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Racial Disparities in Gastrointestinal Cancers-Related Mortality in the US Population

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Abstract

Background—Racial difference in cancer-related mortality has been described in epidemiological studies and evidence points towards higher mortalities in the minorities. To determine the magnitude of racial disparities and sex differences in GI cancer-related mortalities in the US population, we analyzed the data using the third National Health and Nutrition Examination Survey (NHANES III) and related mortality data files.

Methods—NHANES III and its related public linked mortality files were used for this study. Our study cohort included subjects who were ≥18 years and were part of the longitudinal mortality follow-up database. The overall GI cancers related mortality was calculated using combined mortality from malignant neoplasm of esophagus, stomach, colon, liver and pancreas. The evaluation of independent predictors of overall GI cancer-related mortality and of each individual GI cancer was carried out using the Cox proportional hazards model.

Results—A total of 13,221 individuals were included in the analyses with the average person year follow-up of 13.9 years. During the follow-up period, 4,146 subjects died. Of these, 199 were from GI-related cancers. Non-Hispanic black (NHB) had significantly higher overall GI-cancer related mortality compared to non-Hispanic white (NHW, adjusted hazard ratio, aHR: 2.31, 95 % CI 1.57–3.38, $p < 0.001$). Subgroup analyses by sex demonstrated higher mortality from gastric, colorectal and primary liver cancer related mortality in NHB men compared to NHW men. Esophageal and pancreatic cancer mortalities were higher in NHB women compared to NHW women.

Conclusion—Overall GI cancer-related mortality is significantly higher among NHB compared to NHW in the US population.

Keywords

Racial disparities; GI-cancer mortality; NHANES III

Background

Health disparity is defined as a significant discrepancy in overall rate of disease incidence, prevalence, morbidity, mortality, or survival in a specific population as compared to the health status of a general population [1]. Despite the great advancement in medicine over the past decades, racial disparities in cancer-related mortality remain a challenging problem in the United States. This problem was brought into light in the 1980s by the Department of Health and Human Services and the American Cancer Society reporting the health disparities for several malignancies in poor and minority populations, notably among African Americans when compared to non-Hispanic whites. Several factors including lack of health insurance, inability to access medical care, poverty, and low education level were attributable to such findings [2, 3]. In addition, low socioeconomic status may lead to lower rates of cancer screening and delay in diagnosis leading to higher mortality rate [4-6].

Gastrointestinal (GI) malignancies account for significant morbidity and mortality in the United States. It is estimated that 284,680 individuals will be diagnosed with GI-related cancers in the year 2012, according to a recent report by the American Cancer Society [7]. Similar to other health issues [8-10], several studies identified racial differences in the mortality of GI cancers. Using the national cancer registry data (Surveillance, Epidemiology and End Results [SEER]), two studies reported the survival rates of stage-specific colorectal and pancreatic cancers differed among blacks when compared to whites. Blacks consistently experienced worse rates of stage-specific survival and life expectancy than did whites for both sexes, across all age groups, and for localized, regional, and distant stages of the disease [11, 12].

The National Health and Nutrition Examination Survey (NHANES) is a program of studies designed to assess the health and nutritional status of adults and children in the United States. Unlike the cancer registry such as SEER, the sample for the NHANES survey is selected to represent the U.S. population. In order to produce reliable statistics, the survey has been designed to over-sample persons 60 and older as well as minorities, notably African Americans and Hispanics. NHANES data are also linked to death certificate records from the National Death Index (NDI). Linkage of the NHANES survey participants with the NDI provides the opportunity to investigate specific health problems with mortality. To determine the magnitude of racial disparities and sex differences in GI cancer-related mortalities in the US population, we therefore analyzed the data using the third National Health and Nutrition Examination Survey (NHANES III) and related mortality data files. This study was conducted to test the hypothesis that the non-Hispanic black population suffers from high overall GI cancer-related mortality compared to the non-Hispanic white population from a nationally representative sample of US adults.

Methods

The NHANES III is a program conducted in the United States from 1988 through 1994 by the National Center for Health Statistics, Centers for Disease Control and Prevention. It used complex, multistage, stratified, clustered samples of civilians from 2 months of age and older to collect information about their health and nutrition. The survey consists of interviews, standardized physical examination and laboratory tests from blood samples collected at examination centers. This study was approved by the Center for Disease Control

and Prevention's Institutional Review board. The details of survey design and sampling methods are available elsewhere [13].

Study Cohort

The NHANES III included a total of 33,994 subjects. Overall, 19,593 adults, 18 years old, completed the interview and examination, and were part of the longitudinal mortality follow-up database. We excluded 5,901 Mexican-American and other minorities (such as Asian) due to an insufficient number of reported deaths during the follow-up period, 462 with missing values for demographic and socioeconomic information, and nine without long-term follow-up data (i.e. person years follow-up of zero). After applying these exclusions, 13,221 subjects constituted our study cohort.

Definitions and Variables

Sociodemographic data including the participants' age, sex, race/ethnicity, highest educational attainment, and annual family income were obtained. As individuals were followed until year 2006 for mortality, income of less than \$20,000 (average threshold for family of four for year 2006) was considered as low income status [14]. Current smoker was defined as history of ongoing smoking with or without >100 cigarettes in lifetime. Excessive alcohol consumption was defined as more than two drinks per day in men and more than one drink per day in women [15]. The average alcohol consumption was calculated based on the responses to two survey questions that queried about the number of days of drinking over the past 12 months and the number of drinks on a given drinking day.

Mortality Data

In 2009, National Center for Health Statistics (NCHS) completed a mortality update for NHANES III survey participants (1988–1994), by linking participants to death certificate data found in the National Death Index (NDI) through a probabilistic record matching process. These data provided mortality follow-up data of NHANES III participants from the date of survey participation (1988–1994) through December 31, 2006. Two versions of the NHANES III linked mortality files including public-use file and restricted-use file were released. Only the public-use mortality file was used in our analyses. Details of these NHANES III linked mortality files and NDI record matching process have been provided elsewhere [16].

According to the NDI database, cause of death coding for all deaths occurring prior to 1999 followed the 9th revision of the International Statistical Classification of Disease, Injuries and Cause of Death (ICD-9) guidelines, while deaths during and after 1999 were coded using ICD-10. In order to have the same cause-of-death codes across all years in the study period, deaths occurring prior to 1999 were recoded into ICD-10 codes and the data were released in the public-use mortality file as Underlying Cause of Death 113 (UCOD_113) [16].

The overall GI cancers-related mortality (UCODE_113, 21–25) was calculated using *combined* mortality from malignant neoplasm of esophagus (ICD-10 C15), stomach (ICD-10 C16), colon, rectum and anus (ICD-10 C18–C21), liver (ICD-10 C22) and pancreas (ICD-10 C25). Individual cancer-related mortality was calculated using their appropriate UCODE_113.

Statistical Analysis

Basic descriptive statistics, including mean, standard deviations, ranges and percentages were used to characterize the study population. Appropriate comparison tests including chi-square test and Student's *t* test were used for comparison between groups for categorical and

continuous variables, respectively. The survival data were univariately assessed with Kaplan–Meier survival estimates for comparison of univariate survival curves between non-Hispanic white and black. The follow-up period was available from the public-use mortality file which provided follow-up of NHANES III participants from the time of enrollment to death or the end of the follow up on December 31, 2006. The evaluation of independent predictors of overall GI cancer-related mortality and of each individual GI cancer was carried out using the Cox proportional hazards model and hazard ratios (HR), and corresponding confidence intervals (CI) are reported. In order to further characterize the impact of race and sex on the mortality outcome, we also performed the analyses stratified by sex. All analyses were performed using SAS 9.3 (SAS Institute, Cary, North Carolina, USA) with appropriate sample weight, to account for unequal selection probabilities, designing, and complexity of survey data.

Results

Study Cohort Characteristics

Our study cohort consisted of 13,221 subjects. Baseline sociodemographic characteristics demonstrated the mean age of 44.5 years, 47.4 % male, 87.5 % non-Hispanic white, and 12.5 % non-Hispanic black. Of these, 22.3 % had less than high school education, and 32 % had annual family income less than \$20,000.

Comparison Between Non-Hispanic Whites and Non-Hispanic Blacks

Non-Hispanic whites were older (48.3 ± 0.5 vs. 44.8 ± 0.4 years, $p < 0.001$), had higher education (79.2 vs. 67.1 %, $p < 0.001$) and higher annual incomes (71.7 vs. 45.8 %, $p < 0.0001$) than non-Hispanic blacks. While smoking rate was higher in non-Hispanic blacks (32.3 vs. 29.1 %, $p < 0.038$), we found no significant differences in the rate of excessive alcohol use (7.1 vs. 8.0 %, $p = 0.199$). Selected characteristics of the study cohort are shown in Table 1.

Overall GI-Cancer Related Mortality

The average person-years of follow-up were 13.9, and 4,146 subjects died during the study period. Seven hundred ninety-seven subjects died from solid organ related malignancies, and of these 199 (20 %) were GI-related cancers (16 esophageal, 27 gastric, 95 colorectal, 19 primary hepatic, and 42 pancreatic cancers). When taking the sampling weight into account to calculate the magnitude of GI-cancer related mortality at the *population level*, we found that 86,495 subjects died of esophageal cancer, 169,991 from gastric cancer, 614,499 from colorectal cancer, 140,357 from primary hepatic cancer, and 266,010 from pancreatic cancer during the study period (Table 2). The esophageal, gastric, colorectal, primary hepatic and pancreatic cancers accounted for 6.8, 13.3, 48.1, 11.0 and 20.8 % of overall GI cancer-related deaths, respectively.

The mortality from all causes during the study period in the US population was 18.4 %, of which 4 % were related to malignancies. The mortality from GI cancers was 0.82 % and it accounted for 20.3 % of all cancer-related deaths. Our analyses emphasized the burden of GI cancers in the US population.

When we analyzed the outcomes using the Cox proportional hazard model controlling for covariates, we found significantly higher GI cancer mortality rate among non-Hispanic blacks when compared to whites (aHR 2.31; 95 % CI 1.57–3.38; Table 3, Fig. 1). In addition, male subjects had a much worse outcome compared to female counterparts (aHR 1.70; 95 % CI 1.15–2.52; Table 3). The results separated by sex are in accordance with the Cox analyses. In male subjects, non-Hispanic blacks had significantly higher GI cancer-

related mortalities when compared to non-Hispanic whites (aHR 2.88; 95 % CI 1.72–4.82; Table 4). We, however, did not observe these findings in female subjects (Table 5).

Analyses Stratified by Different Types of GI Cancer

Esophageal Cancer-Related Mortality—Esophageal cancer-related mortality accounted for 6.8 % of overall GI cancer in the US population. Independent risk factors for mortality included non-Hispanic black (aHR 6.98, 95 % CI 1.70–28.63), smoking (aHR 4.16, 95 % CI 1.76–9.80), and excessive alcohol use (aHR 8.55, 95 % CI 2.23–32.75). Stratified analysis by sex did not show any racial difference in mortality in males; however, non-Hispanic blacks had significantly higher risk of esophageal cancer-related mortality than that of non-Hispanic white females (aHR 7.05, 95 % CI 1.59–31.29) (Tables 3, 4 and 5).

Gastric Cancer-Related Mortality—The mortality rate from gastric cancer was 13.3 % of all GI cancer-related deaths. Though we did not find the racial difference among whites and blacks in the overall mortality (aHR 1.93, 95 % CI 0.74–5.05; Table 3), subgroup analysis stratified by sex showed higher risk of gastric cancer-related mortality in non-Hispanic black males (aHR 7.96, 95 % CI 2.75–22.96; Tables 4 and 5).

Primary Liver Cancer-Related Mortality—The mortality from primary liver cancer accounted for 11.0 % of overall GI mortality. Similar to the results in gastric cancer-related mortality, we did not observe a racial difference in primary liver cancer mortality (Table 3). However, analysis of the male population showed non-Hispanic black ethnicity as an independent risk factor for primary liver cancer-related mortality (aHR 5.17, 95 % CI 1.71–15.63; Tables 4 and 5).

Colorectal Cancer-Related Mortality—Colorectal cancer accounted for the majority of deaths among GI-cancer related mortality (48.1 %). Both male sex (aHR 1.92, 95 % CI 1.07–3.43) and non-Hispanic black ethnicity (aHR 2.12, 95 % CI 1.24–3.64) were found to be independent predictors of colorectal cancer-related mortality in the total population (Tables 3 and 4). This racial difference in mortality was not observed in the female population (Table 5).

Pancreatic Cancer-Related Mortality—Mortality from pancreatic cancer was the second most common cause of death among all GI cancer-related mortality (20.8 %). Male sex (aHR 2.47, 95 % CI 1.17–5.22) and non-Hispanic black (aHR 2.80, 95 % CI 1.23–6.37) were identified as independent predictors of pancreatic cancer-related mortality (Table 3). Subgroup analysis by sex showed smoking (aHR 4.12, 95 % CI 1.12–15.10) as an independent predictor for pancreatic cancer-related mortality in the male population while non-Hispanic black race (aHR 4.67, 95 % CI 1.01–21.57) was an independent predictor in the female population (Tables 4 and 5).

Discussion

The results from the NHANES III analyses supported our hypothesis on racial disparities and sex differences in GI cancer-related mortalities in the US population. When considering overall GI cancers, non-Hispanic blacks had poorer survival outcome compared to non-Hispanic whites. In the categorization analyses, the higher mortality in non-Hispanic blacks was primarily driven by esophageal, colorectal, and pancreatic cancers. When we dichotomized the analyses by sex, we found that the racial disparities were more evident among the male population as non-Hispanic blacks had significantly higher mortality from gastric, hepatic and colorectal cancers compared to non-Hispanic whites.

We found that non-Hispanic whites had higher level of income and education compared to non-Hispanic blacks. Racial disparities in cancer mortalities have long been ascribed to differences in socioeconomic status, which is a measure of education, poverty status, occupation, access to healthcare, and preventative care, all of which correspond to access to treatment and the quality of treatment [17]. Higher socioeconomic status in non-Hispanic white might be associated with increased utilization of health care services, better neighborhood resources, greater health education and awareness, thereby improving overall health status and prognosis [17, 18]. On the contrary, lower income and education has been traditionally associated with reduced access to sufficient healthcare and treatment, resulting in poorer outcome [17-19]. While the level of socioeconomic status may be a determinant of poor survival outcomes in our study, there may be an intricate interaction with race. In our multivariate Cox hazard model to determine the predictors of overall mortality, we observed that only black population and male sex, but not the level of education and income, were significantly associated with mortality. These results indicate that there might be the intrinsic factors among non-Hispanic black males that may perhaps interfere with the survival outcomes. This assumption is supported by recent studies that showed the difference in gene expression in the cancer tissues between non-Hispanic black and white leading to different response to therapy [20]. In addition, epigenetic processes, in particular DNA methylation, may play a role in the induction of phenotypes in cancer. More importantly, significant epigenetic differences in between racial groups may account for the differences seen in tumor initiation, progression, aggressiveness, and outcome of these cancers [21].

We acknowledge several limitations of our study. One particular concern is with regard to staging classification for each type of GI cancers which was lacking in the NHANES III dataset. Several reports showed non-Hispanic black, due to low socioeconomic status and inability to access to healthcare, tend to have cancer diagnosed at the advanced stage [22]. In addition, the level of clinical detail in NHANES does not allow us to capture significant factors that may affect survival, such as concurrent medical comorbidities, severity of chronic liver disease (particularly for subjects with primary liver cancer), rate of cancer screening, the ability to access to healthcare, and information on the details of all treatments (either surgery or chemotherapy) received. Moreover, the use of overall survival as the primary endpoint does not account for the possibility of non-cancer attribution on mortality [23]. Lastly, the data on other minorities such as Hispanics and Asians were not part of the analyses.

In conclusion, our results showed the significant racial differences in GI cancer-related mortalities between non-Hispanic black and white. Intuitively, racial disparity seems most likely to be a product of differences in socioeconomic status, access to care, or the quality of care. The successful elimination of disparities will require rational solutions focusing on race-based research and intervention [24]. We also found that race by itself is an independent predictor of mortality. Future studies with the emphasis on intrinsic/biological differences between races leading to the poor survival outcomes are warranted.

Acknowledgments

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Fig. 1.

Kaplan-Meier curves comparing cumulative survival of non-Hispanic black and non-Hispanic white for overall GI cancers (a), esophageal cancer (b), gastric cancer (c), primary liver cancer (d), pancreatic cancer (e), and colorectal cancer (f) in the US population during the study period

Table 1

Comparison of baseline characteristics between non-Hispanic white and black

Characteristic	Non-Hispanic white unweighted frequencies (weighted % $\pm$ SE) $n = 8,104$ (87.5 % $\pm$ 0.73)	Non-Hispanic black unweighted frequencies (weighted % $\pm$ SE) $n = 5,117$ (12.5 % $\pm$ 0.73)	<i>p</i> value
Age (years), mean	48.3 $\pm$ 0.5	44.8 $\pm$ 0.4	< 0.001
Age groups			
18–44	2,874 (55.5 % $\pm$ 1.3)	3,103 (67.1 % $\pm$ 1.1)	< 0.001
45–64	1,990 (26.4 % $\pm$ 0.7)	1,132 (21.1 % $\pm$ 0.8)	< 0.001
65–84	2,730 (16.7 % $\pm$ 0.9)	815 (10.9 % $\pm$ 0.6)	< 0.001
85+	510 (1.4 % $\pm$ 0.2)	67 (0.9 % $\pm$ 0.1)	< 0.001
Sex			
Male	3,717 (47.8 % $\pm$ 0.5)	2,332 (44.2 % $\pm$ 0.9)	< 0.001
Female	4,387 (52.2 % $\pm$ 0.5)	2,785 (55.8 % $\pm$ 0.9)	< 0.001
Education level			
Less than high school	2,478 (20.8 % $\pm$ 1.0)	1,962 (32.9 % $\pm$ 1.3)	< 0.001
High school or more	5,626 (79.2 % $\pm$ 1.0)	3,155 (67.1 % $\pm$ 1.3)	< 0.001
Income level			
Less than \$20,000	3,097 (28.3 % $\pm$ 1.1)	2,957 (54.2 % $\pm$ 1.8)	< 0.001
\$20,000 or more	5,007 (71.7 % $\pm$ 1.1)	2,160 (45.8 % $\pm$ 1.8)	< 0.001
Excessive alcohol use			
No	7,588 (92.0 % $\pm$ 0.6)	4,768 (92.9 % $\pm$ 0.4)	0.199
Yes	516 (8.0 % $\pm$ 0.6)	349 (7.1 % $\pm$ 0.4)	0.199
Smoking status			
No	6,206 (70.9 % $\pm$ 1.0)	3,482 (67.7 % $\pm$ 1.1)	0.038
Yes	1,898 (29.1 % $\pm$ 1.0)	1,635 (32.3 % $\pm$ 1.1)	0.038

SE standard error

Table 2

The numbers of subjects with gastrointestinal (GI) cancers-related mortality in our study cohort and weighted analysis for the frequencies of GI cancers-related mortality in the US population

Cancer-related mortality	Unweighted frequencies	Weighted frequencies ^a	Weighted percentage (SE)
Overall GI cancers	199	1,277,352	0.82 % ± 0.09
Esophageal cancer	16	86,495	0.06 % ± 0.02
Gastric cancer	27	169,991	0.11 % ± 0.03
Primary liver cancer	19	140,357	0.09 % ± 0.03
Pancreatic cancer	42	266,010	0.17 % ± 0.04
Colorectal cancer	95	614,499	0.39 % ± 0.06

SE standard error

^aTotal cases of GI cancer-related mortality in the US population

Table 3
Hazard ratios for overall and individual gastrointestinal cancer-related mortality in all subjects in the study

Demographics and social variables (reference group)	Overall gastrointestinal cancer-related mortality	Esophageal cancer-related mortality	Gastric cancer-related mortality	Primary liver cancer-related mortality	Pancreatic cancer-related mortality	Colorectal cancer-related mortality
Age in years	1.11 (1.09–1.12)*	1.18 (1.12–1.25)*	1.09 (1.06–1.12)*	1.08 (1.03–1.13)*	1.11 (1.09–1.13)*	1.11 (1.08–1.13)*
Sex (female) male	1.70 (1.15–2.52)*	2.53 (0.54–11.93)	1.34 (0.54–3.36)	0.53 (0.14–2.00)	2.47 (1.17–5.22)*	1.92 (1.07–3.43)*
Race (NHW) NHB	2.31 (1.57–3.38)*	6.98 (1.70–28.63)*	1.93 (0.74–5.05)	1.42 (0.46–4.37)	2.80 (1.23–6.37)*	2.12 (1.24–3.64)*
Annual family income (\$20,000 less than \$20,000	1.27 (0.82–1.96)	0.47 (0.14–1.59)	6.35 (2.13–18.94)*	1.94 (0.42–8.96)	1.20 (0.55–2.60)	0.87 (0.47–1.59)
Education level (high school or more) less than high school	0.78 (0.44–1.38)	0.75 (0.22–2.55)	0.27 (0.08–0.90)*	0.89 (0.28–2.83)	0.41 (0.19–0.88)*	1.29 (0.58–2.90)
Smoking status (not smoker) current smoker	1.51 (0.99–2.32)	4.16 (1.76–9.80)*	0.44 (0.14–1.40)	2.31 (0.49–10.83)	3.02 (1.11–8.17)*	0.92 (0.43–1.95)
Alcohol status (not excessive use) excessive use	1.78 (0.95–3.33)	8.55 (2.23–32.75)*	0.77 (0.15–3.92)	2.66 (0.36–19.74)	2.69 (0.74–9.77)	0.64 (0.18–2.29)

95 % CI 95 % confidence interval, *NHW* non-Hispanic white, *NHB* non-Hispanic black

* *p* value <0.05

Table 4
Hazard ratios for overall and individual gastrointestinal cancer-related mortality in male subjects

Demographics and social variables (reference group)	Overall gastrointestinal cancer-related mortality	Esophageal cancer- related mortality	Gastric cancer- related mortality	Primary liver cancer- related mortality	Pancreatic cancer- related mortality	Colorectal cancer- related mortality
Age in years	1.13 (1.11–1.15) *	1.20 (1.12–1.27) *	1.13 (1.09–1.18) *	1.10 (1.07–1.14) *	1.12 (1.09–1.16) *	1.13 (1.10–1.16) *
Race (NHW) NHB	2.88 (1.72–4.82) *	6.13 (0.64–59.15)	7.96 (2.75–22.96) *	5.17 (1.71–15.63) *	1.63 (0.61–4.32)	2.48 (1.18–5.20) *
Annual family income (\$20,000) less than \$20,000	1.12 (0.65–1.92)	0.27 (0.06–1.21)	1.21 (0.39–3.75)	0.86 (0.12–6.16)	0.97 (0.33–2.84)	1.41 (0.59–3.35)
Education level (high school or more) less than high school	0.71 (0.39–1.28)	0.19 (0.04–1.00)	0.26 (0.10–0.70) *	1.30 (0.20–8.50)	0.37 (0.14–0.93) *	1.14 (0.46–2.83)
Smoking status (not smoker) current smoker	1.99 (1.18–3.32) *	6.72 (1.23–36.61) *	1.14 (0.31–4.14)	2.46 (0.54–11.12)	4.12 (1.12–15.10) *	1.02 (0.50–2.10)
Alcohol status (not excessive use) excessive use	2.10 (0.86–5.15)	11.33 (1.88–68.50) *	1.68 (0.28–9.96)	–	3.74 (0.81–17.20)	0.53 (0.11–2.66)

95% CI 95% confidence interval, NHW non-Hispanic white, NHB non-Hispanic black

*
p value <0.05

Table 5
Hazard ratios for overall and individual gastrointestinal cancer-related mortality in female subjects

Demographics and social variables (reference group)	Overall Gastrointestinal cancer-related mortality	Esophageal cancer- related mortality	Gastric cancer- related mortality	Primary liver cancer- related mortality	Pancreatic cancer- related mortality	Colorectal cancer- related mortality
Age in years	1.08 (1.07–1.10)*	1.15 (1.06–1.25)*	1.06 (1.03–1.09)*	1.07 (1.01–1.13)*	1.10 (1.07–1.12)*	1.09 (1.06–1.11)*
Race (NHW) NHB	1.70 (0.98–2.96)	7.05 (1.59–31.29)*	0.34 (0.06–1.88)	0.57 (0.09–3.46)	4.67 (1.01–21.57)*	1.65 (0.64–4.24)
Annual family income(\$20,000) less than \$20,000	1.50 (0.59–3.79)	0.69 (0.09–5.32)	–	2.72 (0.43–17.29)	1.61 (0.39–6.66)	0.50 (0.16–1.55)
Education level (high school or more) less than high school	0.84 (0.35–2.02)	3.90 (0.45–34.08)	0.29 (0.05–1.60)	0.78 (0.18–3.34)	0.45 (0.13–1.53)	1.49 (0.42–5.34)
Smoking status (not smoker) current smoker	1.13 (0.51–2.51)	2.92 (1.02–8.38)*	0.09 (0.01–0.81)*	2.15 (0.28–16.35)	2.00 (0.42–9.61)	0.82 (0.21–3.14)
Alcohol status (not excessive use) excessive use	1.46 (0.48–4.44)	5.17 (0.65–41.13)	–	4.53 (0.67–30.76)	0.64 (0.07–5.80)	0.84 (0.09–7.87)

95% CI 95% confidence interval, NHW non-Hispanic white, NHB non-Hispanic black

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p value <0.05