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Disparities in Knowledge of Mouth or Throat Cancer Among Rural Floridians

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Abstract

Objective—The aim of this study was to examine risk factors for reduced mouth or throat cancer (MTC) knowledge using a sample of rural North Floridian adults.

Methods—Telephone interviews were conducted across rural census tracts throughout North Florida in 2009-2010, using a survey adapted for cultural appropriateness. The sample consisted of 2,393 individuals (1,059 males and 1,334 females; 1,681 whites and 712 blacks).

Findings—Only 9% of the study respondents indicated they had not heard of MTC; however, only 12% endorsed knowing “a lot.” Higher education levels and health literacy indicated they had more MTC knowledge. Among female participants, whites had more knowledge than blacks (OR = 1.9). Among black participants, males had more knowledge than females (OR = 1.7). Conversely, greater concern with MTC was associated with lower education levels, health literacy, and financial status, but higher depression scores. Awareness that excessive sun exposure is a risk factor for MTC was lower than for earlier studies using more urban samples.

Conclusions—This study adds to the literature on MTC knowledge and concern because this sample was drawn exclusively from rural populations in North Florida, a group with the highest MTC morbidity and mortality. An unanticipated finding was that blacks were more concerned than their white rural counterparts. This study was also the first to report that depression was associated with increased concern about MTC. The goal is to persuade at-risk groups to obtain MTC screenings with the goal of reducing disparities in MTC whenever they occur.

Keywords

depression; health disparities; health literacy; mouth or throat cancer; rural

In the United States, there will be 52,100 new cases of cancers of the mouth and throat (MTC) diagnosed in the next year, with approximately 11,460 deaths.[1] Oral cancer is preceded by visible changes in the oral mucosa, allowing clinicians to detect and treat effectively early intraepithelial stages of oral carcinogenesis.[2] Nevertheless, most oral cancers are currently detected at a late stage, when treatment is complex and costly, and poor outcomes are likely. The 5-year relative survival rate among cases localized at diagnosis show disparities between blacks and whites among both males (56% vs 66%) and females (64% vs 71%).[3] Lack of awareness among the public of the signs, symptoms, and

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risk factors for oral cancer, as well as an absence of prevention and early detection by health care providers, are believed to be responsible for the diagnostic delay.[4]

National data from the 1990 National Health Interview Survey (NHIS) indicated that only 25% of adults could correctly identify one early sign of MTC, and correct identification of risk factors ranged from 13% for alcohol use to 67% for tobacco use.[5] Since that time, data from statewide surveys have suggested that levels of knowledge of MTC are increasing.[5-9] Generally, there have been 2 strategies used to assess MTC knowledge. The simplest is to directly ask respondents for their subjective rating of MTC awareness—either, "Have you heard of MTC? (often called oral cancer)" or, "How much do you know about MTC?" State-level data from Maryland, North Carolina, New York, and Florida suggest that 15%-20% of residents have never heard of MTC.[6-9] The second method to test knowledge has been to ask more specific questions about MTC. Knowledge of *risk factors* has typically been asked in a format where respondents rate the likelihood of a stated behavior increasing a person's risk for MTC, often along with several foils. Other studies ask more specific questions about MTC *signs and symptoms*—often by open-ended questions.[6-8] These studies have generally found that respondents know little about MTC.

Health literacy refers to the degree to which individuals have the capacity to obtain, process, and understand basic health information and services needed to make appropriate health decisions.[10] Low health literacy is common, with a recent review of this literature of studies in the US concluding that 26% of participants were classified as having low health literacy.[10] Because low health literacy is so common, it is important to understand how low health literacy can affect one's health, both directly and indirectly. Our previously published work demonstrates an association between low health literacy in males and lack of MTC exam awareness.[11] Also present in the literature are studies exploring the effects of health conditions such as depression on secondary prevention behaviors. For example, data from population-based studies in the US,[12,13] Canada,[14] and England[15,16] have found that higher depressive symptoms predict reduced use of mammography. However, associations between depression and cervical cancer screenings are less consistent.[13,14,17] Currently lacking are studies examining the presence or absence of participants' health literacy levels on screening behaviors, specifically in the presence of chronic conditions such as depression. Also lacking are studies directly assessing health literacy levels, MTC knowledge and/or concern, and depressive symptoms within the individuals' environmental context; ie, rural versus urban residence.

Rural communities face unique and formidable access to care barriers—barriers placing them at a greater risk for experiencing chronic disease and cancer.[18-20] Out-migration (leaving rural communities to move to urban areas) of younger residents has resulted in rural communities typically composed of individuals who are older, less educated, more likely to report their health as poor, and have reduced access to primary health care providers.[21] Also resulting from geographic isolation and rurality are increased concentrations of minority populations, poor whites, higher rates of unemployment and poverty, and lower rates of education,[21] all of which are barriers to accessing health care. Other barriers attributed to geographic isolation include fewer services such as cell phone service, broadband or other high-speed Internet technology.[22]

Because most health care providers locate in densely populated metro areas, nearly 80% of non-metropolitan US counties are classified as either whole or partial primary health care professional shortage areas (HPSA); 60% of nonmetropolitan counties are in dental care HPSAs. The percentage of rural residents lacking health insurance ranges from 20% to 30%, with lack of dental insurance even more common. Rural residents access health care via

small private medical/dental practices or rural health care clinics usually offering limited, episodic and primary care service.[18]

Assuming improved health literacy results from increased health care provider contact, residents of HPSA are expected to have lower levels of health literacy than those living in urban areas. As a result, lower levels of health literacy, compounded by an overall lack of resources, including medical/dental specialists, cause rural residents to access/receive fewer preventive cancer services than urban residents.[23,24] Also adding to the burden of cancer for rural communities is the high prevalence of risk factors such as cigarette smoking, sun exposure, poor diet, physical inactivity, alcohol consumption, and human papillomavirus infection.[25,26] Urban residents wishing to access medical/dental care, including examinations for secondary cancer prevention, face far fewer barriers than do their rural counterparts. The formidable barriers faced by rural residents when accessing health care cause them to be at increased risk of late-stage diagnosis for cancer in general.[27-30]

As a whole, rural residents experience fewer medical and dental visits, spend little to no time using technology, and can have limited access to television and radio. In addition, contact with others is limited by geography and transportation issues. Each of these factors interferes with rural residents' exposure to knowledge and services, especially in relation to cancer. Limited time with health care practitioners, combined with limited or no access to the Internet and/or other types of technology lowers opportunities for patient education. Although commonly used pamphlets and posters offer cancer information and resources, low levels of literacy, both health and general, limit their educational effectiveness.

The aims of this study are to document the level of MTC knowledge and concern among residents of rural North Florida and then to determine risk factors of lack of knowledge and concern. Specific hypotheses include that (1) males, older adults, and blacks living in rural North Florida possess reduced MTC knowledge and concern, and (2) that among this rural sample depression and lower levels of education and health literacy are associated with an individual's increased risk for low levels of MTC knowledge and concern.

Methods

Questionnaire Development

The telephone survey questions were adapted from items used in large national surveys such as the NHIS and Behavioral Risk Factor Surveillance System. Draft questions about MTC were discussed with focus groups of rural blacks to ascertain the understanding, interpretation, and utility of items.[31] The focus group participants were residents of the target areas for the survey, so that the question wording was tailored to reflect the culture and demographics of that locale. The final instrument was field-tested using a test/retest model with 93 participants.[31] Reliability coefficients were 0.71 for awareness, 0.78 for concern, 0.79 for the composite score for correct identification of the risk factors, and 0.70 for signs and symptoms.

Sample Design

The sample targeted a specified geographic region that included 36 rural census tracts from Jefferson, Leon, Gadsden, Union, Alachua, and Bradford counties in North Florida. Sampling strata were defined by census block groups, according to percent black as follows: 30+%, 20%-29%, and below 20%. The reported percentages of race for each block group allowed us to select telephone numbers in more densely black areas for our study. Because geographic location was essential to the overall study and at that time cell phone samples were not available at any geographic unit smaller than the state, only telephones with landlines were included in the sample. This approach also maintained stability for recontact

on a follow-up survey a year later, obtained clearer communication signals, and was optimal for sampling the older population who are more likely to use only landlines. Only people aged 25 or older were included, and a within-household respondent selection procedure was implemented to maximize participation of older men and help balance representation by gender. We asked for the oldest male in the household, but allowed immediate substitution (with whomever eligible adult was on the phone) if the oldest male was not available.

Survey Methodology

The Survey Research Center at the University of Florida Bureau of Economic and Business Research conducted the telephone survey using trained interviewers and a computer-assisted telephone interviewing system. Each phone number was dialed up to 10 times, with calls rotated throughout different days and times 7 days a week until 9 p.m. A total of 16,000 phone numbers were dialed, yielding 2,605 interviews with an average interview length of 22.7 minutes (standard deviation [SD] = 5.3). Participants completing the survey were mailed a $15 Wal-Mart gift card. The number of completed interviews with black males was below target after the first month of baseline survey fieldwork, despite oversampling in census tracts with higher percentages of blacks. From that point, the race question was used as a screening criterion, so that interviews were only completed with households where the selected respondents were black. Thus, over 3,000 calls to non-black households did not result in an interview. The cooperation rate of all cases actually interviewed was 44.7%, with a response rate of 26.4% actual completed interviews. The survey began in late November of 2009 and was completed in March of 2010.

Description of Variables

There were 2 primary variables of interest: (1) Subjective knowledge of MTC, and (2) Concern about getting MTC. The wording for the first variable was, “How much do you know about cancer of the mouth or throat? Would you say a lot, a little, nothing?” Concern about MTC was measured by a question that asked, “How concerned are you about getting MTC in the future?” with answers given on a 4-point scale ranging from “Definitely Not Concerned” to “Very Concerned.”

Predictor variables include health literacy score, depression (CES-D short form), financial status, education level, having a regular physician, having a regular dentist of record (both recorded as 1 = yes, 0 = no), race (1 = white, 0 = black/African American), and gender (1 = male, 0 = female). The measure of health literacy score and the CES-D short form score were rescaled to 0-3, with 3 having the highest health literacy skills or most depression, so that the overall scores corresponded to the item-level response choice categories. A continuous financial status scale (range 0-2, with 2 indicating the highest) was created based on 2 questions. First, participants were asked to describe their financial status on a 4-point scale: “I really can’t make ends meet,” “I manage to get by,” “I have enough to manage plus some extra,” or “Money is not a problem; I can buy about whatever I want.” In the second question, the respondents were asked to describe how comfortably they would be able to pay an unexpected $500 medical bill, on a 3-point scale. Participants’ education level was classified into 6 categories: 1 (8th grade or less), 2 (some high school, but did not graduate), 3 (high school graduate or GED), 4 (some college or 2-year degree), 5 (4-year college graduate), and 6 (more than 4-year college degree). A 5-point measure of global health was used (scored as 1 = excellent, 2 = very good, 3 = good, 4 = fair, 5 = poor).

Awareness of and mouth throat=cancer was determined by the question “Have you ever heard of cancer of the mouth or throat? It is sometimes called oral cancer.” The response choices were “Yes,” “No,” or “Not sure if I have or not.” A participant’s knowledge of risk factors (percentage of correctly identified risk factors) and signs and symptoms (percentage

of correctly identified signs and symptoms) of MTC were also measured. These were determined by a series of questions regarding possible causes and symptoms of MTC. Respondents reacted to each item by choosing from 3 choices “Yes,” “No,” or “Not sure.” Correct responses were scored as 1 and incorrect and not sure responses as 0 so that each dependent variable represented the number of correct responses. A combination of correct and incorrect risk factors or signs and symptoms were asked. Wording for MTC knowledge items are presented in Table 1.

Data Analysis

Survey-sample weighted multiple logistic regression models (proportional odds models) were used to assess the association of the 2 categorical response variables and the psychosocial predictor variables, adjusting for age, gender, and race. Model selection was performed following the strategies described in Muller and Fetterman.[25] A maximum model was constructed with all of the predictors, their interactions with gender and race, and predictor/gender/race 3-way interactions. After minimizing removable collinearity through effect coding, centering, and scaling, collinearity was evaluated and found acceptable for the maximum model (and therefore not a concern for any smaller model).[32] The assumption of proportional odds was also evaluated and found acceptable. Model selection was preceded by a backward step-down selection starting from the interaction terms. The survey procedure, PROC SURVEYLOGISTIC, of the statistical software SAS (version 9.2) was used for the analysis (SAS Institute Inc., Cary, North Carolina). The “TOTAL = ” option in PROC SURVEYLOGISTIC was used to identify stratum population totals in our survey dataset. Stratification and weights were specified using the STRATA and WEIGHT statements.

Survey-sample weighted multiple linear regression models were used to study whether there is an age, gender, or race difference in the 2 continuous response variables (number of correctly recognized risk factors or signs and symptoms). A maximum model was constructed with all 3 factors, all 2-way interactions, and the age/gender/race 3-way interaction. After evaluating collinearity and a complete residual analysis, a backward step-down selection was performed starting from the interaction terms. PROC SURVEYREG was used for the analysis with the “TOTAL = ” option and the STRATA and WEIGHT statements. The Bonferroni method was used to control for multiple testing with the exclusion *P* value set at .05/4 because there were 4 response variables of interest.

Results

Sample

The sample for this study consisted of 2,393 individuals (1,059 males and 1,334 females; 1,681 whites and 712 blacks). The mean age of respondents was 56.1 years (SD = 14.7 with a range of 25-94). The distribution across education was 2% with 8th grade or less (n = 52), 7% with some high school (n = 169), 27% who had completed high school or received a GED (n = 644), 30% who had attended some college (n = 716), 16% (n = 382) who were college graduates, 18% (n = 419) who had attended postgraduate school, and <1% who gave no answer (n = 11). Descriptive statistics for the sample characteristics by race are presented in Table 2. Ninety-one percent of the study respondents (n = 2,289) indicated they had heard of MTC. Frequency distributions for the MTC knowledge and concern variables are presented in Tables 3 and 4, respectively.

Regression Models

Predicting MTC Knowledge—Results from the logistic regression models are summarized in Table 5. In Model 1, participants with higher education levels and health

literacy scores indicated they had more MTC knowledge with odds ratios 1.21 (95% CI: 1.12-1.31) and 1.47 (95% CI: 1.27-1.70), respectively. In addition, there was a gender by race interaction effect. Among female participants, whites had more knowledge than blacks (OR: 1.86, 95% CI: 1.41-2.47). Among black participants, males had more knowledge than females (OR: 1.71, 95% CI: 1.20-2.43).

Results from the linear regression models are summarized in Table 6. As hypothesized, white participants on average correctly identified more known *risk factors* than black participants (Model 3 in Table 6). Moreover, this percentage of correct responses dropped as age increased. A higher level of education was associated with a higher number of correctly identified risk factors. Those with a regular dentist recognized more known risk factors compared to those without a regular dentist. In addition, among blacks, education was a significantly stronger predictor of correctly recognized known risk factors than for whites. In Model 4, female participants and whites on average recognized more known *signs and symptoms* than male or black participants. Participants with higher levels of education and health literacy recognized more known signs and symptoms. Those with a regular dentist recognized more known signs and symptoms compared to those without a regular dentist. In addition, among blacks, education was a significantly stronger predictor of correctly recognized signs and symptoms than for whites.

Predicting Concern—In Model 2 (Table 5), participants with higher education levels (OR: 0.87, 95% CI: 0.81-0.93), higher health literacy scores (OR: 0.69, 95% CI: 0.61-0.79), higher financial status (OR: 0.80, 95% CI: 0.68-0.95), and better overall health (OR: 0.89, 95% CI: 0.82-0.97) reported that they were less concerned about getting MTC. However, participants who were more depressed indicated they were more concerned about getting MTC (OR: 1.50, 95% CI: 1.25-1.79). Among female participants, whites were less concerned than blacks, whether they had a regular physician or not. Among male participants with a regular physician, whites were less concerned than blacks (OR: 0.59, 95% CI: 0.43-0.79), whereas this racial difference was not found among male participants without a regular physician.

Discussion

This study examined knowledge and concern about MTC, one of the cancers with the highest rate of mortality in a sample drawn exclusively from rural populations in Florida. Although we did not have a strictly urban control sample, we were able to contrast our data with statewide statistics, which are predominately from urban areas. These comparisons suggest that rural residents have less knowledge of MTC than their urban counterparts. We also found that race, education, and health literacy most consistently predicted lower knowledge of MTC. These results suggest that there is a need to educate the rural population about the risk factors associated with MTC and symptoms.

Rural versus Statewide Comparisons

Statewide surveys have suggested that levels of knowledge of MTC are increasing; however, samples used for these studies are statewide probability samples, and data on persons specifically living in rural areas are not reported. Data from the 2000 US Census indicates that in Florida, New York, and Maryland, only 12%-14% of the population lives in areas designated as rural. Surveys in these states suggest that 15%-20% of residents have never heard of MTC,[6-9] whereas in our sample of rural North Floridians, only 9% endorsed they had not heard of MTC. Another possible comparison is to consider respondents who indicated they knew “a lot” about MTC. In his statewide survey of Florida, Tomar[8] found that 44% indicated that they knew “a lot” compared to our sample of rural Floridians, where

only 12% endorsed this response. We suggest that on a subjective level, rural adults are increasingly aware of MTC, but actual knowledge of the disease may be lower than for urban residents.

Three well-established risk factors include use of tobacco products, regular alcohol drinking, and excessive sun exposure. Comparison of correct responses from our data with reports from North Carolina and Florida indicate close agreement for use of tobacco products (correct responses ranging from 93%-95%), and regular alcohol drinking (44%-53%).[6,8] However, findings were strikingly dissimilar for endorsing excessive sunlight as a risk factor (62%-63% for North Carolina and statewide Florida, 38% for rural Florida). In general, these rates are up from the first US national data collected in 1990, which indicated that 67% were correct in identifying tobacco use but only 13% for alcohol and 36% for excessive exposure to sunlight.[6]

Our data show that rural residents are less aware of the increased risk of MTC associated with sun exposure compared to nonrural residents. This finding is worrying because of the increased exposure to the sun among rural residents compared to persons residing in a more urban setting. Consistent with this, several studies have identified significant excess risks of lip cancer among farmers[33,34] and that rural residents are less likely to use sun protection products.[35] Cancer of the lip is a type of oral cancer whose etiology is highly related to sun exposure.[36,37] Available worldwide data reveal that this type of cancer is much more frequent in white males and in those persons working under prolonged sun exposure conditions.[38] It is estimated that 10%-15% of the approximately 26,000 new mouth cancers (excluding throat cancer) that occur yearly in the United States are lip cancer.[6]

Disparities in Knowledge

With some exceptions, statewide surveys have generally shown inconsistent demographic differences in knowledge of risk factors or signs and symptoms. Although Tomar found that fewer older respondents or black adults had never heard of oral cancer compared to younger adults or whites, no adjustments were made for confounding factors.[8] Studies that have adjusted for other factors have reported that greater knowledge of risk factors was associated with younger age and higher levels of formal education, but not race.[6,7] In our multivariate model, education level was a strong predictor of knowledge, and race differences depended on level of education. Race differences were most profound among the least educated, with only small race differences in knowledge occurring at higher levels of education. Our data also indicated that lower health literacy was associated with less knowledge of MTC. Although absolute levels of health literacy are higher in more urban settings, a recent finding suggests that lower health literacy in the rural population may be largely explained by confounding variables.[39,40] Our data suggest that improving education and socioeconomic status are obvious, important, and potentially modifiable goals. The need for increasing patients' health literacy and general levels of knowledge of oral health has recently received attention.[41,42] One barrier is the shortage of dentists practicing in rural areas.[43]

Concern About MTC

Several studies support the assertion that personal concern plays an important role in motivating persons to seek MTC screening. Concern about MTC falls under the general umbrella term "risk perceptions."[44] The more at risk or vulnerable people feel, the more concerned or worried they become and this threat or concern may motivate them to take action. A study by Horowitz obtained in-depth information about subjects' perspectives on MTC in a series of focus groups.[4] After participation, those who thought they would request an MTC exam acknowledged they were more concerned about MTC than subjects who indicated they would not. Tomar et al. also asked about concern for oral cancer and found

that higher concern was associated with the receipt of an exam, although age, race, or gender differences were not tested.[8] Our data indicated that among female participants, whites were less concerned than blacks. For male participants reporting having a regular physician, blacks were more concerned than whites. We were surprised by the racial findings. It is also interesting that regular contact with the health care system may serve to increase concern for MTC among black males, the demographic group at greatest risk for MTC morbidity and mortality.[3]

Most studies linking depression with cancer outcomes involved community-based samples of females, whereas few studies have examined this relationship in men. In fact, we were only able to find a single study which linked any measure of mental health and cancer screenings in men. Although not a population-based study, Druss found that veterans with any diagnosis of mental illness or substance abuse were less likely to have received colorectal and prostate screenings than those without these diagnoses.[45] No studies have reported that lower depressive symptoms were associated with increased cancer screenings at any site. It is interesting that this data indicated that rural persons with increased depressive symptoms were more concerned about MTC. It is known that persons with depressive symptoms are more likely than those without to believe that they are susceptible to chronic medical conditions.[46] It is argued that depressed persons are more vigilant and attentive to physiological symptoms, and therefore more concerned about health issues in general.[47] This possible explanation warrants further investigation. Studies have shown that depression is associated with greater use of health care overall,[14,48,49] but it is not necessarily associated with more preventive care.[50]

Strengths and Limitations

This study provides insights into the factors that predict MTC knowledge and concern. However, some limitations are worth noting. First, as the sample was based on rural North Floridians who had a landline telephone, the findings may not generalize to other populations. Second, the data are cross-sectional; consequently, caution must be taken in drawing any causal claims as unmeasured third variables may have confounded these findings. In addition, only 26% of eligible respondents completed the interview. As the data were from a single wave of data collection, directionality of any association is also unknown. Respondents' understanding of the sites where MTC could occur is not known (ie, the lip). However, respondents were told in the first survey questions that "cancer of the mouth or throat…is sometimes called oral cancer." There are several strengths of this study. This study is unique because of the sample of rural Floridians with a significant proportion of blacks. In addition, the survey items were tailored to reflect the culture and demographics of that locale. The final instrument was field-tested to establish reliability and validity of the questions.[31] This study was also the first to test and establish that depression and health literacy are associated with increased concern about MTC.

Summary and Conclusions

These findings suggest that there is a need to educate the rural population about the risk factors associated with MTC and symptoms. We found that race, education, and low health literacy were the factors that most consistently predicted lower awareness of MTC. In addition, compared to urban residents, our data suggest that rural residents are unaware of the risk of mouth cancer caused by excessive sun exposure. In particular, because this sample was drawn exclusively from rural populations in North Florida, a group having some of the highest rates of MTC morbidity and mortality, this study adds to the body of knowledge relating to MTC knowledge and concern. An unanticipated finding was that blacks were more concerned than their white rural counterparts about MTC. This study is the first study we are aware of that links depressive symptoms with increased concern about

MTC. The ultimate goal of this line of research is to persuade at-risk groups to obtain MTC screenings, with the objective of reducing disparities in MTC, whenever they occur.

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Table 1

Wording and Responses for MTC Knowledge Items

	Answered Correctly n (%)	Answered Incorrectly n (%)	Not Sure n (%)
Risk factors			
Smoking cigarettes, pipe, or cigars (+)	2229 (93.2%)	62 (2.6%)	100 (4.2%)
Being over 60 years of age (+)	831 (34.8%)	850 (35.6%)	709 (29.7%)
Drinking alcohol nearly every day (+)	1256 (52.5%)	590 (24.7%)	547 (22.9%)
Spending too much time in the sun (+)	914 (38.2%)	1027 (43.0%)	449 (18.8%)
Having human papilloma virus (+)	960 (40.2%)	327 (13.7%)	1103 (46.2%)
Having a relative who has had mouth or throat cancer (+)	1482 (62.0%)	537 (22.5%)	372 (15.6%)
Using smokeless tobacco (+)	2169 (90.7%)	93 (3.9%)	130 (5.4%)
Eating spicy foods (−)	1451 (60.6%)	253 (10.6%)	689 (28.8%)
Drinking hot beverages (−)	1668 (69.7%)	213 (8.9%)	512 (21.4%)
Use of spicy sauces (−)	1450 (60.6%)	341 (14.3%)	601 (25.1%)
Lip biting (−)	1032 (43.2%)	663 (27.7%)	696 (29.1%)
Dentures or partial dentures that do not fit well (−)	999 (41.8%)	752 (31.4%)	641 (26.8%)
Being overweight (−)	1255 (52.4%)	517 (21.6%)	621 (26.0%)
Signs and symptoms			
Having trouble swallowing (+)	1637 (68.4%)	274 (11.5%)	482 (20.1%)
Sore throat that does not go away (+)	1973 (82.4%)	130 (5.4%)	290 (12.1%)
Cough that does not go away (+)	1511 (63.2%)	428 (17.9%)	453 (18.9%)
White patches in mouth that do not go away (+)	1924 (80.4%)	107 (4.5%)	362 (15.1%)
A sore or ulcer in the mouth that does not go away (+)	2150 (89.8%)	64 (2.7%)	179 (7.5%)
Numbness in your mouth (+)	1192 (49.8%)	317 (13.3%)	883 (36.9%)
Swelling in the throat or neck (+)	1789 (74.8%)	158 (6.6%)	445 (18.6%)
Felt soreness in your mouth that did not go away (+)	1855 (77.5%)	151 (6.3%)	387 (16.2%)
Hoarseness that does not go away (+)	1610 (67.3%)	291 (12.2%)	492 (20.6%)
Tooth sensitivity to hot or cold (−)	1077 (45.1%)	742 (31.0%)	571 (23.9%)
Bad breath (−)	727 (30.4%)	995 (41.6%)	670 (28.0%)

Correct signs and symptoms indicated by (+), incorrect by (−). Percentages may not sum to 100 because of rounding.

Response choices for risk factor items: Yes—it increases the chance of getting mouth or throat cancer. No—it does not increase a person's chances of getting mouth or throat cancer. If you are not sure what to say, please say "not sure."

Response choices for sign and symptom items: Yes, you think it is a sign or symptom, or No, it is not a sign or symptom. If you are not sure of what to say, please say "not sure."

Table 2

Descriptive Statistic for the Sample Characteristics by Race

Characteristic	Whites (n = 1681)	Blacks (n = 712)	*P* Value
Age	57.5 (*SD* = 14.8)	53.2 (13.9)	<.0001
Gender (females)	962 (55%)[a]	372 (51%)	n.s.
Education			<.0001
8th grade or less	24[b] (1%)	28 (4%)	
Some high school	77 (5%)	92 (13%)	
Completed HS or GED	415 (25%)	229 (32%)	
Some college	530 (32%)	186 (26%)	
College graduate	306 (18%)	76 (11%)	
Postgraduate	321 (19%)	98 (14%)	
Heard of mouth/throat cancer exam	842 (50%)	268 (38%)	<.0001
Ever had exam (without description)	196 (23%)	63 (25%)	
Ever had exam (with description)	385 (45%)	71 (29%)	
Ever had exam (total)	860 (79%)	249 (66%)	<.0001
Exam last year (of the 1168 who reported a lifetime exam)	490 (57%)	126 (51%)	.050
Dental office site of the last MTC exam (of the 1168 who reported a lifetime exam, with 9 missing)	638 (77%)	143 (61%)	<.0001
Regular dentist	1196 (71%)	381 (54%)	<.0001
Regular physician	1544 (92%)	630 (89%)	.053
Health literacy (range, 0-3)	2.42 (0.67)	2.23 (0.78)	<.0001
CES-D (range, 0-3)	0.62 (0.53)	0.70 (0.52)	.001
MOSS (range, 0-4)	2.97 (0.96)	2.83 (0.97)	.002
Financial status (range, 0-2)	1.21 (0.57)	0.88 (0.60)	<.0001

[a] All percentages were calculated adjusting survey sampling weights.

[b] Because of missing values, the raw counts may not add up to the total number.

Table 3

Frequency Distribution for MTC Knowledge by Race/Gender

	Nothing % (n)	A Little % (n)	A Lot % (n)
Black			
Male (336)	29% (96)	60% (200)	12% (40)
Female (372)	35% (130)	57% (213)	8% (29)
White			
Male (715)	20% (145)	68% (484)	12% (86)
Female (959)	16% (152)	70% (675)	14% (132)
Total (2382)	22% (523)	66% (1572)	12% (287)

Missing = 11.

Table 4

Frequency Distribution for MTC Concern by Race/Gender

	Definitely Not Concerned % (n)	A Little Concerned % (n)	Concerned % (n)	Very Concerned % (n)
Black				
Male (338)	31% (106)	31% (106)	15% (49)	23% (77)
Female (369)	34% (126)	27% (100)	16% (58)	23% (85)
White				
Male (713)	38% (271)	42% (303)	14% (98)	6% (41)
Female (961)	43% (409)	42% (399)	12% (111)	4% (42)
Total (2381)	38% (912)	38% (908)	13% (316)	10% (245)

Missing = 12.

Table 5

Logistic Regression Models for Predictors of Knowledge and Concern With MTC

	Estimate (b)	Standard Error	Odds Ratio (95% CI)	*P* Value
Model 1: Self-reported knowledge of MTC				
Age	−0.0033	0.0034		n.s.
Gender (female)	0.5341	0.1797		.003
Race (black)	0.6213	0.1434		<.0001
Gender × Race	−0.6020	0.2121		.0045
Education	0.1914	0.0400	1.21 (1.12–1.31)	<.0001
Health literacy	0.3839	0.0746	1.47 (1.27–1.70)	<.0001
Race in female gender			1.86 (1.41–2.47)	<.0001
Gender in black race			1.71 (1.20–2.43)	.003
Model 2: Concern about MTC				
Age	−0.0038	0.0029		n.s.
Gender (female)	−1 .5605	0.4667		<.0001
Race (black)	−2.3008	0.4559		<.0001
Gender × Race	2.2208	0.5787		.0001
Education	−0.1433	0.0373	0.87 (0.81–0.93)	.0001
Health literacy	−0.3699	0.0670	0.69 (0.61–0.79)	<.001
Financial status	−0.2202	0.0840	0.80 (0.68–0.95)	.0087
Regular medical doctor	−1.1633	0.3996		.0036
Global health rating	−0.1162	0.0444	0.89 (0.82–0.97)	.0089
Depression	0.4028	0.0919	1.50 (1.25–1.79)	<.0001
Gender*Regular MD	1.7891	0.4971		.0003
Race*Regular MD	1 .7763	0.4726		.0002
Gender*Race*Regular MD	−2.2255	0.6121		.0003
Race in male gender with regular MD			0.59 (0.43–0.79)	.0004
Race in male gender without regular MD			0.92 (0.45–1.87)	n.s.
Race in female gender with regular MD			0.59 (0.46–0.77)	<.0001
Race in female gender without regular MD			0.10 (0.04–0.24)	<.0001

Table 6

Linear Regression Models for Predictors of Correctly Identifying Signs/Symptoms and Risk Factors

	Estimate (b)	Standard Error	*t* Value	*P* Value
Model 3: Risk factors				
Age	−0.0027	0.0002	11.53	<.0001
Gender (female)	−0.0039	0.0034	−1 .16	n.s.
Race (black)	0.0723	0.0126	5.74	<.0001
Education	0.0228	0.0033	6.83	<.0001
Regular dentist	0.0139	0.0040	3.45	.0006
Race * Education	−0.0107	0.0031	−3.44	.0006
Education in whites	0.0122			
Education in blacks	0.0335			
Model 4: Signs and symptoms				
Age	−0.0006	0.0003	−1 .76	.0779
Gender (female)	−0.0142	0.0051	−2.76	.0058
Race (black)	0.0936	0.0176	5.33	<.0001
Education	0.0372	0.0049	7.55	<.0001
Health literacy	0.0241	0.0077	3.11	.0019
Regular dentist	0.0178	0.0059	3.00	.0027
Race * Education	0.0123	0.0043	−2.88	.0041
Education in whites	0.0249			
Education in blacks	0.0496			