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Latino Acculturation and Periodontitis Status Among Mexican-origin Adults in the United States: NHANES 2009–2012

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Abstract

This study examined the association between Latino acculturation indicators (language and citizenship/nativity status) and periodontitis using data from the National Health and Nutrition Examination Survey (NHANES) 2009–2012. Descriptive statistics and logistic regression analysis were performed and all analyses were adjusted for the complex survey design. Results showed that 63.2% of participants had periodontitis; 9.4% mild, 37.9% moderate, and 16% severe. Language was significantly associated with periodontitis after adjusting for age, educational level, gender, usual source of care, flossing, smoking, and glycohemoglobin level ($p=0.02$). Dental public and private health efforts should implement culturally tailored oral health promotion education efforts for this population.

Keywords

Acculturation; Health Status Disparities; Mexicans; NHANES; Periodontitis

Introduction

Periodontitis is an inflammatory disease caused by a bacterial infection that damages the periodontal tissues and causes the attachment loss and destruction of the alveolar bone that supports the teeth which can ultimately lead to tooth loss.¹ Clinical diagnosis of periodontitis is based on the severity and extent of gingival inflammation as measured by bleeding of the gums, pocket depth (distance from the gingival sulcus or periodontal pocket), clinical attachment level (distance from the cemento-enamel junction to the base of the sulcus or periodontal pocket), the amount of alveolar bone loss, or a combination of these measures.²

In the United States (U.S.), Mexican-origin adults encounter substantial disparities in periodontal health. In fact, based on the 2009–2010 National Health and Nutrition Examination Survey (NHANES), individuals of Mexican-origin have the highest prevalence of periodontitis (66.7 %) among U.S. adults.³ When compared to non-Hispanic Whites, Mexican-origin adults are three times more likely to have periodontitis after controlling for potential confounders.⁴ Additionally, a study that assessed the prevalence of periodontitis among Latino ethnic subgroups using data from the Hispanic Community Health Study/ Study of Latinos (HCHS/SOL) revealed that Mexicans had the highest prevalence of pocket depth and attachment loss at all severity levels.⁵

The disproportionate burden in periodontal health among Mexican-origin adults in the U.S. warrants further research on the potential factors driving this disparity. In particular, the process of Latino acculturation or the adoption of the U.S. culture's beliefs and behaviors⁶ has been shown to directly impact an individual's lifestyle behaviors and beliefs which can influence the use of prevention and treatment services, all of which can have negative, positive, or mixed effects on their health.^{7,8} Examining the impact of acculturation on periodontal health is essential given the extensive epidemiological evidence indicating that lifestyle risk factors such as smoking and alcohol consumption play a role in the development and severity of periodontitis.⁹ However, information on the periodontal health implications of acculturation among Mexican-origin Latinos is limited and fragmented.¹⁰

In the 1990s, an analysis of the Hispanic Health and Nutrition Examination Survey (HHANES 1982–84) explored the association between periodontal health and acculturation using an 8-item acculturation index modified from the 20-item Cuellar scale which included the acculturation measures of language, ethnic identification, and nativity.¹¹ The results indicated that low acculturated Mexican-origin adults had a higher prevalence of gingivitis and periodontal pocketing when compared to those with a high acculturation status. While the study provided valuable information on acculturation and periodontal health, the Latino population has more than tripled over the decades since it was published.¹² Recently, a study was conducted in four U.S. communities to examine if heterogeneity in periodontitis among Latino ethnic subgroups could be explained by acculturation defined by the conventional markers of nativity status, language preference, and duration of U.S. residence.¹³ This study concluded that individuals with a longer time in the U.S. had a lower prevalence of periodontitis as did people with English language preference after adjusting for potential confounders, suggesting that these acculturation markers positively impact periodontitis. Nonetheless, further examination of the association between acculturation markers and periodontal health is warranted using study designs that are generalizable to the underlying U.S. population.

It is projected that by 2060 the U.S. Latino population will increase to 119 million making it critical that researchers, clinicians, public health officials, policy makers, and community leaders improve and expand their understanding of the potential role of Latino acculturation on the periodontal status of this population.¹⁴ To address the gaps in the literature, this study characterized the periodontal status of Mexican-origin adults that reside in the U.S. and examined the association between Latino acculturation indicators and periodontitis status

using a national representative sample with a robust measure that captures periodontal diseases.

Methods

Procedures

Data were analyzed from NHANES, a cross-sectional and nationally representative population based survey conducted by the National Center for Health Statistics (NCHS) that collects information on the health status of adults and children in the United States.¹⁵ A detailed explanation of the survey methods, analytic guidelines, and data collection protocols can be accessed on the NHANES website.¹⁵ Data from the 2009 to 2012 NHANES cycles were aggregated (n=20,293) to obtain the study subpopulation that is comprised of individuals who self-identify as being of Mexican-origin (defined as individuals who were born in the United States but are of Mexican ancestry as well as those born outside the U.S. who identified as Mexican), had no missing data for diabetes status, glycated hemoglobin, and acculturation indicators, and those eligible to undergo the full mouth periodontal examination (FMPE) (n=1228). Individuals were eligible for the FMPE if they were aged 30 years or older, had at least one tooth (excluding third molars) and did not require antibiotic prophylaxis due to an existing health condition. The FMPEs were conducted by dental hygienists in the 2009 to 2010 NHANES cycle and by dentists in the 2011 to 2012 NHANES cycle. Individuals with incomplete FMPE data and those who were edentulous were excluded from the study (n=235). The final study subpopulation included 993 individuals.

Measures

Participants' periodontal status was determined using the Centers for Disease Control and Prevention/American Academy of Periodontology (CDC/AAP) case definition for the surveillance of periodontal diseases which includes mild, moderate, or severe periodontitis.² Descriptive analyses were conducted to estimate the prevalence of periodontitis for each case definition by covariates. Univariate and multivariate analyses were conducted using a composite score for combined periodontitis, defined as mild, moderate, and severe periodontitis cases.

Two Latino acculturation indicators were included in this study. Preferred language use was determined using the question "What language(s) do you usually speak at home?" The frequency distribution of responses to this question was analyzed to determine the categorization of this variable. Individuals that preferred to speak Spanish or more Spanish than English were classified as preferring to speak Spanish. Those that reported speaking English, more English than Spanish, or both equally at home were classified as preferring to speak English. Nativity and citizenship status were used to define the second Latino acculturation indicator. Nativity status, defined as the country where participants were born, was classified as U.S.-born or Foreign-born. Participants' self-disclosed U.S. citizenship status was dichotomized as yes or no. However, a cross-tabulation analysis of nativity and citizenship status suggested that these two variables could not be analyzed separately. As a

result, nativity and citizenship status were combined to create one variable defined as U.S.-born/U.S. citizen, foreign born/U.S. citizen, and foreign born/Non-U.S. citizen.

Several demographic variables known to be associated with periodontitis status were included: age, education, federal poverty level, gender, and marital status.^{4,16} Age was classified into four categories (30–39, 40–49, 50–64, 65+). Responses to the question “What is the highest grade or level of school you completed or the highest degree you have received?” were used to determine participants’ education level. Individuals who responded less than 9th grade and 9th to 11th grade were classified as having less than high school, those who indicated having completed high school, a General Education Development (GED) test or equivalent were classified as high school level. Participants who indicated having undergone some college or being college graduates or above were classified as higher than high school level. The ratio of family income to poverty was used as a surrogate for participants’ socio-economic status. More than 10 percent of responses were missing which resulted in the creation of a missing category. The final federal poverty level variable was categorized as greater than or equal to 200 percent above the federal poverty line, less than 200 percent above the federal poverty line, and missing. Marital status was categorized as married or living with a partner, not living with a partner (which included widowed, divorced, and separated), and those never married.

Two access to health care indicators were included in the analyses. Responses to the question “Is there a place that you usually go when you are sick or need advice about health?” were used to identify whether an individual had a usual source of care. Individuals who said yes or reported having more than one usual source of care were coded as having a usual source of care and all other responses were coded as no. Responses to the question “Are you covered by health insurance or some other kind of health care plan?” were used to identify participants’ insurance status and defined as “yes” or “no”. Dental care utilization questions such as “About how long has it been since you last visited a dentist?” were not included in this study because they were only asked in one of the survey cycles of interest (NHANES 2011–12).

Risk factors for periodontitis were also included in the study. Participants’ smoking status was categorized as non-smokers, former smokers, and current smokers using participants’ responses to the questions “Have you smoked at least 100 cigarettes in your entire life?” and “Do you now smoke cigarettes” consistent with prior population-based studies.^{3,16} Diabetes was included as a significant risk factor in this study given the high prevalence among Mexican-origin adults¹⁷ and the bidirectional association between diabetes and periodontitis.^{18,19} Continuous glycohemoglobin percentage was considered the best indicator of diabetes status and is a predictor of periodontitis.⁴ Thus, participants with missing diabetes status and glycated hemoglobin were excluded from the study. Participant’s oral health behavior pertaining to days of dental floss use were determined based on participants’ response to question “How many days did you use a dental floss/device?” Responses for the use of dental floss varied from 0 to 7 days and were categorized as never floss or flossed at least one time a week. Categorization of this dichotomous variable was based on non-statistical analysis of the distribution of this variable.

Statistical analysis

Descriptive statistics were computed to assess the prevalence of periodontitis and to characterize the study population by Latino acculturation indicators, demographics, health care utilization indicators, and risk factors. Bivariate analyses investigated the associations between combined periodontitis status and variables of interest using the Wald test. Design-adjusted multiple logistic regression analyses examined factors associated with periodontitis. Latino acculturation indicators, demographics, health care utilization indicators, and risk factors were included as covariates. We employed stepwise forward variables selection to find the set of confounding variables to control for in the final model while language and citizenship/nativity were always included in the model as the variables of interest. To lower the rate of false discovery findings from multiple tests interaction effects were not investigated. All analyses were adjusted for survey design and conducted using SAS 9.4.

Results

Participant Characteristics by Periodontal Status

A total of 993 Mexican-origin adults were included in this study, of which 9.4 percent, 37.9 percent, and 16.0 percent met the CDC-AAP case definition for mild, moderate, and severe periodontitis, respectively (see Table 1). Moderate and severe periodontitis increased with lower educational status, poverty, lack of insurance or a usual source of care, and was highest among men and current smokers. In regards to acculturation indicators, moderate and severe periodontitis was highest among Spanish speakers and foreign-born individuals that were non-U.S. citizens.

Participant Characteristics by Combined Periodontal Status

The prevalence of combined mild, moderate, and severe periodontitis was 63.2 %. Table 2 compares the characteristics of the participants with and without periodontitis. The majority of participants with periodontitis were between the ages of 40 to 49 (32.2%) and the odds of having periodontitis significantly increased with increasing age ($p<0.01$). Periodontitis was most common among males compared to females (62.7% vs 37.3% respectively) and the odds of having periodontitis were 2.9 times higher for males compared to females ($p<0.01$). Individuals with the lowest educational status had the highest prevalence of periodontitis (65.9%) and the odds of having periodontitis significantly increased as education levels decreased ($p<0.01$). Similarly, the odds of having periodontitis also increased with poverty ($p<0.01$). Not being married was significantly associated with periodontitis status ($p<0.01$). While 54.4 percent of participants with periodontitis were not covered by any health insurance or health care plan, 65.7 percent reported having a usual source of care. Almost half of the participants with periodontitis reported that they formerly or currently smoked (45.1%), and those that currently smoked were 2.4 times more likely to have periodontitis ($p<0.01$) when compared to non-smokers. The overall mean glycohemoglobin level in this study was 5.9% (SE=0.05) and individuals with periodontitis had a slightly higher glycohemoglobin level (6.0%, SE =0.05).

More than half of the overall study's population preferred to speak Spanish (59.9%) and were foreign born, non-U.S. citizens (48.5%; not shown in Table 2). A similar trend was

visible among individuals with periodontitis as 65.9 percent preferred to speak Spanish and 52.1 percent were foreign born/non-U.S. citizens. Language was significantly associated with periodontitis ($p<.01$), however, citizenship/nativity status was not ($p=0.08$). Mexican-origin adults whom preferred to speak Spanish were 1.3 times as likely to develop periodontitis compared to those whom preferred to speak English ($p<.01$).

Multivariate Analysis

Table 3 reports the results of the stepwise multivariate analysis for combined periodontal status. The adjusted odds ratios (ORs) were similar to those in the bivariate model. Language was the only acculturation indicator that remained significant in the model. Specifically, Mexican-origin adults who preferred to speak Spanish were 1.8 times more likely to have periodontitis compared to Mexican-origin adults who preferred to speak English ($p=0.02$). Poverty, marital status, and insurance status were not significant in the multiple logistic regression model. Increasing age, male gender, lower education level, and lack of having a usual source of care were significantly associated with periodontitis status. Smoking, glycohemoglobin level, and flossing were risk factors significantly associated with periodontitis status.

Discussion

This cross-sectional analysis of Mexican-origin adults in the U.S. confirms the pronounced disparity in periodontal health that is present within this population. More than half (63%) of the participants in this study met the case definition for combined periodontitis and the majority of cases (53.9%) were further categorized as either moderate or severe. Efforts to reach the national Healthy People 2020 goal of reducing the proportion of adults aged 45 to 74 with moderate or severe periodontitis to 11.5 percent will require the implementation of dental public health and private sector programs that target Mexican-origin adults.²⁰ Specifically, we found that periodontitis increased with age and glycohemoglobin level and was more likely in males, persons with less than a high school level education, current smokers, and individuals that never floss, as consistent with previous studies.^{4,16,21}

Moreover, language is a significant Latino acculturation indicator that should be considered when developing targeted oral health programs for this population. In this study, 69.6 percent of Spanish speakers had combined periodontitis and the majority of cases were moderate or severe (59.2). In the multivariate model, preferred language remained a significant influence on periodontitis even when taking into account nativity/citizenship and having a usual source of care. The increased odds of periodontitis among Spanish speaking Mexican-origin adults suggest the need to further explore the influence of culture on oral health disparities in this population. One area to further explore is the role that culture has on lifestyle risk factors that are associated with periodontitis. For example, literature indicates that culture negatively influences periodontal risk factors such as smoking and alcohol consumption.^{22,23} Scant information also suggests the need to further explore the influence of culture on the oral health behaviors and beliefs of Latinos.²⁴

Further, culture can also influence the oral health perceptions of Latinos. An analysis of participant responses to the NHANES question “Do you think you might have gum disease,”

(not shown) further revealed that 57.3 percent of Mexican-origin Latinos who did not believe they had gum disease actually met the case definition for periodontitis. The incongruence between oral health status and participants' perception of their periodontal health was further pronounced when language was taken into account. Among Mexican-origin Latinos that preferred to speak Spanish, 63.9 percent who did not believe they had gum disease met the case definition for periodontitis in contrast to 47.0 percent in the group that preferred to speak English. Thus, bilingual oral health promotion programs aimed at improving knowledge and awareness of periodontitis in this population are warranted.

This analysis has several limitations. The factors associated with periodontitis should not be inferred as causal due to the cross-sectional nature of the NHANES data. The health care utilization variables included in this study were not dental specific as dental care utilization data were only available in NHANES 2011–12 cycle. It is unknown if the inclusion of dental utilization data could have influenced the association between language and periodontitis. Additionally, this study only assessed cigarette smoking and did not include smokeless tobacco and other tobacco products that are associated with periodontitis. Also, although alcohol consumption data was collected in both cycles of the NHANES used in this study (2009–10 and 2011–12), this variable was not included in this study. Alcohol consumption, defined at consumption of at least 12 drinks/year, was not significantly associated with periodontal status (OR=1.2, CI [.8, 1.9], $p=.25$). We also considered responses to the question “Was there ever a time or times in your life when you drank 4/5 or more drinks of any kind of alcoholic beverage almost every day?” but due to high percentage of missing data (74 percent) this variable was not included in the analyses. Finally, acculturation is a broad sociological construct which involves various dimensions. Although language and nativity/citizenship status are commonly used indicators of acculturation; they are insufficient to capture the intricacies of this construct. Future qualitative studies should be conducted with Mexican-origin Latinos to identify acculturation related factors associated with the oral health status and dental care utilization of this population.

Regardless of the limitations, this study found that language preference was associated with periodontitis beyond other markers of acculturation and markers of access to healthcare. Future studies should further explore the role of language on oral health disparities in this population and efforts should be placed on strengthening the bilingual, bicultural dental workforce capacity in the nation. Culturally tailored oral health promotion education efforts should aim to improve the oral health knowledge and behaviors of periodontal diseases in this population.

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Demographic characteristics, access to health care indicators, periodontitis risk factors, and acculturation indicators of Mexican-origin Latinos (n=993) by periodontal status, NHANES 2009–2012.

Table 1

Characteristic	Healthy (SE)	Mild Periodontitis (SE)	Moderate Periodontitis (SE)	Severe Periodontitis (SE)	P-value
Acculturation Indicators					
Language					<.01
English	46.3 (3.3)	7.9 (1.7)	32.7 (3.3)	13.1 (2.2)	
Spanish	30.4 (2.2)	10.4 (1.7)	41.2 (2.5)	18.0 (2.0)	
Citizenship/Nativity					0.19
U.S.-born, U.S. citizen	43.3 (4.1)	7.4 (1.8)	33.8 (4.3)	15.6 (3.1)	
Foreign-born,U.S. citizen	36.5 (3.4)	12.4 (3.1)	36.2 (3.3)	15.0 (3.8)	
Foreign-born,non-U.S.citizen	32.1 (2.4)	9.9 (2.0)	41.2 (2.9)	16.7 (1.4)	
Demographic characteristics					
Age					<.01
30–39	48.4 (2.3)	13.0 (2.1)	33.2 (3.1)	5.4 (12.6)	
40–49	37.4 (3.2)	10.2 (1.9)	36.3 (3.2)	16.1 (2.7)	
50–64	23.3 (3.0)	3.7 (1.5)	42.9 (4.3)	30.2 (3.3)	
65+	18.9 (2.9)	4.6 (1.6)	48.4 (2.5)	28.1 (3.2)	
Education Level					<.01
Above HS	55.7 (4.4)	8.9 (1.9)	27.4 (3.5)	8.0 (1.4)	
HS	39.8 (3.4)	10.7 (2.7)	32.5 (3.5)	17.0 (3.2)	
Less than HS	27.7 (1.9)	9.3 (1.8)	43.8 (2.9)	19.2 (2.0)	
Federal Poverty Line (FPL)					<.01
< 200% FPL	32.4 (2.0)	8.8 (1.4)	40.6 (2.6)	18.2 (2.1)	
>= 200% FPL	46.0 (3.9)	9.9 (1.7)	32.3 (3.4)	11.8 (1.7)	
Missing	31.9 (5.3)	11.3 (3.4)	39.6 (5.0)	17.2 (4.1)	
Gender					<.01

Characteristic	Healthy (SE)	Mild Periodontitis (SE)	Moderate Periodontitis (SE)	Severe Periodontitis (SE)	P-value
Female	49.7 (2.3)	7.0 (1.5)	34.5 (2.4)	8.8 (1.4)	
Male	25.3 (1.9)	11.5 (1.4)	40.7 (2.8)	22.4 (2.7)	
Marital Status					0.17
Married & Living With Partner	36.3 (1.7)	9.5 (1.4)	38.0 (2.3)	16.2 (1.8)	
Widowed, Divorced, Separated	33.3 (3.9)	8.4 (2.7)	40.4 (3.8)	17.8 (3.2)	
Never Married	51.1 (5.0)	10.6 (4.2)	28.8 (5.1)	9.5 (2.9)	
Access to Health Care					
Insurance					<.01
Yes	42.9 (3.2)	7.1 (1.5)	33.9 (3.1)	16.1 (2.5)	
No	30.5 (1.8)	11.7 (1.7)	41.7 (2.0)	16.0 (1.3)	
Usual Source of Care					<.01
Yes	41.7 (1.9)	7.8 (1.6)	35.6 (3.0)	14.9 (2.0)	
No	24.6 (2.7)	13.4 (1.9)	43.1 (3.3)	18.9 (2.5)	
Risk Factors					
Smoking					<.01
Non-smoker	43.7 (2.2)	11.2 (1.8)	33.0 (1.7)	12.1 (1.5)	
Former smoker	26.5 (3.2)	8.2 (1.9)	46.6 (4.0)	18.7 (1.9)	
Current smoker	24.7 (2.8)	4.5 (2.1)	43.9 (5.3)	26.9 (5.1)	
Flossing					<.01
Floss 1–7 days per week	46.8 (1.9)	9.2 (1.7)	33.0 (2.1)	10.9 (1.6)	
Never floss	22.9 (3.0)	10.0 (2.2)	44.3 (3.2)	22.8 (2.4)	
	Mean (SE)	Mean (SE)	Mean (SE)	Mean (SE)	
Glycohemoglobin %	5.6 (0.1)	5.7 (0.1) 92	6.0 (0.1) 387	6.3 (0.1)	

Table 2

Demographic characteristics, access to health care indicators, periodontitis risk factors, and acculturation indicators of Mexican-origin Latinos (n=993) by combined periodontal status, NHANES 2009–2012.

Characteristics	Periodontitis N=666 (%)	Healthy N=327 (%)	Crude OR [95% CI]	P-value
Acculturation Indicators				
Language				<.01
English	229 (34.1)	161 (50.4)	Referent	
Spanish	437 (65.9)	166 (49.6)	2.0 [1.4, 2.8]	<.01
Citizenship/Nativity				0.08
U.S.-born, U.S. citizen	216 (31.9)	131 (41.8)	Referent	
Foreign-born,U.S. citizen	124 (16.0)	62 (15.8)	1.3 [0.9, 2.0]	0.14
Foreign-born,non-U.S.citizen	326 (52.1)	134 (42.4)	1.6 [1.0, 2.5]	0.02
Demographic characteristics				
Age				<.01
30–39	127 (30.6)	122 (49.4)	Referent	
40–49	170 (32.2)	101 (33.1)	1.6 [1.1, 2.3]	0.02
50–64	165 (21.5)	53 (11.2)	3.1 [2.1, 4.5]	<.01
65+	204 (15.8)	51 (6.3)	4.0 [2.5, 6.5]	<.01
Education Level				<.01
Above HS	112 (17.3)	119 (37.4)	Referent	
HS	107 (16.8)	58 (19.1)	1.9 [1.2, 3.1]	<.01
Less than HS	446 (65.9)	149 (43.5)	3.3 [2.2, 4.9]	<.01
Federal Poverty Line				<.01
< 200% FPL	171 (27.6)	130 (40.5)	Referent	
>= 200% FPL	417 (61.2)	165 (50.5)	1.8 [1.2, 2.6]	0.02
Missing	78 (11.1)	32 (8.9)	1.8 [1.1, 3.1]	<.01
Gender				<.01
Female	270 (37.3)	212 (63.4)	Referent	
Male	396 (62.7)	115 (36.6)	2.9 [2.3, 3.7]	<.01
Marital Status				0.02
Married, Living With Partner	480 (74.9)	233 (73.3)	Referent	
Widowed,Divorced, Separated	148 (19.6)	64 (16.8)	1.1 [0.7, 1.7]	0.53
Never Married	38 (5.5)	30 (9.9)	0.5 [0.3, 0.8]	<.01
Access to Health Care				
Insurance				<.01
Yes	341 (45.6)	199 (58.8)	Referent	

Characteristics	Periodontitis N=666 (%)	Healthy N=327 (%)	Crude OR [95% CI]	P-value
No	325 (54.4)	128 (41.2)	1.7 [1.2, 2.4]	<.01
Usual Source of Care				<.01
Yes	460 (65.7)	264 (80.7)	Referent	
No	206 (34.3)	63 (19.3)	2.2 [1.6, 3.1]	<.01
Risk Factors				
Smoking				<.01
Non-smoker	365 (54.9)	235 (73.2)	Referent	
Former smoker	173 (15.8)	56 (5.7)	2.2 [1.5, 3.2]	<.01
Current smoker	128 (12.7)	36 (4.1)	2.4 [1.7, 3.3]	<.01
Flossing				<.01
Floss 1–7 days per week	327 (50.4)	237 (75.0)	Ref	
Never Floss	318 (49.6)	86 (25.0)	3.0 [2.0, 4.4]	<.01
	Mean (SE)	Mean (SE)		
Glycohemoglobin %	6.0 (0.05)	5.6 (0.06)		

Table 3

Results of multiple logistic regression analysis of combined periodontitis status among Mexican-origin Latinos (n=993), NHANES 2009–2012.

Characteristics	Adjusted OR [95% CI]	P-value
Acculturation		
Language		0.02
English	Referent	
Spanish	1.8 [1.1, 2.9]	0.02
Citizenship/Nativity		0.63
U.S.-born, U.S. citizen	Referent	
Foreign-born, U.S. citizen	0.8 [0.5, 1.3]	0.38
Foreign-born, non-U.S. citizen	0.8 [0.4, 1.5]	0.46
Demographics		
Age		<0.01
30–34	Referent	
35–49	1.5 [0.9, 2.4]	0.07
50–64	2.6 [1.8, 3.9]	<.01
65+	4.5 [2.7, 7.4]	<.01
Gender		<0.01
Female	Referent	
Male	2.6 [2.0, 3.4]	<.01
Education		<0.01
Above HS	Referent	
HS	1.6 [0.9, 2.9]	0.10
Less than HS	2.4 [1.4, 4.2]	<0.01
Health Care Utilization		
Usual Source of Care		<0.01
Yes	Referent	
No	1.9 [1.1, 2.8]	<0.01
Risk Factors		
Smoking		<.01
Non-Smoker	Referent	
Former smoker	1.4 [0.8, 2.4]	0.17
Current smoker	1.9 [1.3, 2.8]	<.01
Flossing		<.01
Floss 1–7 days per week	Referent	

Characteristics	Adjusted OR [95% CI]	P-value
Never Floss	2.2 [1.3, 3.5]	<.01
		0.02
Glycohemoglobin (%)	1.3 [1.0, 1.87]	0.02

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