not linked to cancer registry or insurance claims data and may be subject to recall bias because it uses self-reported data. Future studies could use administrative claims datasets such as the SEER-Medicare data to validate these findings. However, there is a trade-off in that Medicare claims datasets are restricted to adults over 65 years old and may lack data about potential predictors and covariates of health care use. This study adds to the existing literature by using patient-level variables and including younger survivors and those with multiple cancers. Second, we were underpowered to examine differences by cancer site and suggest future studies with larger subgroup samples include cancer site as a potential contributing factor. Third, we were limited in assessing the role of financial constraints. We used education as a proxy for SES, which is highly associated with income<sup>45</sup>, but further studies are needed to explore the role of out-of-pocket costs and financial need. Finally, the NHIS excludes cancer survivors residing in health care facilities; therefore, our results may not generalize to the sub-set of cancer survivors whose health is most fragile. While there is an under-representation of minorities in the survivor sample compared to men with no cancer history, it is likely not due to racial/ethnic differences in underreporting of cancer diagnoses. The prevalence of African American and Hispanic male cancer survivors in our sample is low; however, our estimates are consistent with the SEER cancer registry prevalence data ([www.SEER.cancer.gov](http://www.SEER.cancer.gov)) and likely reflect differences in incidence, age of onset, and survival after cancer.

Cancer survivors require regular medical care to address cancer screening and surveillance, late and long-term effects of cancer and its treatment, and screening and treatment for non-cancer comorbidities<sup>19</sup>. Unfortunately, we do not know if more frequent physician visits yield better health outcomes. Future studies are needed to assess whether lower rates of health care receipt among racial/ethnic minority male survivors are associated with lower receipt of cancer-related follow-up care and poorer health outcomes.



We found that racial/ethnic disparities in health care receipt among older male cancer survivors persisted, even after adjusting for socio-demographic, health care access and medical need factors. These results indicate that older minority male survivors may not be receiving appropriate follow-up and preventive care, a particular concern for those with more comorbidities. Further study is merited to identify patient-level, provider, or health system factors that may influence racial/ethnic disparities among male survivors and may be amenable to change with targeted interventions. It will also be important to document the impact that reduced health care receipt may have on mental and physical health functioning. Overall, our results suggest that older minority male cancer survivors may need specific support to ensure receipt of necessary post-treatment health care.

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Characteristics of Adult Men With and Without a History of Cancer, Stratified by Age, from the National Health Interview Survey (2006 to 2010)\*

Table 1

Sample Characteristics	Ages 18-64 Years		Ages 65 Years	
	Cancer Survivors n=1,051	No Cancer History n=40,810	Cancer Survivors n=1,663	No Cancer History n=7,509
	% (SE)	% (SE)	% (SE)	% (SE)
<b>Race/Ethnicity</b>				
African American	9.8 (1.0)	12.2 (0.3)	6.5 (0.6)	8.5 (0.4)
Hispanic	5.4 (0.7)	17.0 (0.4)	3.9 (0.5)	7.9 (0.4)
Non-Hispanic White	84.8 (1.2)	70.8 (0.5)	89.6 (0.8)	83.6 (0.6)
<b>Predisposing Factors</b>				
Age, years				
<40	12.7 (1.4)	48.7 (0.4)	-	-
40 to 64	87.3 (1.4)	51.3 (0.4)	-	-
65 to 79	-	-	71.0 (1.3)	78.7 (0.6)
80	-	-	29.0 (1.3)	21.3 (0.6)
<b>Marital Status</b>				
Married/Living together	72.0 (1.5)	62.3 (0.4)	76.9 (1.2)	73.8 (0.6)
Not Married	28.0 (1.5)	37.7 (0.4)	23.1 (1.2)	26.2 (0.6)
<b>Enabling Factors</b>				
Education				
< High School	11.0 (1.1)	15.4 (0.3)	19.8 (1.2)	24.2 (0.6)
High School/GED	26.6 (1.5)	28.7 (0.3)	29.2 (1.3)	30.1 (0.7)
< Bachelors	28.0 (1.6)	29.5 (0.3)	22.9 (1.2)	20.5 (0.6)
Bachelors	34.4 (1.8)	26.5 (0.4)	28.1 (1.4)	25.1 (0.7)
<b>Insurance Status</b>				
Private with/without Public	71.1 (1.6)	66.6 (0.4)	62.0 (1.4)	56.2 (0.7)
Public Only	18.2 (1.3)	10.1 (0.2)	37.9 (1.4)	43.0 (0.7)
None	10.7 (1.1)	23.3 (0.3)	0.1 (0.1)	0.8 (0.1)
<b>Usual Place of Care</b>				
Yes	90.3 (1.1)	76.1 (0.4)	98.1 (0.4)	95.7 (0.3)
No	9.7 (1.1)	23.9 (0.4)	1.9 (0.4)	4.3 (0.3)

Sample Characteristics	Ages 18-64 Years		Ages 65 Years	
	Cancer Survivors n=1,051	No Cancer History n=40,810	Cancer Survivors n=1,663	No Cancer History n=7,509
Need Factors	% (SE)	% (SE)	% (SE)	% (SE)
<b>Comorbidities, number</b>				
0	43.9 (1.7)	70.3 (0.3)	20.3 (1.2)	27.3 (0.6)
1	31.8 (1.6)	20.8 (0.3)	34.6 (1.4)	32.7 (0.6)
2	16.3 (1.3)	6.5 (0.2)	27.6 (1.2)	25.2 (0.6)
3	8.0 (0.8)	2.4 (0.1)	17.6 (1.1)	14.9 (0.5)
<b>Health Status</b>				
Excellent	17.0 (1.5)	32.9 (0.3)	11.5 (0.9)	15.7 (0.5)
Very Good	26.6 (1.6)	33.4 (0.3)	21.2 (1.2)	27.9 (0.6)
Good	27.4 (1.6)	24.4 (0.3)	37.1 (1.3)	32.6 (0.6)
Fair	17.4 (1.4)	7.0 (0.2)	22.3 (1.2)	17.6 (0.5)
Poor	11.5 (1.2)	2.3 (0.1)	7.9 (0.7)	6.1 (0.4)
<b>Functional Limitations</b>				
Yes	47.2 (1.8)	23.3 (0.3)	65.4 (1.4)	56.0 (0.8)
No	52.8 (1.8)	76.7 (0.3)	34.6 (1.4)	44.0 (0.8)
<b>Cancer Site</b>				
Prostate	23.7 (1.6)	-	53.2 (1.4)	-
Melanoma	15.5 (1.4)	-	10.9 (0.9)	-
Hematologic	12.2 (1.2)	-	6.0 (0.8)	-
Colorectal	9.4 (1.0)	-	11.8 (0.9)	-
Testicular	7.7 (1.0)	-	0.5 (0.2)	-
Lung	4.2 (0.8)	-	5.5 (0.6)	-
Other	34.7 (2.0)	-	22.6 (1.2)	-
<b>No. of Cancers</b>				
1	91.7 (1.0)	-	89.1 (0.8)	-
>1	8.3 (1.0)	-	10.9 (0.8)	-
<b>Time since diagnosis, year</b>				
<1	7.2 (1.0)	-	6.4 (0.7)	-
1-5	46.5 (1.8)	-	38.7 (1.5)	-

Sample Characteristics	Ages 18–64 Years		Ages 65 Years	
	Cancer Survivors n=1,051	No Cancer History n=40,810	Cancer Survivors n=1,663	No Cancer History n=7,509
	% (SE)	% (SE)	% (SE)	% (SE)
6–9	17.6 (1.4)	- -	17.0 (1.1)	- -
10	28.7 (1.6)	- -	38.0 (1.4)	- -

\* Weighted percentages. SE: Standard Error. Comorbidities are categorized to include hypertension, diabetes, heart disease, lung disease, and stroke. All comparisons between survivors and adults with no cancer history are statistically significant.



**Table 2**

Racial/Ethnic Differences in Self-reported Lack of Health Care Receipt in the past year among Men with and without a Cancer History, National Health Interview Survey (2006 to 2010)\*

		No Primary Care		No Specialist		No Flu Vaccine		No Pneumococcal Vaccine	
		% (SE)	OR 95%CI	% (SE)	OR 95%CI	% (SE)	OR 95%CI	% (SE)	OR 95%CI
<b>Age 18–64 years old</b>									
<b>Survivors</b>									
AA		11.3 (3.1)	0.52 (0.27–0.99)	43.5 (5.3)	1.26 (0.81–1.98)	59.3 (5.6)	1.04 (0.63–1.71)		
Hispanic		19.6 (5.1)	0.99 (0.51–1.93)	38.6 (6.9)	1.04 (0.57–1.90)	65.1 (6.5)	1.33 (0.74–2.40)		
White		19.8 (1.6)	Reference	37.8 (1.8)	Reference	58.4 (2.3)	Reference		
<i>p</i> -value:		0.119		0.594		0.671			
<b>Non-Survivors</b>									
AA		43.6 (0.9)	1.25 (1.16–1.34)	84.3 (0.6)	1.66 (1.52–1.82)	81.0 (0.7)	1.26 (1.15–1.38)		
Hispanic		56.6 (0.8)	2.10 (1.96–2.25)	88.5 (0.5)	2.38 (2.16–2.63)	85.0 (0.5)	1.68 (1.53–1.84)		
White		38.3 (0.4)	Reference	76.4 (0.3)	Reference	77.2 (0.3)	Reference		
<i>p</i> -value:		<0.001		<0.001		<0.001			
<b>Race-ethnicity*Cancer History Interactions</b>									
			<i>p</i> -value		<i>p</i> -value		<i>p</i> -value		
Overall			<b>0.005</b>		<b>0.019</b>		0.599		
WNH-AA			<b>0.008</b>		0.234		0.455		
WNH-Hispanic			<b>0.028</b>		<b>0.008</b>		0.440		
<b>Age 65 years old</b>									
<b>Survivors</b>									
AA		5.1 (1.6)	0.62 (0.31–1.25)	39.3 (3.8)	1.82 (1.29–2.57)	40.2 (4.2)	2.41 (1.64–3.53)	51.0 (3.9)	2.54 (1.81–3.57)
Hispanic		13.2 (5.0)	1.76 (0.73–4.25)	41.7 (6.5)	2.01 (1.17–3.47)	42.1 (6.8)	2.61 (1.47–4.61)	59.1 (6.5)	3.52 (2.05–6.05)
White		7.9 (0.8)	Reference	26.3 (1.3)	Reference	21.8 (1.4)	Reference	29.1 (1.4)	Reference
<i>p</i> -value:		0.168		<0.001		<0.001		<0.001	
<b>Non-Survivors</b>									
AA		21.6 (1.7)	1.53 (1.24–1.90)	65.5 (2.0)	1.72 (1.43–2.06)	50.7 (2.0)	1.97 (1.65–2.34)	62.5 (1.7)	2.33 (2.00–2.71)
Hispanic		24.1 (2.1)	1.77 (1.39–2.26)	65.9 (1.6)	1.75 (1.51–2.03)	46.9 (2.1)	1.69 (1.41–2.02)	66.6 (2.1)	2.79 (2.30–3.38)
White		15.2 (0.6)	Reference	52.5 (0.8)	Reference	34.3 (0.8)	Reference	41.7 (0.7)	Reference

	No Primary Care	No Specialist	No Flu Vaccine	No Pneumococcal Vaccine
<i>p</i> -value:	<0.001	<0.001	<0.001	<0.001
<b>Race/ethnicity*Cancer History Interactions</b>				
	<i>p</i> -value	<i>p</i> -value	<i>p</i> -value	<i>p</i> -value
Overall	<b>0.044</b>	0.857	0.270	0.670
WNIH-AA	<b>0.013</b>	0.770	0.341	0.653
WNIH-Hispanic	0.990	0.626	0.160	0.412

AA = African American; WNIH = White Non-Hispanic; SE = standard error; OR = odds ratio; CI = confidence interval

**Table 3A**

Association of Race/Ethnicity with Self-reported Lack of Health Care Receipt among Adult Men (age 18–64) with a Cancer History (n=1051)

Outcome:	No Primary Care Provider			No Specialist Provider			No Seasonal Flu Vaccination			
	Reported Regression Estimate:	Odds Ratios	95% Confidence Interval	p-value	Odds Ratios	95% Confidence Interval	p-value	Odds Ratios	95% Confidence Interval	p-value
<u>Unadjusted</u>				0.144			0.537			0.531
African American	0.53	(0.28–1.00)			1.29	(0.82–2.02)		1.07	(0.65–1.76)	
Hispanic	0.99	(0.52–1.92)			1.07	(0.59–1.96)		1.41	(0.77–2.56)	
<u>Adj. for Predisposing Factors</u>				0.132			0.539			0.663
African American	0.51	(0.26–0.98)			1.30	(0.82–2.06)		1.05	(0.62–1.77)	
Hispanic	0.92	(0.48–1.76)			1.04	(0.57–1.88)		1.34	(0.71–2.50)	
<u>Adj. for Predisposing &amp; Enabling Factors</u>				0.516			0.272			0.632
African American	0.67	(0.34–1.32)			1.46	(0.92–2.32)		1.16	(0.69–1.95)	
Hispanic	0.95	(0.48–1.89)			0.98	(0.52–1.82)		1.35	(0.69–2.63)	
<u>Adj. for Predisposing, Enabling &amp; Need Factors</u>				0.732			0.045			0.619
African American	0.76	(0.37–1.52)			1.92	(1.14–3.24)		1.17	(0.69–1.98)	
Hispanic	0.93	(0.43–2.00)			1.04	(0.53–2.01)		1.37	(0.69–2.74)	

OR = odds ratio; CI = confidence interval. Reference group = non-Hispanic White. The Behavioral Model of Health Services Use (Andersen 1995). Adjusted (Adj.) models includes only non-missing. Adjusted for predisposing factors (age and marital status), enabling factors (education, health insurance and usual place of care), and need factors (comorbidities, health status, functional limitations, time since diagnosis, and number of cancer diagnoses). Sample only includes those with no missing covariates.

**Table 3B**

Association of Race/Ethnicity with Self-reported Lack of Health Care Receipt among Adult Men (age =65) with a Cancer History (n=1663)

Outcome:	No Primary Care Provider			No Specialist Provider			No Seasonal Flu Vaccination			No Pneumococcal Vaccination		
	Odds Ratios	95% Confidence Interval	p-value	Odds Ratios	95% Confidence Interval	p-value	Odds Ratios	95% Confidence Interval	p-value	Odds Ratios	95% Confidence Interval	p-value
<u>Unadjusted</u>												
African American	0.57	(0.27-1.19)	0.127	1.80	(1.26-2.59)	<0.001	2.40	(1.62-3.54)	<0.001	2.51	(1.77-3.54)	<0.001
Hispanic	1.78	(0.74-4.29)		2.06	(1.19-3.56)		2.62	(1.48-4.64)		3.51	(2.03-6.04)	
<u>Adj. - Predisposing Factors</u>												
African American	0.57	(0.27-1.18)	0.173	1.78	(1.24-2.56)	<0.001	2.23	(1.50-3.31)	<0.001	2.42	(1.70-3.43)	<0.001
Hispanic	1.52	(0.67-3.43)		2.08	(1.22-3.56)		2.64	(1.49-4.65)		3.46	(2.03-5.90)	
<u>Adj. - Predisposing &amp; Enabling Factors</u>												
African American	0.52	(0.24-1.13)	0.219	1.79	(1.23-2.60)	<0.001	2.14	(1.42-3.23)	<0.001	2.32	(1.62-3.33)	<0.001
Hispanic	1.18	(0.51-2.74)		2.01	(1.15-3.52)		2.37	(1.31-4.30)		3.14	(1.79-5.48)	
<u>Adj. - Predisposing, Enabling &amp; Need Factors</u>												
African American	0.48	(0.22-1.05)	0.151	1.78	(1.19-2.68)	0.002	2.21	(1.45-3.37)	<0.001	2.24	(1.54-3.24)	<0.001
Hispanic	1.22	(0.53-2.82)		2.09	(1.18-3.70)		2.20	(1.21-4.01)		3.10	(1.75-5.51)	

Reference group = non-Hispanic White. The Behavioral Model of Health Services Use (Andersen 1995). Adjusted (Adj.) models includes only non-missing. Adjusted for predisposing factors (age and marital status), enabling factors (education, health insurance and usual place of care), and need factors (comorbidities, health status, functional limitations, time since diagnosis, and number of cancer diagnoses). Sample only includes those with no missing covariates.