Florida Adults' Oral Cancer Knowledge and Examination Experiences

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Abstract

Objective: *This study assessed awareness of oral cancer, knowledge of its major risk factors and clinical signs, and oral cancer examination experiences among Florida adults aged 40 years and older.* ***Methods:*** *A statewide random digit dial, computer assisted telephone survey was conducted in 2002. Data from 1,773 respondents were weighted to permit statewide estimates. Bivariate analyses were used to examine awareness and knowledge of oral cancer. Multiple logistic regression analysis was used to model past-year oral cancer examination experiences of Florida's adults.* ***Results:*** *In Florida, 15.5% of adults aged 40 years and older had never heard of oral cancer and another 40.3% reportedly knew little or nothing about it. About one-half of adults did not think oral white or red patches or bleeding could indicate oral cancer and 27.6% correctly identified three of oral cancer's major risk factors. After hearing an oral cancer exam described, just 19.5% of adults reported receiving one within the preceding 12 months. Blacks and Hispanics were significantly less likely than non-Hispanic whites to have received a recent oral cancer examination. Persons with low levels of education, those who lacked a regular dentist or source of preventive medical care, and adults who knew few or none of the clinical signs of oral cancer also were less likely to have received a recent oral cancer exam.* ***Conclusions:*** *There is widespread lack of awareness and knowledge in Florida regarding oral cancer and low levels of reported examination, particularly among groups experiencing disproportionately high incidence and late stage diagnosis. Increasing awareness of this disease and promoting primary and secondary prevention may help lessen the disease burden in Florida and reduce racial disparities in its outcomes.*

Key Words: mouth neoplasms; health knowledge, attitudes and practice; prevention; early diagnosis; ethnic groups

Introduction

An estimated 29,370 new cases of oral and pharyngeal cancer (hereafter referred to as oral cancer) and 7,320 deaths from these cancers are projected for the United States in 2005 (1), with approximately two-thirds of new cases and deaths occurring among males. Oral cancer is the seventh most common cancer in white males and the fourth most common in black males (2) and more than 90% of cases of oral cancer in the United States occur among persons aged 40 years and older (3).

Cigarette smoking and alcohol are the major known risk factors for oral cancer in the United States, accounting for more than 75% of cases (4). Use of smokeless tobacco (5) and cigar smoking (6) also have been established as independent risk factors for oral cancer. Actinic radiation is a risk factor for lip cancer (7). Dietary factors, particularly low consumption of fruit, have been implicated in oral cancer carcinogenesis (8-11), and recent evidence suggests that specific viral infections may be involved as well (12,13).

Oral cancer survival rates vary widely by stage of disease and tumor site, with five-year survival rates ranging from more than 80% for cases diagnosed at localized stages to less than 30% for cases that have metastasized to other sites (14). Overall survival rates for oral cancer have not improved substantially over the past 25 years, in part because only about one-third of cases are diagnosed at localized stages.

In 2002, black men experienced an age-adjusted mortality rate for oral cancer that was more than 60% higher than for white men (6.3 vs. 3.9 per 100,000), although incidence rates are now nearly equal for these two groups (14). That disparity in mortality may be due to more advanced cancer staging among blacks at the time of diagnosis, differences in the anatomic location of the tumor (pharynx vs. oral cavity), socioeconomic status differences, and differences in treatment (15-17). But even when diagnosed at localized stages and controlling for anatomic site, blacks appear to have a worse prognosis than whites (14,17,18), perhaps due in part to increased risk for recurrence among blacks (19).

Among the states, Florida experiences a disproportionate burden from oral cancer. In 2001, there were more than 2,400 new cases and 623 deaths from oral cancer, second only to California for both of those statistics (20). Florida had the second-highest age-adjusted oral cancer incidence rate that year for males and third-highest for females among the 43 states with cancer incidence data, and exceeded the national rate for mortality for both sexes (20).

Early detection and treatment of precancerous lesions and diagnosis of oral cancer at localized stages are considered by most experts to be the major approaches to secondary prevention of these cancers (7,21,22). At present, the principal test for oral cancer is a comprehensive clinical examination that includes a visual and tactile examination of the mouth, full protrusion of the tongue with the aid

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of a gauze wipe, and palpation of the tongue, floor of the mouth, and lymph nodes in the neck. Based on available evidence that early detection probably improves prognosis, several *Healthy People 2010* objectives specifically addressed early detection of oral cancer: Objective 21-6 is to "Increase the proportion of oral and pharyngeal cancers detected at the earliest stage" and Objective 21-7 is to "Increase the proportion of adults who, in the past 12 months, report having had an examination to detect oral and pharyngeal cancer" (23).

As part of the first step in addressing the magnitude and disparities of oral cancer in Florida, a baseline assessment of awareness, knowledge, attitudes, and practices regarding oral cancer among the state's adults was conducted. This report presents findings from that survey. To the knowledge of the authors, it is the first such survey conducted in the state of Florida.

Methods

Survey instrument. Data for this study are from a telephone-based survey of adults aged 40 years and older living in the state of Florida. Many items in the survey instrument were derived from questionnaires that have been used in national (24) and state (25, 26) surveys of adults on oral cancer. A modified version of the MacArthur Scale of Subjective Social Status (27) was used to assess the respondents' perceived social status. Using similar methodology as reported by Sing-Manoux *et al.* (28), the interviewer asked each respondent to "think of a ladder with 10 rungs as representing where people stand in the United States. At the top of the ladder (represented by the number 10) are the people who are the best off—those who have the most money, the most education and the most respected jobs. At the bottom (represented by the number 1) are the people who are the worst off—who have the least money, least education, and the least respected jobs or no job..." They were then asked to place themselves on this ladder, at this time in their lives, relative to other people in the United States by selecting a number from 1 (bottom of ladder) to 10 (top of ladder). Similarly, they were asked to place themselves, by selecting a number from 1 to 10, on a ladder that represented where people stand in their communities, at the top of which are people who have the highest standing in their communities, and at the bottom are people who have the lowest standing in their communities. Additional demographic and behavioral items were derived from the Behavioral Risk Factor Surveillance System survey (29).

The survey asked respondents whether they had ever heard of oral cancer and asked them to rate their level of knowledge on the subject, ranging from "a lot" to "nothing at all." Participants were asked whether they thought the major known risk factors for oral cancer increased a person's chances of developing the disease, using a 4-point Likert-type response scale ranging from "definitely increases the chance" to "definitely does not increase the chance." The survey also asked respondents whether specific clinical signs were possible indicators of oral cancer, including white or red patches in the mouth, non-healing sores or lesions, and bleeding. After describing to participants what an examination for oral cancer entails, they were asked whether they had ever received such an examination and when they received the most recent one. The survey also asked respondents about their history of tobacco use, use of medical and dental services, and demographic characteristics. Respondents were asked, "Are you Hispanic or Latino?" and were then asked, "What is your race? Would you say: White; Black or African-American; Asian or Pacific Islander; American Indian or Native American; or Other?"

Because nearly all of the items used in the survey instrument have been used in several prior studies, a formal pretest of the instrument was not conducted. However, prior to conducting the full survey, telephone interviews were conducted with a small number of respondents to ensure the interviewers and subjects understood the questions and the computer-assisted telephone interview (CATI) software was properly programmed. Several of the items in had been pretested in earlier studies conducted in two Florida counties by the authors (30).

Survey administration. The telephone-based surveys were conducted by the University of Florida Survey Research Center. Using random digit dialing (RDD) generated with Wincati from Sawtooth Technologies, trained staff surveyed the sample using standardized procedures. Data were captured using CATI software

FIGURE 1
Theoretical model for association between population characteristics and receipt of an oral cancer examination

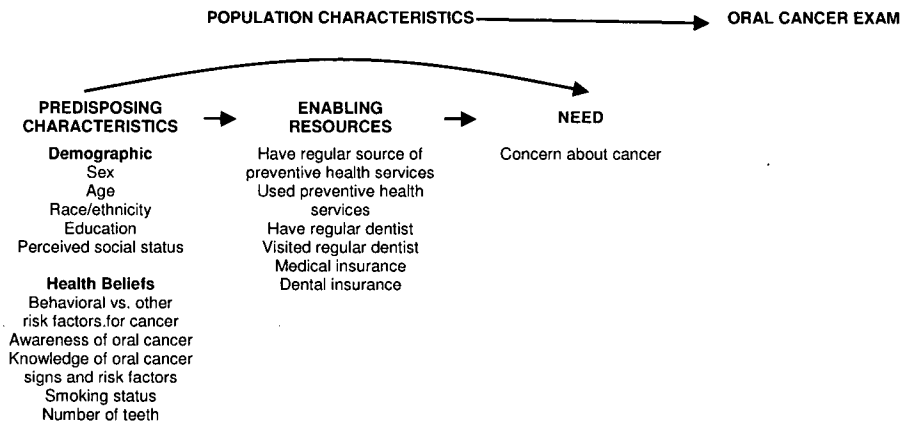

TABLE 1
Reported level of awareness and knowledge of Florida adults age 40 years and older concerning oral cancer, by selected respondent characteristics.

Characteristic	Unweighted sample size*	Heard of oral cancer, know a lot or some about it (%)	Heard of oral cancer, but know little or nothing about it (%)	Never heard of oral cancer (%)	P-value
Sex					.08
Male	656	41.9	40.5	17.6	
Female	1117	46.2	40.0	13.8	
Age (y)					.001
40–49	421	45.7	37.8	16.6	
50–59	397	49.4	39.4	11.2	
60–69	398	44.9	41.4	13.6	
70+	518	36.5	44.1	19.3	
Race/ethnicity					<.00001
Hispanic	350	28.4	31.4	40.2	
White†	1008	49.3	42.0	8.8	
Black†	320	30.1	39.7	30.2	
Other or not reported	95	43.5	43.0	13.5	
Education					<.00001
<High school grad	259	16.5	42.7	40.7	
High school grad	473	35.2	44.5	20.3	
Some post-high school college or technical school	480	49.1	40.2	10.7	
College graduate or more advanced	554	55.6	36.1	8.3	
Have regular dentist					<.00001
Yes	1365	46.9	41.0	12.1	
No	406	34.0	37.6	28.4	
Smoking status					.18
Current	267	45.4	38.2	16.4	
Former	637	42.6	43.9	13.5	
Never	868	45.0	38.0	17.0	
TOTAL	1773	44.2	40.3	15.5	

Note: Percentages are based on weighted data; p-values based on chi-square test for survey data.
* Seven of the 1780 respondents did not give valid responses to the questions concerning awareness of oral cancer and were excluded from analysis. Several categories do not sum to 1773 due to missing data.
† Not of Hispanic origin.

licensed from Marketing Systems Group Genesys. The studies received ethical clearance from the Institutional Review Board of the University of Florida Health Science Center.

The sample for this study was selected by using GENESYS, a sampling database licensed by Marketing Systems Group. This database, updated quarterly, contains telephone banks (area code + prefix + first two digits of suffix) that have at least one residential number listed in the white pages. An additional criterion was that the household had to include at least one member aged 40 years or older. GENESIS has the telephone banks geocoded to census tracts, which permits linkages to the corresponding census and Current Population Survey data for those census tracts. This enabled isolation of telephone banks in particular census tracts that were expected to have a minimum percentage of households that were black or Hispanic. To ensure an adequate sample size for blacks and Hispanics, census tracts with high concentrations of those groups were sampled. Three strata of households with at least one member aged 40 years or older were defined for this survey: a statewide stratum, a stratum of households sampled from census tracts in which at least 50% of the households were black, and a stratum of households sampled from census tracts in which at least 50% of the households were Hispanic.

The surveys were conducted from 9 a.m. to 9 p.m. Monday through Friday, Saturday morning and afternoon, and on Sunday afternoon and evening. The survey software used call rules to rotate sampling across days and times. Numbers were called a maximum of 10 times before being finalized as unproductive. Refusals were called twice.

The inclusion criteria for participation in the study were to be at least 40 years of age and to speak either English or Spanish. Each telephone interview lasted approximately 15 minutes and was conducted in En-

TABLE 2
Proportion of Florida adults aged 40 years and older correctly identifying several possible signs of oral cancer, by selected respondent characteristics

Characteristic	White patches not not painful % (± 95% CI)	Red patches not painful % (± 95% CI)	Sore/lesion that does not heal % (± 95% CI)	Bleeding in mouth % (± 95% CI)
Sex				
Male	52.5 (4.1)	46.6 (4.1)	85.6 (2.7)	57.0 (4.1)
Female	53.8 (3.2)	47.7 (3.2)	86.6 (2.1)	57.5 (3.1)
Age (y)				
40–49	52.4 (5.2)	50.5 (5.2)	88.1 (3.1)	55.0 (5.2)
50–59	55.7 (5.2)	47.2 (5.2)	90.4 (3.0)	56.6 (5.1)
60–69	55.6 (5.5)	51.1 (5.5)	87.8 (3.5)	60.9 (5.4)
70+	49.9 (4.6)	40.8 (4.5)	79.7 (3.7)	58.3 (4.6)
Race/ethnicity				
Hispanic	43.5 (5.5)	46.1 (5.5)	75.1 (4.7)	44.5 (5.5)
White	55.2 (3.2)	47.1 (3.2)	88.5 (2.0)	59.1 (3.2)
Black	52.8 (6.2)	51.0 (6.2)	85.4 (4.2)	61.1 (6.0)
Other or not reported	52.6 (11.1)	39.3 (10.9)	82.8 (7.6)	59.7 (11.0)
Education				
<High school grad	49.1 (7.0)	49.1 (7.0)	72.7 (6.1)	54.4 (6.9)
High school grad	51.0 (4.9)	44.2 (4.9)	86.2 (3.3)	57.7 (4.9)
Some post-high school college or technical school	56.1 (4.8)	48.1 (4.8)	87.0 (3.3)	58.5 (4.8)
College graduate or more advanced	54.2 (4.6)	48.4 (4.6)	89.6 (2.6)	56.6 (4.5)
Have regular dentist				
Yes	54.4 (2.9)	48.4 (2.9)	87.6 (1.8)	57.5 (2.9)
No	49.0 (5.5)	42.9 (5.4)	81.1 (4.2)	56.3 (5.5)
Smoking status				
Current	49.7 (6.6)	43.0 (6.5)	82.6 (4.9)	50.0 (7.3)
Former	54.9 (4.2)	47.2 (4.2)	87.1 (2.7)	57.3 (4.2)
Never	53.1 (3.7)	48.9 (3.7)	86.7 (2.3)	59.9 (3.6)
TOTAL	53.2 (2.6)	47.2 (2.6)	86.2 (1.7)	57.3 (2.5)

CI = confidence interval

glish or Spanish. Response rates varied, depending on the definition. Given the ambiguity in the field surrounding response rates, the following distribution of dispositions are presented: To complete 1,780 surveys, 8,500 telephone numbers were selected, of which 358 of those telephone numbers were for businesses, institutions, group quarters, or had no eligible participant. Because of technical problems (e.g., fax number, answering machine with no message, number disconnected, or no answer after 10 attempts), 3,977 telephone numbers were excluded. There were 75 telephone numbers that reached households in which physical, mental, or language barriers made the potential respondents ineligible. Among eligible households, 1,415 declined participation and 19 discontinued participation once the interview had begun.

Data analysis. To adjust for oversampling of blacks and Hispanics and to correct for differential participation rates among demographic groups, the sample was post-stratified by race/ethnicity, sex, and age group, and sampling weights were calculated for each respondent to represent the 2002 population of Florida aged 40 years and older. Preliminary analyses were conducted by using SAS v.9.1 software (SAS Institute, Inc., Cary, NC). Most data analyses were conducted by using SUDAAN 9.0 software (Research Triangle Institute, Research Triangle Park, NC) to apply sampling weights and to account for the sample design. Bivariate analyses used chi-square analysis for survey data to test for general associations between variables. SUDAAN software was used to calculate standard errors for prevalence estimates, from which 95% confidence intervals were calculated. Bivariate analysis and multiple logistic regression analysis were used to identify factors that were independently associated with respondents' receipt of an oral cancer examination within the preceding 12 months. Based on participants' responses to the questions on race and Hispanic origin, respondents were classified as non-Hispanic white (hereafter referred to as white), non-Hispanic black (hereafter referred to as black), Hispanic, or other race or ethnicity. The last category also included respondents that did not report their race or ethnicity and those reporting multiple races.

The design and analysis of this survey was guided by the general framework of Andersen's model of predisposing, enabling, and need factors that influence use of health services (31, Figure 1).

Results

The final sample included 1,780 adults in Florida aged 40 years and older. Of those survey participants, 1,773 provided useable responses on whether they had heard of oral cancer (Table 1).

Compared to Florida's population, the study sample overrepresented women, adults aged 60 years and older, and, by design, blacks and Hispanics. All prevalence estimates are therefore based on data weighted to the 2002 Florida population in order to adjust for differential response rates and to account for over-sampling of black and Hispanic households.

Overall, 15.5% of Florida adults aged 40 years and older had never heard of "oral or mouth cancer," and an additional 40.3% had heard of it but reported they knew little or nothing about it (Table 1). Awareness of oral cancer differed significantly by race/ethnicity: 40.2% of Hispanic adults and 30.2% of black adults had never heard of oral cancer, compared

TABLE 3
Proportion of Florida adults aged 40 years and older correctly identifying risk factors for oral cancer*, by selected respondent characteristics

Characteristic	Sun exposure % (± 95% CI)	Regular Alcohol consumption % (± 95% CI)	Tobacco use % (± 95% CI)	Correctly identified all three % (± 95% CI)
Sex				
Male	58.6 (4.1)	45.0 (4.1)	96.3 (1.4)	26.7 (2.3)
Female	63.9 (3.0)	43.2 (3.1)	94.6 (1.3)	28.3 (2.2)
Age (y)				
40–49	64.9 (5.0)	47.4 (5.2)	96.0 (1.9)	30.1 (4.7)
50–59	61.6 (5.0)	43.4 (5.1)	97.1 (1.5)	25.5 (4.5)
60–69	63.2 (5.3)	43.1 (5.4)	96.6 (1.8)	29.4 (5.0)
70+	56.1 (4.6)	41.2 (4.5)	92.4 (2.3)	25.1 (3.9)
Race/ethnicity				
Hispanic	72.0 (4.9)	49.5 (5.5)	92.1 (3.1)	39.7 (5.4)
White	61.0 (3.1)	40.3 (3.2)	96.5 (1.1)	24.5 (2.8)
Black	51.0 (6.2)	62.0 (6.0)	91.8 (3.1)	32.8 (5.8)
Other or not reported	57.4 (10.9)	47.2 (11.1)	93.5 (4.4)	27.3 (10.1)
Education				
<High school grad	54.9 (7.0)	47.0 (7.0)	89.3 (3.8)	28.5 (6.0)
High school grad	61.7 (4.8)	45.5 (4.9)	94.9 (2.0)	29.2 (4.4)
Some post-high school college or technical school	63.9 (4.7)	43.1 (4.8)	95.9 (1.9)	27.2 (4.3)
College graduate or more advanced	61.4 (4.4)	42.8 (4.5)	97.2 (1.4)	26.2 (4.0)
Have regular dentist				
Yes	62.1 (2.8)	43.1 (2.9)	96.1 (1.0)	27.1 (2.6)
No	59.1 (5.4)	47.8 (5.5)	92.4 (2.7)	29.3 (4.9)
Smoking status				
Current	54.5 (6.6)	40.6 (6.5)	93.0 (3.2)	19.7 (5.1)
Former	60.3 (4.1)	39.9 (4.1)	96.5 (1.4)	24.7 (3.6)
Never	64.9 (3.5)	48.8 (3.7)	95.3 (1.4)	32.8 (3.5)
TOTAL	61.5 (2.5)	44.1 (2.5)	95.4 (1.0)	27.6 (2.3)

* Respondents were asked: "I am going to read a list of things that may or may not increase a person's chances of getting mouth or lip cancer. For each of these, tell me if you think it definitely increases, probably increases, probably does not or definitely does not increase a person's chance of getting mouth cancer." The items included here are: "Excessive exposure to sunlight? Regular alcohol drinking? Tobacco use in any form?" Correct responses were "definitely increases the chance" or "probably increases the chance."

to 8.8% of whites and 13.5% of persons in other racial or ethnic groups ($p<.00001$). Oral cancer awareness also differed significantly by age group, educational attainment, and the availability of a regular source of dental care.

Table 2 presents findings for knowledge of clinical signs of oral cancer. For each sign, responses of "no" or "I don't know" were considered incorrect answers. About one-half of respondents knew that red patches or white patches in the mouth were possible signs of oral cancer and 57.3% knew that bleeding in the mouth could be an indicator. These responses generally did not differ significantly by sex, age, race/ethnicity, or education.

The large majority of respondents (95.4%) correctly reported that tobacco use definitely or probably increased the risk for oral cancer (Table 3).

However, just 44.1% of adults identified regular alcohol consumption as a risk factor for oral cancer. Sun exposure was recognized as a risk factor by 61.5% of adults. Just 27.6% of adults correctly reported that all three factors probably or definitely increase the risk for oral cancer. Current and former cigarette smokers were less likely than persons who had never smoked to correctly identify all three risk factors.

Just 21.5% of adults had heard of an exam or test for oral cancer, which differed by race/ethnicity, education, and respondents' status on a having regular source of dental care (Table 4).

Survey participants were then asked, "Have you ever had an exam for oral or mouth cancer in which the doctor or dentist pulls on your tongue, sometimes with gauze wrapped around it, and feels under the tongue and inside the cheeks?" Respondents who reported ever having an oral cancer examination were asked when they were most recently examined. Overall, 30.1% of adults aged 40 years or older reported ever having received an oral cancer exam and 19.5% reported being examined for oral cancer within the preceding 12 months (Table 5).

Blacks (9.9%) and Hispanics (8.1%) were significantly less likely than white (23.0%) or persons of other race/ethnicity (22.0%) to report having been examined for oral cancer within the preceding 12 months. In bivariate analysis, the proportion of adults who reportedly had been examined for oral cancer within the preceding 12 months also differed significantly by education and respondents' perceived social status in the United States or in their own community. As expected, respondents who had a regular dentist and saw that dentist within the preceding 12 months were more likely (26.6%) than adults who had not visited their dentist recently (5.2%) or did not have a regular dentist (3.2%) to report having been recently examined for oral cancer ($p <.0001$). Similarly, adults with a recent visit to a regular source of preventive medical care were more likely (22.1%) than those who had not recently visited that facility (6.5%) or who did not have a regular source of preventive care (5.6%) to report a recent oral cancer exam ($p <.0001$). In bivariate analysis, the proportion of adults that reported a recent oral cancer exam tended to decline with the number of teeth reportedly lost due to disease, from 25.9% of adults who had lost no teeth to 8.6% of those who had lost all their natural teeth. Knowl-

TABLE 4
Proportion of Florida adults aged 40 years and older that heard of an exam or test for oral cancer, by selected respondent characteristics

Characteristic	Heard of oral cancer test/exam (%)	p-value
Sex		0.73
Male	21.9	
Female	21.1	
Age (y)		0.98
40–49	22.0	
50–59	21.7	
60–69	20.8	
70+	21.0	
Race/ethnicity		0.0055
Hispanic	16.2	
White	22.7	
Black	18.3	
Other or not reported	33.7	
Education		<0.00001
<High school grad	9.5	
High school grad	18.3	
Some post-high school college or technical school	21.1	
College graduate or more advanced	28.1	
Have regular dentist		0.0001
Yes	23.5	
No	14.1	
Smoking status		0.87
Current	22.2	
Former	20.7	
Never	21.8	
TOTAL	21.5	

edge of clinical signs of oral cancer was significantly associated with a reported recent oral cancer examination in bivariate analysis, as was the degree of concern about getting cancer.

The racial disparity in reported receipt of an oral cancer examination persisted even when analysis was limited to adults who had seen their regular dentist within the preceding year (data not shown). Among Florida adults aged 40 years and older who reported seeing their regular dentist within the preceding 12 months, a recent oral cancer exam was reported by 11.2% of Hispanics and 17.0% of blacks, compared to 30.1% of whites and 27.7% of adults of other race or ethnicity (p<.00001).

Results from the final logistic regression model for having received an oral cancer exam within the preceding 12 months are presented in Table 6.

Race/ethnicity remained strongly associated with past-year oral cancer examinations, with blacks (OR=0.50; 95% CI: 0.31, 0.80) and Hispanics (OR=0.38; 95% CI: 0.24, 0.59) significantly less likely than whites to have been examined. Other significant independent correlates of recent oral cancer examination were educational attainment, having visited a regular dentist within the preceding 12 months, having visited a regular source of preventive medical care within the preceding 12 months, and knowledge of oral cancer clinical signs.

Discussion

Findings from this study suggest that awareness of oral cancer is relatively low among some segments of the Florida adult population aged 40 years and older, including several groups that experience a disproportionate burden of the disease. For example, about 70% of black or Hispanic adults in this age range reported having never heard of oral or mouth cancer or said they knew little or nothing about it. More than one-half of Florida's adults did not know that alcohol was a major risk factor for oral cancer, and knowledge of the most common clinical presentations of early squamous cell carcinomas in the oral cavity generally was low. Few adults were aware of any kind of examination for oral cancer and recent oral cancer examinations were infrequently reported.

The findings from this study may partly explain the epidemiology of oral cancer in Florida. Many adults do not know the disease exists, that they may be at elevated risk for it, and that there are procedures that may detect it at early stages. Consequently, many Floridians may not inspect the soft tissues of their oral cavity, may not be aware of the potentially serious nature of benign-looking clinical presentations of oral squamous cell carcinoma, and may not seek care until the disease has progressed to more advanced stages. Because of the lack of awareness of the disease or the ability of their dentist, physician, or other primary care provider to perform a thorough examination for it, few adults would likely request this service from their clinician. Based on adults' reported experiences, relatively few are routinely examined for oral cancer. It is therefore perhaps not surprising that the large majority of oral cancer cases are diagnosed at advanced stages and that overall five-year survival rates have remained largely unchanged for decades (14).

Based on this study's findings, Florida is close to reaching the *Healthy People 2010* target of 20% (23), with 19.5% of the state's residents aged 40 years or older reporting an oral exam within the preceding 12 months. However, Hispanic and black adults in Florida were not close to achieving that target, nor were the edentulous, adults with lower levels of educational attainment or perceived social status, or persons who have not visited a regular dentist or a regular source of preventive services. Most of these are the groups at highest risk

TABLE 5
Oral cancer exams within the preceding 12 months among adults aged 40 years or older, by selected respondent characteristics

Characteristic	n*	Had oral cancer exam in past year %	p-value
Sex			0.74
Male	648	19.1	
Female	1102	19.8	
Age (y)			0.42
40–49	413	17.0	
50–59	394	22.1	
60–69	392	19.0	
70+	512	19.7	
Race/ethnicity			<0.00001
Hispanic	347	8.1	
White	996	23.0	
Black	312	9.9	
Other or not reported	95	22.0	
Education			<0.00001
<High school grad	252	5.7	
High school grad	463	15.6	
Some post-high school college or technical school	476	17.7	
College graduate or more advanced	548	28.4	
Perceived status in the U.S.			
Low	648	14.2	0.0002
Medium	567	22.0	
High	449	24.4	
Perceived status in community			
Low	547	15.2	0.0079
Medium	496	23.0	
High	610	21.3	
Recent visit to regular dentist			
Have regular dentist, saw dentist within past 12 months	1159	26.6	<0.00001
Have regular dentist, did not see dentist within past 12 months	190	5.2	
Do not have regular dentist	400	3.2	
Use of preventive medical services			<0.00001
Have regular place to go for preventive services, went within past 12 months	1477	22.1	
Have regular place to go for preventive services, did not go within past 12 months	153	6.5	
Do not have regular place to go for preventive services	117	5.6	
Smoking status			0.0047
Current	264	13.2	
Former	628	22.9	
Never	852	19.1	
Medical Insurance			0.27
Yes	1565	19.9	
No	180	16.1	
Dental insurance			0.65
Yes	926	20.0	
No	802	19.0	
Number of teeth lost			<0.00001
None	504	25.9	
1-5	634	20.5	
6+ but not all	396	12.7	
All	191	8.6	

for developing oral cancer. Without unique strategies to reach these segments of the population, it is unlikely that they will reach even the relatively modest target for *Health People 2010*. Unfortunately, population-based efforts to increase awareness and knowledge regarding oral cancer are rare and often are culturally inappropriate (30).

Results of this study show that variables from all three categories described by the Anderson model — predisposing, enabling, and need — were relevant to receipt of an oral cancer screening. For this sample, however, sex and age, frequently described as predisposing variables, and having dental or medical insurance, considered enabling resources, were not significantly related to receipt of an oral cancer examination. It is not entirely surprising that having dental or medical insurance was not predictive of receipt of an oral cancer examination, as it is not a separately billable service in most dental and medical insurance plans. The failure of the study to find an age effect may be related to the age of the study's sample and the fact that beyond age 40, oral cancer screening is recommended for all individuals. There were no differences between men and women on knowledge about oral cancer risk factors and its clinical signs, and few knew there was an examination that could detect it — predisposing characteristics that suggest that few patients of either sex would likely request oral cancer examinations.

Results from this study are generally consistent with reports from similar surveys conducted nationally and in other states. Findings from the 1990 National Health Interview Survey suggested that just 25% of adults in the United States could identify a clinical sign of oral cancer (24). Nearly identical findings were reported from a 1996 survey of Maryland adults aged 18 years and older (25), in which 23% of respondents could correctly identify one early clinical sign of oral cancer. In a 2002 survey of adults in North Carolina, 53% of respondents identified at least one sign, using a methodological approach similar to those two prior surveys. In contrast to

Table 5 - Continued
Oral cancer exams within the preceding 12 months among adults aged 40 years or older, by selected respondent characteristics

Characteristic	n*	Had oral cancer exam in past year %	p-value
Number of questions answered correctly on OC signs (max=4)			<0.00001
0–1	411	11.4	
2	454	19.1	
3	446	19.9	
4	431	27.0	
Number of questions answered correctly on OC risk factors (max =3)			0.067
0–1	434	17.1	
2	806	18.3	
3	508	23.5	
Concern about getting cancer			0.012
Very concerned	576	19.5	
Somewhat concerned	760	21.9	
Not at all concerned	398	14.3	
TOTAL	1750	19.5	

*Thirty of the 1780 respondents reported not knowing whether they ever had an oral cancer examination or when it was most recently received, and were excluded from analysis. Several categories may not sum to 1750 due to missing data.

those studies, this study intentionally asked separately about each of the four clinical signs rather than asking an open-ended question requesting respondents to identify one sign. The rationale was that early oral cancers may manifest themselves clinically in ways other than the one sign respondents could identify, and educational efforts could be better targeted if gaps in knowledge could be more specifically identified. The findings of this study for knowledge of major behavioral risk factors for oral and pharyngeal cancer were similar to those reported in the Maryland, North Carolina, and national surveys, although a different analytic approach for presenting the findings was taken. As part of the risk factor knowledge scores, those surveys also required participants to report that eating spicy foods or frequently biting their lip or cheek were not risk factors for oral cancer. From a prevention perspective, the authors felt that it was unimportant to determine whether respondents could correctly identify factors that did *not* increase the risk for oral cancer, and so we only considered knowledge of established risk factors. Even with that approach, knowledge of the established behavioral risk factors for oral cancer was low among Florida's adults.

There are several limitations to this study that should be considered when interpreting its findings. As with all telephone-based surveys, bias can result from telephone non-ownership in

Table 6
Final logistic regression model for having an oral cancer examination within the preceding 12 months

Characteristic	Odds ratio	95% CI
Race/ethnicity		
White	1.00	Reference
Black	0.50	0.31, 0.80
Hispanic	0.38	0.24, 0.59
Other or not reported	0.90	0.45, 1.79
Education		
<High school grad	0.37	0.18, 0.73
High school grad	0.64	0.44, 0.94
Some post-high school college or technical school	0.59	0.42, 0.84
College graduate or more advanced	1.00	Reference
Recent visit to regular dentist		
Have regular dentist, saw dentist within past 12 months	1.00	Reference
Have regular dentist, did not see dentist within past 12 months	0.16	0.08, 0.33
Do not have regular dentist	0.14	0.07, 0.27
Use of preventive medical services		
Have regular place to go for preventive services, went within past 12 months	1.00	Reference
Have regular place to go for preventive services, did not go within past 12 months	0.29	0.13, 0.65
Do not have regular place to go for preventive services	0.33	0.12, 0.90
Number of questions answered correctly on oral cancer signs		
0–1	0.38	0.25, 0.59
2	0.64	0.43, 0.94
3	0.63	0.43, 0.92
4	1.00	Reference

CI = confidence interval

the target population and the rate of participation in the survey (32, 33). With ongoing changes in telephone technology, there are more and more households that have cellular telephones and no traditional telephone lines in their homes. Such households were not in the sampling frame for this survey, which also may bias the survey results. In general, survey participation rates have been declining over time in the United States, and the demographic composition of telephone survey participants often differs significantly from the target population (33, 34). Although this study attempted to adjust for these factors by incorporating sampling weights in the analysis, such approaches cannot totally eliminate selection bias. Therefore, prevalence estimates from this study may be affected by non-coverage and non-response biases, despite efforts to minimize such effects. In addition, all data in this study are based upon self-report, and the validity of some self-reported information such as receipt of an oral cancer examination remains unknown. However, the findings of the study are reasonably consistent with other, similar surveys, suggesting the measures are fairly reliable. Unless the validity of self-report differed across demographic groups, the observed associations between predictors and outcome are likely valid even if the prevalence of oral cancer examinations may have been under-estimated to some degree.

Findings from this study and separate analyses of data on oral cancer incidence and late stage diagnosis in Florida have informed development of a targeted social marketing project in the northeast region of the state. That study is developing a mass media campaign on oral cancer to increase awareness of oral cancer signs and risk factors and to promote its earlier detection, particularly in the black community. By increasing awareness of this disease and its risk factors, and promoting steps that can be taken to reduce the risk of occurrence, it is hoped that the burden of this disease will be lessened in Florida and that the racial disparities in its outcomes will be reduced.

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