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Prevalence of periodontitis by Hispanic/Latino background among study participants of the Hispanic Community Cohort Study/Study of Latinos

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Abstract

Background—Hispanics/Latinos are an ethnically heterogeneous population with distinct oral health risk profiles. Few studies have examined potential variation in the burden of periodontitis by Hispanic/Latino background.

Methods—A multicenter longitudinal population-based cohort study was used to examine the periodontal health status of 14,006 Hispanic/Latino adults 18–74 years at screening (2008 to 2011) who self-identified as Cuban, Dominican, Mexican, Puerto Rican, Central or South American from four US communities. Weighted, age standardized prevalence estimates and corrected standard errors of probing depth (PD), attachment loss (AL) and periodontitis classified per the CDC-AAP case definition are presented. A Wald Chi-square test was used to compare prevalence estimates across Hispanic/Latino background, age and sex.

Results—Over 51% of all individuals exhibited total periodontitis (mild, moderate or severe) per the CDC-AAP classification. Cubans and Central Americans exhibited the highest prevalence of moderate periodontitis (39.9% and 37.2%, respectively). Across all ages, Mexicans exhibited the highest prevalence of PD across severity thresholds. Among those 18–44 years, Dominicans consistently exhibited the lowest prevalence of AL at all severity thresholds.

Conclusions—Measures of periodontitis varied significantly by age, sex and Hispanic/Latino background among the four sampled HCHS/SOL communities. Further analyses adjusted for demographic, systemic disease, and acculturation factors are needed.

Practical Implications—Aggregating Hispanics/Latinos and/or applying estimates from Mexican Americans may substantially under- or over-estimate the burden of disease leading to

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Author Contributions:

The conception and design of the study was by JDB. The data analysis was by MCJ. Scientific and clinical interpretation of results was by MCJ, AES, SMM, LMK, and JDB. MCJ wrote the manuscript. Contributing to discussion was by MCJ, AES, SMM, LMK, and JDB. Review and editing of the manuscript was by MCJ, AES, SMM, LMK, and JDB. Final approval of the manuscript was given by MCJ, AES, SMM, LMK, and JDB.

errors in the estimation of needed clinical and public health resources. This information will be useful in informing decisions from public health planning to patient-centered risk assessment.

Keywords

Periodontitis; attachment loss; probing depth; Latino; Hispanic; prevalence

Introduction

Hispanics/Latinos are an ethnically heterogeneous population with distinct distributions of demographic, socio-economic, chronic and oral health risk factors.[1] However, there is a paucity of data examining potential variation in the burden of oral disease, and specifically periodontitis by Hispanic/Latino background. Hence, the dental community is not adequately equipped to understand the periodontal needs of the largest and fastest growing US minority population.[2] Nearly two decades ago (1982–1984) the Hispanic Health and Nutrition Examination Survey (HHANES) examined the general and oral health of Hispanics/Latinos across the US. In multivariable adjusted analyses, Puerto Ricans exhibited the highest prevalence of periodontitis compared to Cuban and Mexican Americans.[3] Apart from HHANES, most studies have focused on Mexican Americans, the largest Hispanic/Latino background group in the US.[2] However, systemic disease rates and risk factor profiles have been shown to vary significantly across Hispanic/Latino background.[4–7] Therefore, generalizing oral disease estimates across all Hispanics/Latinos in aggregate may substantially under- or over-estimate the burden of disease and the clinical and public health resources needed for specific groups.

Recent data from the National Health and Nutrition Examination Survey 2009–2010 (NHANES),[8] reported the highest prevalence of total periodontitis (mild, moderate and severe) among Mexican Americans, compared to non-Hispanic whites and non-Hispanic blacks. Periodontitis was defined per the Centers for Disease Control and Prevention and American Academy of Periodontology (CDC-AAP) classification.[9] The prevalence of attachment loss (AL) and probing depth (PD) at all severities were also higher among Mexican Americans.[8–10] However, national estimates for other Hispanic/Latino backgrounds are unavailable. At the time HHANES was conducted, the 3 largest US Hispanic/Latino populations (Cuban, Mexican Americans, and Puerto Ricans) were sampled to produce national estimates; however, Hispanic/Latino communities have grown and experienced dynamic demographic changes evident in the 2010 census.[2]

The Hispanic Community Health Study/Study of Latinos (HCHS/SOL) is the first large scale study of US Hispanics/Latinos to sample various backgrounds, representing Cuban, Dominican, Mexican, Puerto Rican, Central and South Americans, from diverse socio-economic and acculturation backgrounds.[11, 12] This study provides a unique opportunity to inform the dental community of the periodontal health status of individuals of HCHS/SOL by background of origin. The prevalence of periodontal measures is provided in aggregate, by Hispanic/Latino background, age, sex, severity and extent. This information will be useful in informing decisions from public health planning to patient-centered risk assessment.

Methods

Study design, setting and selection of participants

The HCHS/SOL is a multicenter longitudinal population-based cohort study designed to examine the health status, risk factor profile and disease burden of US Hispanics/Latinos. Details of the complex sampling design and methodology have been previously published.[11, 12] Briefly, the HCHS/SOL enrolled 16,415 individuals through a stratified multi-stage area probability sample of individuals aged 18–74 years at screening from randomly selected households in four U.S. field centers (Bronx, NY; Chicago, IL; Miami, FL; San Diego, CA) with baseline examination (2008 to 2011) and yearly telephone follow-up assessment at approximately 3 years. The probability based sampling allows HCHS/SOL to estimate prevalence of diseases and baseline risk factors in the target population, which includes all non-institutionalized Hispanic/Latino adults 18–74 years residing in the four defined community areas. Participants who self-identified as Hispanic/Latino identified their background (or their families) as Cuban, Dominican, Mexican, Puerto Rican, Central or South American (with country specified). A category was allowed for >1 or other background; however, interpretation of this group is limited by sparse data and its heterogeneous nature. Participants were excluded if they planned on moving out of the area ≤3 years, or exhibited severity of health problems, disability, or mental illness which would impair informed consent or physical examination attendance. Study participants underwent comprehensive clinical examinations[12] (medical and oral), behavioral (e.g. tobacco, dietary intake, physical activity) and socio-demographic (socio-economic status, migration history) assessments. The dental examination included tooth count, caries, restoration and periodontal assessments in addition to a questionnaire on oral health behaviors and dental health care utilization. These analyses include participants who attended the HCHS/SOL field center baseline dental examination, were eligible for a periodontal exam and had sample weights and complete values for the variables analyzed. Participants were excluded from the analysis if they were missing data on periodontal measurements (n=2,370), Hispanic/Latino background (n=31) and age (n=8) resulting in a final analytic sample of 14,006 study participants. This study was approved by the Institutional Review Board of all participating institutions and all procedures followed were in accordance with respective institutional guidelines. Participants provided informed consent to participate.

Periodontitis Assessment and Classification

Periodontal exams were conducted at one of four field centers by calibrated dental examiners and trained recorders. Six sites (the distal-facial, mid-facial, mesial-facial, mesial-lingual, mid-lingual and distal-lingual) on fully erupted permanent teeth (including 1–28 teeth present with exclusion of third molars) were assessed. Participants requiring prophylactic antibiotic coverage for the periodontal examination and the edentulous were excluded. At each site measurements were taken twice to estimate probing depth (PD) and attachment loss (AL) utilizing a periodontal probe (UNC-12) with graduated 1mm increments. After the complete oral examination, study participants received a summary of their oral health results advising follow-up care if necessary. Examinations were conducted in three 1-year waves and examiners were recalibrated each year (2008–2010) against a gold standard examiner who had participated in NHANES examinations. The mean inter-class

correlation coefficient (ICC), percent agreement, and Kappa statistic for PD within 1mm across all examiners were 0.95, 95.8, and 0.94, respectively and ranged from 0.90–0.96, 92.1–96.7 and 0.88–0.96 between each examiner and the reference. The mean ICC, percent agreement and Kappa for AL within 1mm across all examiners were 0.86, 92.8, and 0.84 respectively and ranged from 0.56–0.93, 84.3–98.2 and 0.88–0.96 between each examiner and the reference.

The prevalence of periodontitis was described using measures of severity and extent of PD, AL and by the CDC-AAP composite classification (based on both AL and PD; mild/moderate/severe). Severity of PD was classified as ≥1 site with PD ≥4mm, 5mm or 6mm, while severity of AL was classified as ≥1 site with ≥3mm, 4mm, 5mm or 6mm. Measures of extent examined the prevalence of study participants with ≥10% and ≥30% of sites at each severity level of PD and AL. The prevalence of periodontitis according to the CDC-AAP classification[9] was estimated as mild (≥2 interproximal sites with AL ≥3mm and ≥2 sites with PD ≥4mm, or ≥1 site with PD ≥5mm), moderate (≥2 interproximal sites with AL ≥4mm [not on the same tooth], or ≥2 interproximal sites with PD ≥5mm [not on same tooth]) and severe (≥2 interproximal sites with AL ≥4mm [not on the same tooth], or ≥2 interproximal sites with PD ≥5mm [not on same tooth]).

Covariates

All participants underwent physical examinations and interviewer administered questionnaires at one of four corresponding field centers. Information on age (years), sex (male/female), marital status (not married/married, living with partner), nativity (Born in 50 US states/Other), years in the 50 US states (<10/ ≥10 years), Hispanic/Latino background (Cuban, Dominican, Mexican, Puerto Rican, Central American, South American), education (<high school/high school/>high school), income (<$30,000/ ≥$30,000), cigarette smoking (never/former/current), history of diabetes mellitus (yes/no) and frequency of dental care (≤1 per year/>1 per year) were included. All participants underwent physical examinations at the coordinating centers and were asked to fast, refrain from smoking for up to 12 hours and vigorous physical activity prior to the examination. Body mass index (BMI) was calculated as weight (kg) divided by height (meters^2). Diabetes mellitus was defined as a fasting plasma glucose ≥126 mg/dL, 2-hour post load plasma glucose ≥200 mg/dL, glycosylated hemoglobin (HbA1c) ≥6.5%, or anti-hyperglycemic medication use per the American Diabetes Association.[13]

Statistical Analysis

The prevalence of periodontitis was estimated as the percent of people with ≥1sites with PD and AL at various severity and extent thresholds, in addition the CDC-AAP classifications of mild, moderate and severe. Prevalence estimates (%) and corrected standard errors (SE) are provided for the total population, by Hispanic/Latino background, age and sex. All analyses were weighted and accounted for complex sampling and calibrated to the 2010 Census characteristics by age, sex and Hispanic/Latino background. Estimates were age standardized to the 2010 US Census population. Significant deviations from homogeneity across periodontitis classifications by age, sex and Hispanic/Latino background stratified by age and sex were tested with the Wald Chi-square test. P-values from estimates from stratum

with ≤50 participants should be interpreted with caution. Adjustment for multiple testing was not applied. Analyses were conducted with Stata statistical software (version 12.1; StataCorp, College Station, TX).

Results

The baseline demographic characteristics of the total population have been previously described[6] and were similar to those in this analytic sample (eTable 1). The distribution of demographic characteristics and risk factors varied significantly across Hispanic/Latino background (Figure 1). The mean age of the target population was 43 years and over 60% were women (eTable1). Approximately greater than 60% reported at least a high school education (Figure 1; p-value$_{heterogeneity}$<0.0001), and 36% reported household incomes ≥ $30,000 (Figure 1; p-value$_{heterogeneity}$<0.0001). The majority of the target population (80%) was born outside of the 50 US states, with 77% indicating Spanish as their language of preference (eTable 1) and 72% having resided in the 50 US states ≥10 years (Figure 1; p-value$_{heterogeneity}$<0.0001). Twenty percent were current smokers and 50% had visited a dentist within a year (Figure 1; p-value$_{heterogeneity}$<0.0001) The HCHS/SOL population was reweighted to equalize the sexes and prevalence estimates in the subsequent tables and figures were age standardized to the 2010 census.

Probing depth (Table 1), AL (Table 2), extent of PD and AL (Table 3), and CDC-AAP periodontitis classification severities (Table 4) varied significantly by age, sex and Hispanic/Latino background.

Probing Depth

In aggregate, approximately 65% of adults exhibited ≥1 site with PD ≥4mm and 16% exhibited ≥1 site with PD ≥6mm (eTable 2). Mexicans exhibited the highest prevalences of ≥1 site with PD ≥4mm or 6mm (Figure 2), with the lowest prevalences among Dominicans (≥1 site with PD ≥4mm) and Cubans (≥1 site with PD ≥6mm; p-value$_{heterogeneity}$<0.0001). Across all ages, Mexicans exhibited the highest prevalence of PD across severity thresholds, with few exceptions (Table 1). For example among those aged 18–44, Dominicans exhibited the lowest prevalences of ≥1 site with PD ≥4–6mm, while among older adults ≥55 years, Cubans exhibited the lowest prevalence of ≥1 site with PD ≥5 or 6mm. With respect to, the prevalence of each PD severity threshold was higher overall among males compared to females in the combined population (p<0.0001; results not shown).

Attachment Loss

The prevalence of AL decreased with increasing severity (AL ≥4mm-6mm) and 68% of adults exhibited ≥1 site with AL ≥3mm (eTable2). The prevalence of AL at severity thresholds increased with age (p<0.0001) and was higher among males compared to females across all severity thresholds in the population overall (p<0.0001; results not shown).Central Americans exhibited the highest prevalence of AL ≥3mm and Cubans of AL ≥4–6mm (Figure 3). Dominicans consistently exhibited the lowest prevalences of AL. The prevalence of ≥1 site with AL ≥3–6mm varied significantly by Hispanic/Latino background among males and females aged 18–44, in analyses stratified by severity, sex, age (Table 2). Among both sexes

aged 18–44, Dominicans exhibited the lowest prevalence of ≥1 sites with AL ≥3–6mm ($p<0.001$).

Extent of Probing Depth and Attachment Loss

Overall, approximately 23% of individuals were observed to have ≥10% of sites with a PD ≥4mm, while only 6% exhibited ≥30% of sites with PD ≥4mm (Table 3). Estimates varied significantly by Hispanic/Latino background where Mexicans consistently exhibited the highest prevalence of those with ≥10% or 30% of sites with PD ≥5 and 6mm ($p<0.01$, Table 3). In aggregate, approximately 20% of individuals exhibited ≥10% sites with AL ≥4mm, whereas 9% had ≥30% of sites with AL ≥4mm. Cubans consistently exhibited the greatest extent of disease measured as ≥10% or 30% of sites with AL ≥3–6mm, whereas the Dominicans and Mexicans exhibited the lowest prevalence for extent of AL ($p<0.0001$).

CDC-AAP Classification

The prevalence of periodontitis per the CDC-AAP classification ranged from 51% for total periodontitis (mild, moderate, severe) to 32% for moderate and 10% for severe (eTable 2). Overall, the prevalence of moderate and severe periodontitis, increased with age and among males compared to females ($p<0.001$; results not shown).

Dominicans exhibited the highest prevalence of no disease (Figure 4; $p\text{-value}_{heterogeneity}<0.001$). Moderate disease was most prevalent among Cubans and Central Americans while Puerto Ricans exhibited the highest prevalence of severe periodontitis. Dominican women aged 18–44 were most likely to present as periodontally healthy ($p<0.0001$; Table 4). Among men, age and Hispanic/Latino background stratified analyses indicated a higher prevalence of mild periodontitis among Central Americans aged 18–44 years, moderate periodontitis among South Americans 65–74 years and severe periodontitis among Puerto Ricans 45–54 years. Among women, moderate periodontitis was consistently more prevalent among Cubans and Central Americans across all ages.

Discussion

In this assessment of diverse US Hispanics/Latinos, we observed significant variation by Hispanic/Latino background, age, and sex in the prevalence of periodontitis severity and extent as measured by PD, AL and CDC-AAP periodontitis classification. A higher prevalence of periodontitis was observed among males, suggesting disparities by sex. Furthermore, older age was associated with increased severity of AL but not PD, as previously indicated.[8]

This is the first large scale study to systematically examine the periodontal health of Hispanics/Latinos across various backgrounds, since the HHANES.[3] Recent data from NHANES 2009–2010[8] reported Mexican Americans exhibited the highest prevalence of PD and AL at all severities. However, our data clearly show substantial variability by Hispanic/Latino background, age and sex. For example, Central Americans and Cubans consistently exhibited the highest prevalence of AL at each severity and extent of disease threshold, with nearly 40% of Cuban women 18–44 exhibiting ≥1 site with AL ≥4mm, compared to a pooled estimate of 28% among all HCHS/SOL women aged 18–44 years. Furthermore, while the

prevalence of ≥1 site with PD ≥4–6mm was highest among Mexicans in pooled analysis, age and sex stratification elucidated subgroups at elevated risk. For example, among Mexican men aged 65–74 years, 94% exhibited ≥1 site with PD ≥4mm whereas among women the highest prevalence (75%) was observed among Central Americans aged 65–74 years.

It should be noted that age standardized estimates for AL reported by Eke et al.[8] were on average 20% points higher than observations in HCHS/SOL. For example among Mexicans, in NHANES, the prevalences ranged from 93% for ≥1 site with AL ≥3mm to 38% for AL ≥6mm compared to 70% and 23%, respectively in HCHS/SOL. The divergence may be due to study design and sampling differences which impact generalizability. Firstly, the NHANES included adults ≥30 years in periodontal examinations, whereas HCHS/SOL included adults 18–74. In HCHS/SOL, the inclusion of younger individuals with the lowest prevalence of periodontitis, and the exclusion of those >74 years may be a potential reasons for the discrepancy. Furthermore, the NHANES is generalizable to the underlying US population by design, whereas, HCHS/SOL is generalizable to the four communities. However, HCHS/SOL's hybrid design, which uses probability sampling within pre-selected diverse regions, is superior to the convenience samples which are typically utilized in epidemiologic cohort studies.

The pathways underlying variation in the periodontal health of US Hispanics/Latinos may be multifactorial. However, most studies available have either been conducted among Mexican Americans, failed to indicate participant background (i.e. "Hispanic-Americans") or had small sample sizes.[3, 14–17] Hispanics/Latinos are a heterogeneous population of diverse demographic, socio-cultural, economic and ethnic backgrounds. Evidence has shown socioeconomic, acculturation, utilization and genetic factors may play an important role in the pathogenesis of periodontitis and related mechanisms.[18, 19] How these factors may differentially influence periodontitis by Hispanic/Latino background is uncertain, as has been shown for other health outcomes.[20] Socioeconomic factors have indicated limited influence on the mean tooth loss of Mexican Americans, in contrast to associations among non-Hispanic whites. Therefore, the oral health return of socioeconomic factors may not be equitable across racial/ethnic or Hispanic/Latino backgrounds given wide variation in socio-demographic factors.[21]

Conclusions

In this diverse population of US Hispanics/Latinos we observed significant variation by age, sex and Hispanic/Latino background in the burden of periodontitis as measured by PD, AL and the CDC-AAP classification. These data provide further evidence for heterogeneity among Hispanic/Latinos with respect to the burden of periodontitis. These estimates provide a baseline of disease burden for the largest US minority group[2] and a useful benchmark for informing decisions from public policy to clinical risk assessment. Further analyses are needed to account for lifestyle, behavioral, demographic and social factors including those related to acculturation.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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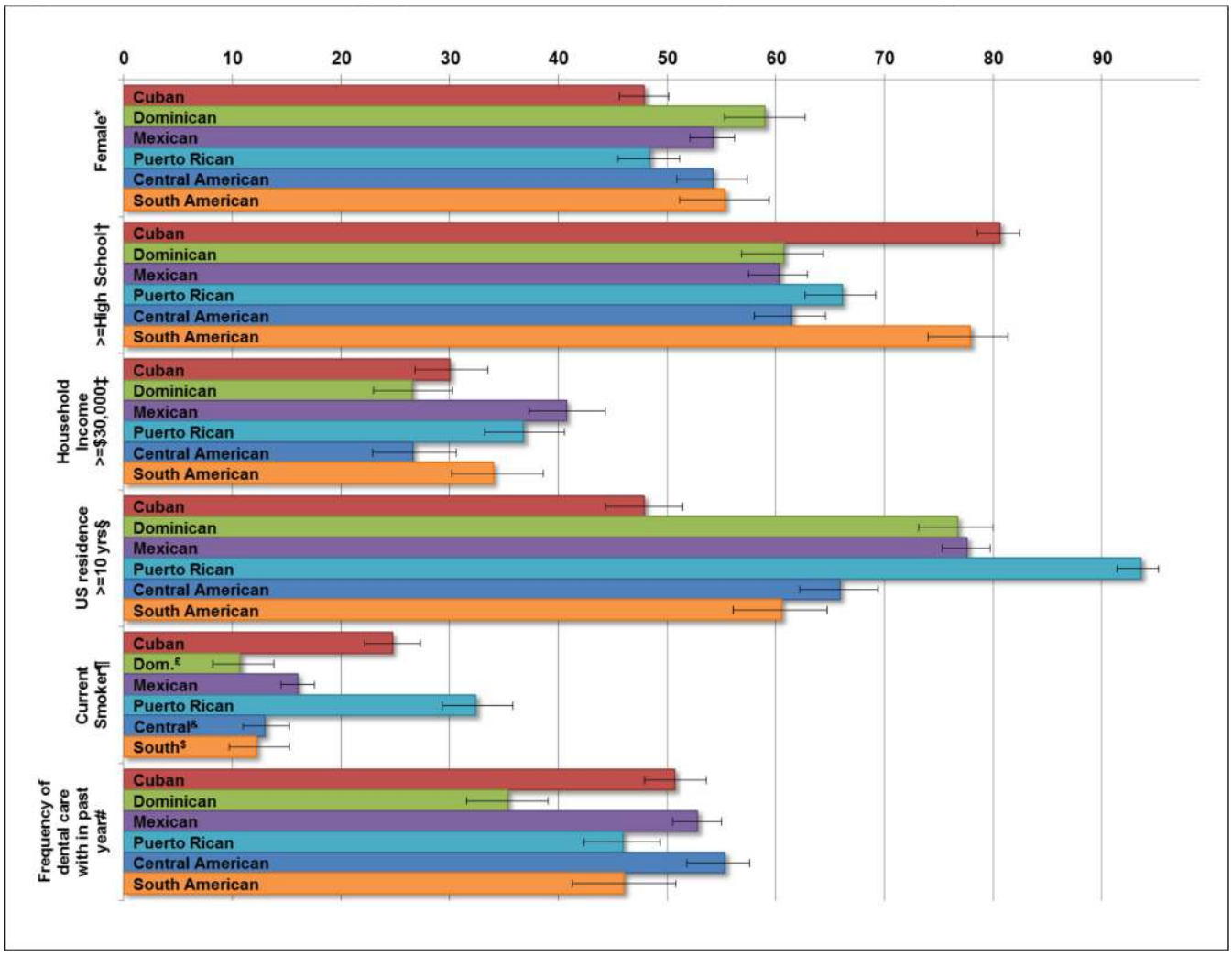

Figure 1. Prevalence of demographic characteristics by Hispanic/Latino Background: HCHS/SOL 2008–2011

All values are weighted for study design and nonresponse and are age standardized to Census 2010 US population, p-value<0.05 from Wald test for Latino subgroup differences for all characteristics. *reference=Male; †reference=<High School education; ‡reference=Household income <$30,000; §reference=US residence <10 years, ¶reference=Non-smokers; #reference=frequency of dental care>1y; £=Dominican; &=Central American; $=South American

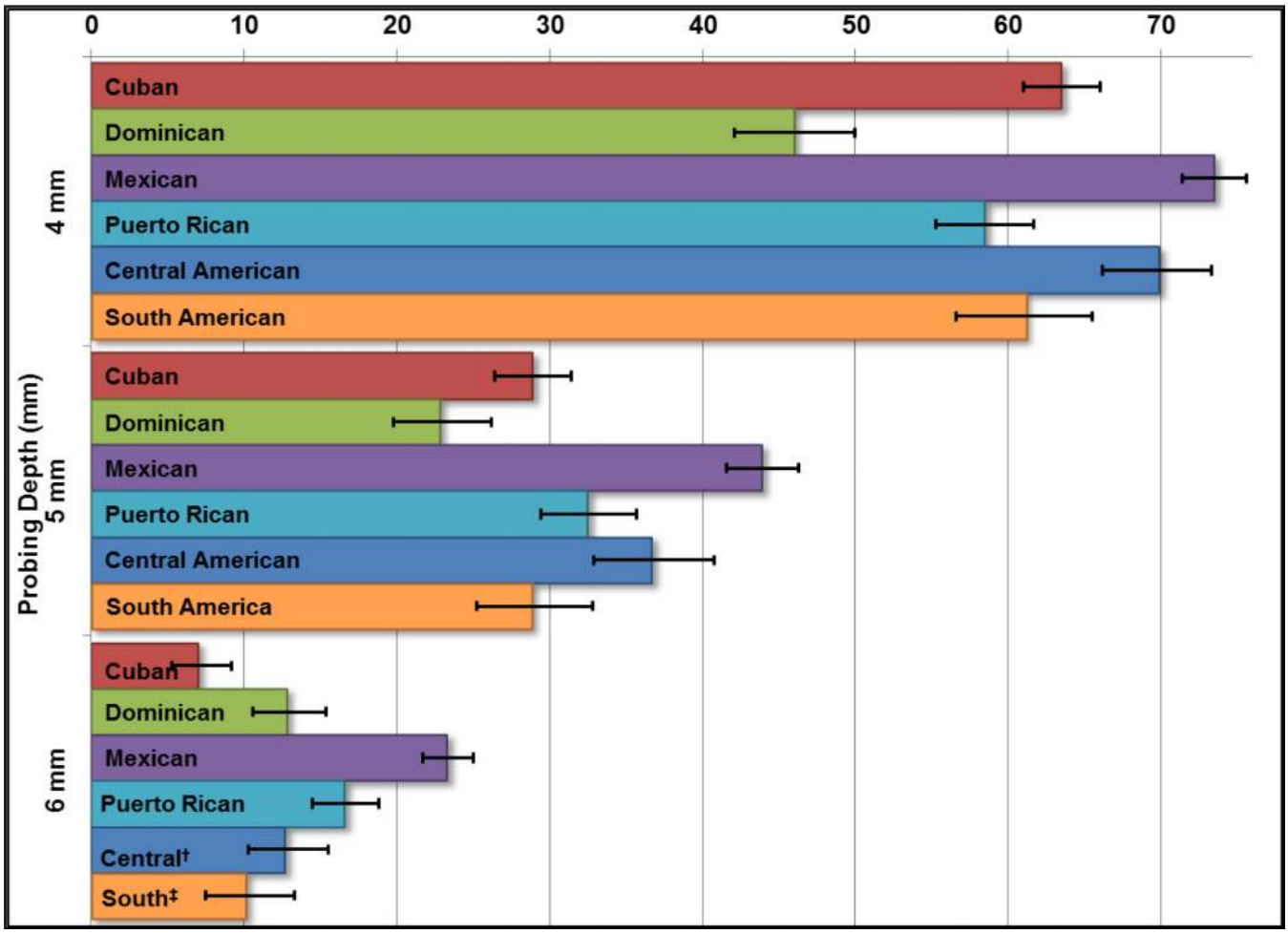

Figure 2. Prevalence and Standard Error Bars for Probing Depth* (PD) by Hispanic/Latino Background: HCHS/SOL 2008–2011

*Prevalence of ≥1 site with probing depth (PD) at severities of ≥4, 5 and 6mm.

All values are weighted for study design and nonresponse and are age standardized to Census 2010 US population

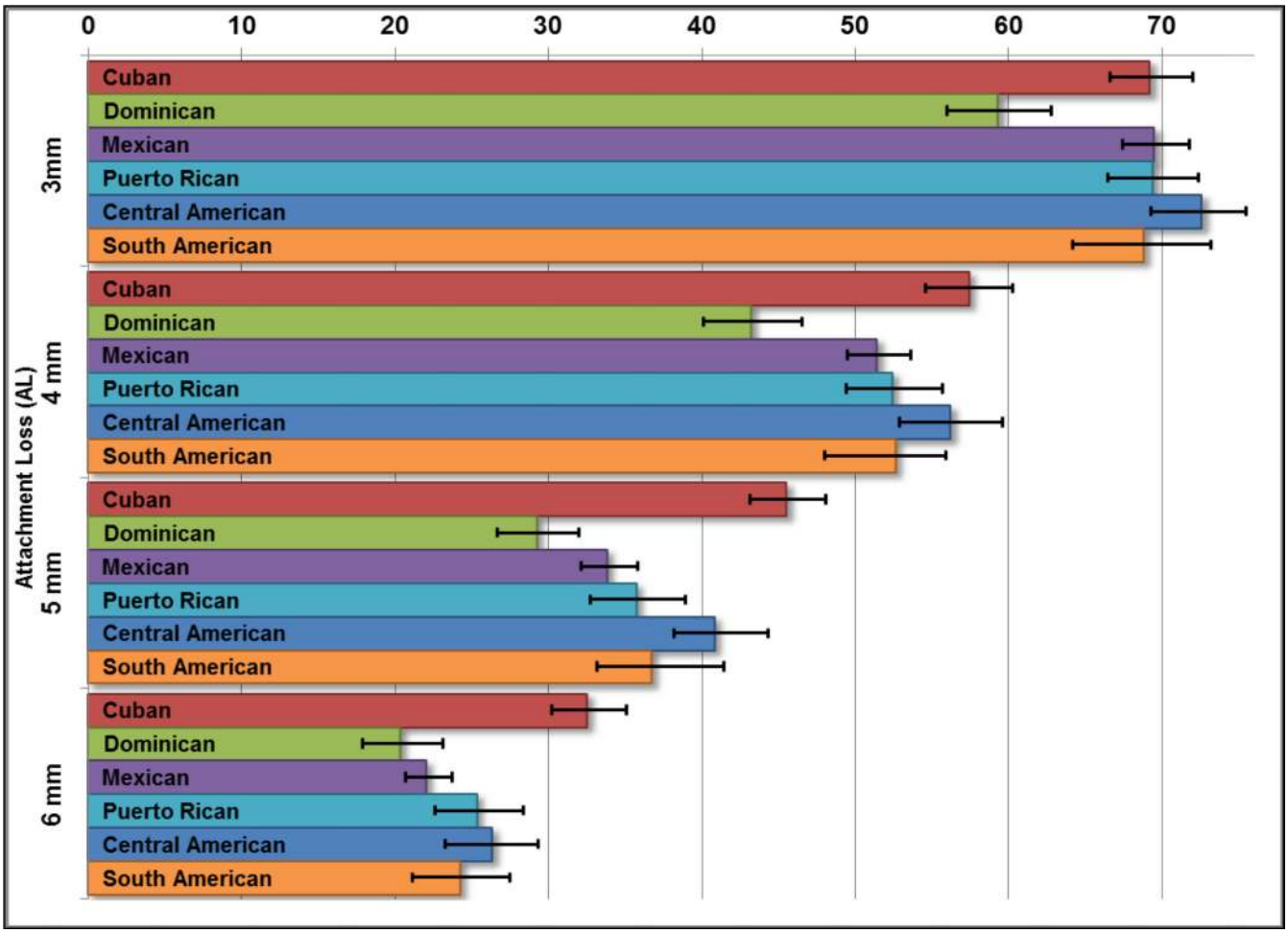

Figure 3. Prevalence and Standard Error Bars for Attachment Loss* (AL) by Hispanic/Latino Background: HCHS/SOL 2008–2011

*Prevalence of ≥1 site with AL at severities of ≥3, 4, 5 and 6mm; p-value<0.05 from Wald test for Latino subgroup differences for all characteristics. All values are weighted for study design and nonresponse and are age standardized to Census 2010 US population.

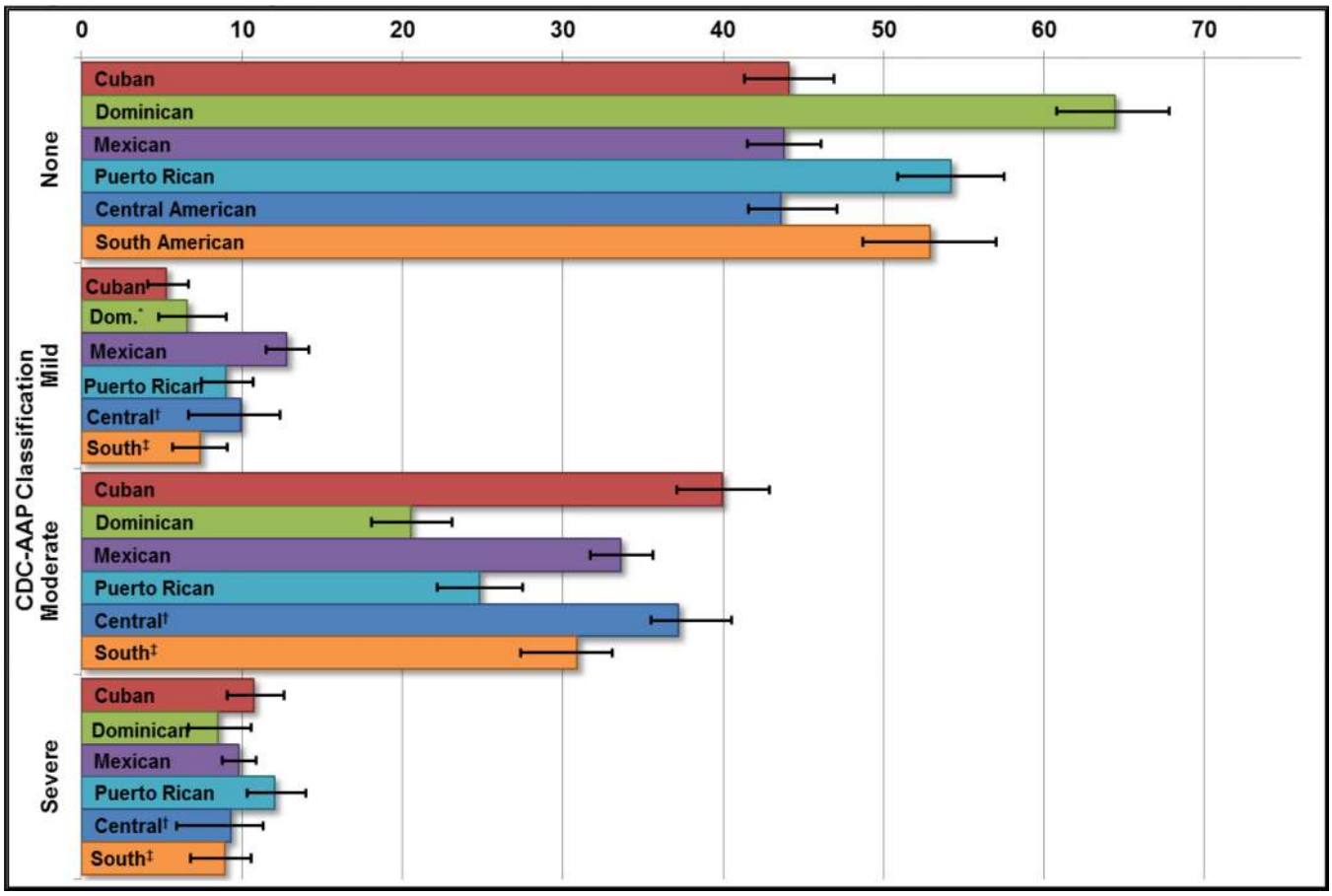

Figure 4. Prevalence and Standard Error Bars for Periodontitis (None, Mild, Moderate, Severe [CDC-AAP]) by Hispanic/Latino Background: HCHS/SOL 2008–2011

*Dominican, †Central American, ‡South American; p-value<0.05 from Wald test for Latino subgroup differences for all characteristics.

All values are weighted for study design and nonresponse and are age standardized to Census 2010 US population.

Table 1.

Prevalence of Probing Depth (PD) Severities by Age and Sex According to Hispanic/Latino Background: HCHS/SOL 2008–2011

			ALL		Cuban		Dominican		Mexican		Puerto Rican		Central American		South American		>1/Other		
PD ≥4mm	**Age**	**Sex**	**%**	**SE**	**%**	**SE**	**%**	**SE**	**%**	**SE**	**%**	**SE**	**%**	**SE**	**%**	**SE**	**%**	**SE**	P_{value}
	18–44	Male	66	1.4	65.2	2.7	43.1	4.3	73.2	2.4	59.1	3.6	74.7	2.7	64.1	4.7	54.4	6.3	<0.0001
		Female	57.4	1.2	60.9	3.0	36.4	4.1	64.1	1.9	47.5	3.2	63.9	2.9	55.8	4.7	51.1	6.1	<0.0001
	45–54	Male	78.6	1.4	72.6	2.9	61.4	5.2	88.6	1.7	82.1	3.1	74.5	5.4	65.1	5.8	69.9*	9.4	<0.0001
		Female	66.4	1.4	67.2	3.4	48.5	4.7	74.9	1.9	67.4	3.8	64	3.8	56.0	4.3	48.5*	17.1	0.002
	55–64	Male	73.4	1.6	68.3	3.1	68.9	5.7	84.6	2.7	61.5	4.4	70.8	5.0	82.9	4.9	72.9*	11.0	<0.0001
		Female	63.4	1.9	61.4	3.0	50.4	6.1	70.1	3.3	58.8	4.9	67.5	4.2	56.5	5.7	68.8*	11.0	0.02
	65–74	Male	64.9	3.4	47.5*	6.0	45.8*	9.5	94	1.7	64.9*	6.6	81.3*	10.3	77.5*	10.3	68.9*	20.9	<0.0001
		Female	53.9	3.6	51.6*	6.9	45.7*	9.5	69.5	5.5	33.8*	6.8	75.3*	9.5	54.7*	10.8	66.7*	16.5	0.002
PD ≥5mm	18–44	Male	34.5	1.3	30.9	2.7	16.9*	2.9	42.8	2.3	27.6	2.9	39.5	3.1	28.2	3.9	25.2*	4.8	<0.0001
		Female	24.8	1.1	24.3	2.4	12.3*	2.3	29.3	1.7	22.0	3.1	27.6	2.8	23.1	4.0	19.1*	4.8	<0.001
	45–54	Male	53.2	1.8	41.6	3.8	44.3*	5.9	65.7	3.1	59.4	4.2	38.3	6.0	37.9	5.6	48.6*	9.7	<0.0001
		Female	37.4	1.5	33.4	3.3	24.1	4.8	48.4	2.4	34.9	4.2	32.2	3.1	28.0	3.7	25.8*	11.5	<0.001
	55–64	Male	46.6	2.2	29.6	3.5	47.5*	7.2	64.8	3.4	40.2	4.4	37.7*	6.4	53.5*	7.4	51.2*	13.0	<0.0001
		Female	33.0	1.7	22.6	2.7	25.2*	4.0	37.7	3.3	38.0	4.7	41.3	4.8	28.3*	5.1	45.7*	11.9	0.001
	65–74	Male	42.5	3.6	26.5*	6.2	36.3*	8.8	68.4	6.6	47.9*	7.3	47.0*	11.4	41.0*	14.0	21.8*	19.5	<0.001
		Female	25.4	2.8	15*	5.0	22.8*	7.3	41.1	5.5	17.3*	5.0	56.3*	10.2	16.7*	7.7	31.3*	16.3	<0.001
PD ≥6mm	18–44	Male	14.9	0.9	7.9*	2.1	5.6*	1.7	21.7	1.7	14.1	2.1	12.0*	2.0	9.4*	2.6	7.6*	2.5	<0.0001
		Female	9.5	0.7	4.3*	1.3	3.9*	1.2	14.2	1.2	7.6*	1.4	8.6*	1.6	6.3*	2.5	4.1*	2.3	<0.0001
	45–54	Male	28.8	1.7	12.6*	3.0	35.7*	6.0	37.6	2.7	38.1	4.2	17.2*	3.8	15.8*	4.4	32.2	8.9	<0.0001
		Female	16.3	1.1	7.4*	2.4	11.2*	2.2	25.0	1.9	17.2	2.8	9.8*	2.1	8.6*	2.7	13.3*	9.1	<0.0001
	55–64	Male	27.3	2.2	10.6*	2.5	39.2*	7.2	43.2	4.1	24.8*	3.5	14.3*	5.1	20.8*	6.1	30.0*	11.8	<0.0001
		Female	14.6	1.3	3.8*	1.1	13.0*	2.9	21.4	2.7	18.1	2.9	11.0*	2.7	10.1*	3.7	17.0*	8.1	<0.0001

			ALL		Cuban		Dominican		Mexican		Puerto Rican		Central American		South American		>1/Other		
PD ≥4mm	**Age**	**Sex**	**%**	**SE**	**%**	**SE**	**%**	**SE**	**%**	**SE**	**%**	**SE**	**%**	**SE**	**%**	**SE**	**%**	**SE**	**P_{value}**
	65–74	Male	18.0	2.6	6.6*	3.4	28.6*	7.9	33.1*	6.0	24.8*	6.3	11.5*	5.3	10.9*	8.6	-	-	0.001
		Female	10.1	1.7	1.7*	1.3	12.4*	5.3	18.7*	4.6	5.9*	2.1	37.3*	10.2	10.3*	7.0	-	-	<0.0001

All values are weighted for study design and nonresponse and are age standardized to the 2010 US Census population.

*P-values based on stratum with ≤50 participants should be interpreted with caution.

Table 2.

Prevalence of Attachment Loss (AL) Severities by Age and Sex According to Hispanic/Latino Background: HCHS/SOL 2008–2011

			ALL		Cuban		Dominican		Mexican		Puerto Rican		Central American		South American		>1/Other		P_{value}
	Age	Sex	%	SE	%	SE	%	SE	%	SE	%	SE	%	SE	%	SE	%	SE	
AL ≥3mm	18–44	Male	55.0	1.4	60.9	2.7	43.8	3.9	53.7	2.2	54.0	3.4	66.3	3.1	62.0	4.3	44.7	5.2	0.0002
		Female	48.5	1.2	57.2	2.4	30.8	3.9	49.2	1.9	49.1	3.3	55.3	2.9	50.2	4.6	46.9	6.3	<0.0001
	45–54	Male	87.2	1.2	79.5	2.7	92.0	2.5	88.9	1.9	94.1	1.5	88.0	2.8	82.7	4.9	83.4*	7.3	0.0001
		Female	81.2	1.5	75.0	3.8	74.3	3.1	88.3	1.5	79.1	6.7	80.5	2.7	70.5	4.1	92.8*	3.5	0.01
	55–64	Male	92.0	1.0	87.2	2.1	95.7	2.2	96.1	1.2	95.1	2.6	79.4	5.8	90.3	4.0	93.1*	5.5	0.001
		Female	82.8	2.3	80.6	3.0	86.2	3.2	83.2	5.4	81.3	4.6	85.9	2.8	83.2	4.9	83.5*	8.5	0.89
	65–74	Male	88.3	2.5	78.6	5.0	97.6*	2.5	95.6	2.3	93.1	4.8	90.6*	5.9	100*	-	100*	-	0.01
		Female	88.5	2.0	83.4	3.7	72.7*	12.7	92.3	3.8	95.9	2.5	97.1*	2.9	88.8*	5.8	76.1*	15.7	0.04
AL ≥4mm	18–44	Male	35.4	1.2	44.6	2.9	24.7	3.4	32.9	2.0	35.1	3.2	44.0	3.2	44.0	4.5	24.9*	4.5	<0.0001
		Female	27.5	1.0	37.9	2.7	16.1	2.5	26.9	1.5	27.4	3.2	32.5	2.8	32.2	4.1	19.5*	4.1	<0.0001
	45–54	Male	76.0	1.4	73.8	2.7	71.4	4.8	76.6	2.4	79.2	3.4	82.3	3.7	75.4	5.2	69.4*	8.9	0.54
		Female	63.1	1.5	65.5	3.3	57.5	4.1	67.9	2.1	57.3	5.6	68.5	3.4	52.1	5.0	47.0*	16.7	0.12
	55–64	Male	83.1	1.4	84.1	2.3	85.1	4.3	84.0	2.7	84.9	3.9	66.5	6.1	78.3	6.1	92.0*	5.7	0.07
		Female	70.6	2.2	74.7	3.3	66.0	5.6	67.6	4.8	70.6	4.6	78.8	3.3	69.2	5.2	75.2*	9.4	0.47
	65–74	Male	82.9	2.7	75.6	5.2	86.0*	7.9	92.5	2.7	85.8	5.7	77.6*	11.5	80.1*	12.1	94.5*	5.9	0.11
		Female	79.6	2.4	80.4	4.1	63.2*	11.5	78.2	5.4	86.5	4.0	89.2*	6.1	70.9*	8.7	72.3*	15.9	0.24
AL ≥5mm	18–44	Male	21.4	0.9	30.9	2.7	14.5*	2.7	18.6	1.4	21.2	2.7	27.7	2.7	26.7	3.9	12.0*	3.8	<0.0001
		Female	14.8	0.7	24.6	2.1	7.0*	1.7	13.9	1.1	13.2	1.8	19.6	1.9	13.5*	3.2	10.8*	3.2	<0.0001
	45–54	Male	59.2	1.6	62.6	3.1	53.3	6.0	55.2	2.8	62.2	4.2	70.8	5.0	59.9	6.0	53.4*	9.7	0.18
		Female	44.0	1.4	53.8	3.2	37.0	4.4	44.6	2.4	39.6	4.4	47.7	3.8	36.0	3.9	30.5*	12.6	0.05
	55–64	Male	70.7	1.8	78.1	2.7	70.9	6.1	66.9	3.5	70.8	4.6	57.6	6.0	68.7*	6.9	76.0*	9.6	0.08
		Female	51.2	2.1	64.6	2.9	42.0	4.9	43.0	4.0	52.5	4.8	58.6	4.3	53.2	5.5	52.0*	11.8	0.0002

			ALL		Cuban		Dominican		Mexican		Puerto Rican		Central American		South American		>1/Other		P_{value}
	Age	**Sex**	**%**	**SE**	**%**	**SE**	**%**	**SE**	**%**	**SE**	**%**	**SE**	**%**	**SE**	**%**	**SE**	**%**	**SE**	
	65–74	Male	68.9	3.1	68.5	5.5	74.0*	8.5	67.4	6.3	73.6	6.5	69.0*	13.1	75.6*	12.3	33.4*	21.7	0.62
		Female	58.3	3.2	66.7	5.3	45.6*	9.5	58.1	5.5	45.6	8.3	68.5*	9.5	61.7*	9.0	58.4*	17.7	0.15
AL ≥6mm	18–44	Male	12.8	0.8	18.7	2.4	6.6*	1.7	10.9	1.1	16.2	2.7	13.5	1.8	14.0*	3.2	7.3*	3.2	0.002
		Female	7.7	0.5	13.4	2.0	4.4*	1.4	7.4	0.8	5.8*	1.1	9.9	1.5	6.0*	2.1	4.6*	2.5	0.001
	45–54	Male	43.9	1.9	50.0	3.5	47.3	6.1	37.7	3.1	49.8	4.4	43.6	5.9	35.6	5.6	36.3*	9.5	0.04
		Female	27.6	1.2	37.7	3.2	22.0	4.6	26.4	1.6	26.3	3.6	27.6	3.2	21.5*	3.6	23.1*	10.8	0.07
	55–64	Male	55.5	2.0	66.4	3.3	59.5	6.6	49.6	3.9	50.9	4.7	49.2	6.2	57.7*	7.3	42.8	12.7*	0.02
		Female	33.7	1.6	42.5	3.1	29.8*	4.7	27.2	2.8	35.0	4.2	41.0	4.3	35.2*	5.1	27.3*	11.0	0.01
	65–74	Male	55.8	3.4	59.4*	6.1	52.0*	9.8	49.8	6.8	59.9*	7.2	58.6*	12.7	64.2*	13.8	21.8*	19.5	0.55
		Female	44.9	3.3	54.7*	6.0	26.3*	7.4	44.1	5.4	30.7*	7.3	56.9*	9.8	55.7*	9.2	35.5*	17.6	0.02

All values are weighted for study design and nonresponse and are age standardized to the 2010 US Census population

*P-values based on stratum with ≤50 participants should be interpreted with caution.

Table 3.

Prevalence of Study Participants by Severity of Probing Depth (PD) and Attachment Loss (AL) Stratified by Hispanic/Latino Background: HCHS/SOL 2008–2011

	≥10% sites				≥30% sites			
PD Severity	**≥3mm**	**≥4mm**	**≥5mm**	**≥6mm**	**≥3mm**	**≥4mm**	**≥5mm**	**≥6mm**
All	-	23.1 (0.6)	5.6 (0.3)	2.1 (0.2)	-	5.9 (0.3)	1.5 (0.2)	0.3 (0.1)
Cuban	-	32.0 (1.3)	2.4 (0.5) *	0.9 (0.4) *	-	4.8 (0.5)	0.6 (0.3) *	0.2 (0.1) *
Dominican	-	12.6 (1.3)	5.2 (0.8)	1.7 (0.5) *	-	3.9 (0.7)	1.0 (0.4) *	0.5 (0.3) *
Mexican	-	22.9 (0.9)	8.2 (0.5)	3.0 (0.3)	-	7.1 (0.5)	2.2 (0.3)	0.5 (0.1) *
Puerto Rican	-	19.1 (1.5)	6.6 (0.7)	2.7 (0.5)	-	7.1 (1.0)	1.9 (0.5) *	0.1 (0.1) *
Central American	-	28.6 (1.8)	3.8 (0.7)	1.3 (0.4) *	-	5.5 (0.8)	0.8 (0.3) *	0.3 (0.2) *
South American	-	22.7 (2.0)	3.3 (0.9) *	1.7 (0.8) *	-	4.9 (1.1) *	1.4 (0.8) *	0.5 (0.3) *
>1/Other	-	19.4 (2.8)	4.9 (1.5) *	1.8 (0.8) *	-	5.3 (1.8) *	0.6 (0.6) *	-
P_{value}		**<0.0001**	**<0.0001**	**0.003**		**0.003**	0.01	0.23
AL Severity	**≥3mm**	**≥4mm**	**≥5mm**	**≥6mm**	**≥3mm**	**≥4mm**	**≥5mm**	**≥6mm**
All	32.2 (0.6)	20.3 (0.5)	12.5 (0.5)	7.0 (0.3)	14.6 (0.4)	8.8 (0.4)	5.6 (0.3)	2.7 (0.2)
Cuban	40.3 (1.7)	29.8 (1.1)	21.2 (1.1)	11.9 (0.7)	20.4 (1.1)	15.8 (0.9)	11.1 (0.7)	5.4 (0.5)
Dominican	26.8 (1.5)	16.5 (1.3)	8.6 (1.0)	5.2 (0.7)	12.5 (1.2)	6.2 (0.8)	3.2 (0.6) *	1.3 (0.3) *
Mexican	28.6 (0.9)	15.7 (0.7)	8.4 (0.6)	4.9 (0.4)	11.7 (0.7)	6.0 (0.4)	3.4 (0.4)	1.6 (0.2)
Puerto Rican	33.5 (1.6)	19.5 (1.2)	10.5 (0.8)	5.5 (0.5)	14.4 (1.0)	6.6 (0.5)	3.9 (0.5)	1.9 (0.3)
Central American	34.7 (1.6)	22.0 (1.3)	13.3 (1.1)	7.6 (1.0)	15.1 (1.3)	8.6 (0.9)	5.8 (0.9)	3.5 (0.7)
South American	32.2 (1.9)	23.3 (1.7)	15.3 (1.5)	7.6 (1.2)	15.6 (1.3)	10.5 (1.2)	5.5 (1.1) *	2.3 (0.7) *
>1/Other	30.5 (3.0)	16.0 (2.4) *	11.0 (2.2) *	5.7 (1.6) *	10.1 (2.0) *	6.6 (1.8) *	2.3 (1.1) *	1.3 (0.7) *
P_{value}	**<0.0001**	**<0.0001**	**<0.0001**	**<0.0001**	**<0.0001**	**<0.0001**	**<0.0001**	**<0.0001**

All values are weighted for study design and nonresponse and are age standardized to the 2010 US Census population

* P-values based on stratum with ≤50 participants should be interpreted with caution.

Table 4.

Prevalence of None, Mild, Moderate, Severe Periodontitis (CDC-AAP) by Age and Sex According to Hispanic/Latino Background: HCHS/SOL 2008–2011

			ALL		Cuban		Dominican		Mexican		Puerto Rican		Central American		South American		>1/Other		*P*value
	Age	Sex	%	SE	%	SE	%	SE	%	SE	%	SE	%	SE	%	SE	%	SE	
None	18–44	Male	57.4	1.3	52.4	2.7	78.1	3.0	52.4	2.2	63.6	3.2	49.6	3.1	61.6	4.4	70.6	4.8	<0.0001
		Female	67.5	1.2	62.6	2.7	81.6	3.5	63.9	1.8	72.5	3.2	62.0	2.8	69.2	4.2	75.2	5.0	<0.0001
	45–54	Male	27.4	1.5	29.7	3.3	43.4	5.8	20.4	2.4	27.8	3.7	24.8*	4.5	36.3*	5.8	32.2*	9.0	<0.001
		Female	43.0	1.5	35.1	3.5	57.8	4.5	36.3	2.2	51.4	4.9	42.3	3.6	53.2	4.2	56.4*	16.0	0.004
	55–64	Male	22.2	1.6	19.0*	2.3	30.6*	6.5	16.8	2.5	29.8*	4.7	33.8*	6.1	20.6*	5.8	14.0*	6.7	0.008
		Female	39.8	2.1	33.4	3.1	55.5	5.1	40.6	4.5	41.3	4.9	29.3	3.9	44.5	5.5	33.0*	10.8	0.03
	65–74	Male	21.5	2.8	28.5*	5.2	27.2*	8.1	7.9*	2.7	27.0*	7.0	18.4*	10.2	12.2*	6.9	5.5*	5.9	0.01
		Female	38.1	3.3	32.7*	5.1	51.1*	9.9	29.5	5.6	58.6	8.1	17.9*	8.3	38.7*	9.0	33.3*	16.5	0.005
Mild	18–44	Male	11.7	0.8	9.1*	1.7	6.6*	2.0	14.1	1.4	10.0*	1.7	15.3*	2.4	9.7*	2.4	9.1*	3.6	0.03
		Female	11.0	0.8	6.8*	1.7	9.3*	2.8	13.6	1.3	10.8*	1.8	10.9*	1.8	8.8*	2.6	6.4*	2.1	0.04
	45–54	Male	7.6	1.0	3.5*	1.3	5.2*	2.1	11.5	1.9	8.4*	3.5	3.8*	2.0	5.4*	2.0	11.0*	5.6	0.04
		Female	9.6	0.8	2.9*	1.0	5.4*	1.6	15.4	1.4	11.2*	2.5	5.5*	1.5	7.7*	2.2	2.8*	1.6	<0.0001
	55–64	Male	5.5	1.1	0.4*	0.4	1.4*	1.0	12.6*	3.3	3.3*	1.1	5.8*	2.6	5.1*	3.8	-	-	<0.0001
		Female	8.2	1.0	3.6*	1.5	7.9*	2.3	11.0	2.0	10.1*	2.4	5.8*	2.4	6.1*	2.7	12.5*	7.9	0.05
	65–74	Male*	4.4	1.3	1.3	1.3	5.6	5.5	7.7	2.6	3.9	2.8	13.7	11.6	4.4	3.2	-	-	0.30
		Female*	3.4	0.7	0.3	0.3	2.4	1.7	6.6	1.7	2.9	1.7	8.3	5.0	1.6	1.7	13.9	12.8	0.01
Moderate	18–44	Male	26.8	1.2	31.3	3.0	13.1*	2.5	30.1	1.7	21.4	2.9	31.2	3.0	24.6	4.0	18.1*	3.7	<0.0001
		Female	18.8	1.0	25.6	2.6	8.0*	1.6	20.0	1.5	14.8	2.8	23.6	2.3	18.5*	3.3	17.2*	4.8	<0.001
	45–54	Male	44.1	1.7	46.9	3.7	31.6*	5.4	50.5	2.5	29.9	3.6	56.8	6.1	46.2	5.9	31.9*	8.7	<0.0001
		Female	36.9	1.4	48.9	4.0	29.9	5.1	37.7	2.4	27.0	3.5	40.7	3.8	29.2	3.6	35.6*	14.2	0.02
	55–64	Male	48.3	1.9	62.5	3.6	35.5*	5.8	43.3	3.2	42.2	4.6	46.1*	6.1	46.6*	7.1	54.6*	12.8	<0.001

			ALL		Cuban		Dominican		Mexican		Puerto Rican		Central American		South American		>1/Other		*P*value
	Age	**Sex**	**%**	**SE**	**%**	**SE**	**%**	**SE**	**%**	**SE**	**%**	**SE**	**%**	**SE**	**%**	**SE**	**%**	**SE**	
		Female	38.5	1.9	50.5	3.9	27.9*	4.5	35.9	3.6	29.8	3.3	52.5	4.4	34.8*	4.7	32.5*	10.6	<0.001
	65–74	Male	50.8	3.3	53.6*	5.7	38.7*	9.4	56.1	6.7	35.4*	6.7	41.7*	11.3	70.5*	11.2	94.5*	5.9	0.02
		Female	45.3	3.1	56.2*	5.6	34.2*	8.7	44.9	5.5	29.5*	6.7	50.8*	9.8	47.2*	9.4	50.6*	17.9	0.03
Severe	18–44	Male	4.2	0.5	7.3*	1.4	2.3*	1.0	3.4	0.6	5.0*	1.6	3.9*	1.1	4.1*	1.6	2.3*	1.4	0.04
		Female	2.7	0.3	5.1*	1.2	1.1*	0.7	2.5	0.4	1.9*	0.6	3.5*	0.9	3.5*	1.4	1.1*	1.1	0.02
	45–54	Male	20.8	1.5	19.9*	2.8	19.9*	5.8	17.5	2.3	33.9	4.1	14.6*	3.4	12.2*	3.6	24.9*	8.7	0.002
		Female	10.5	0.8	13.2*	2.2	6.9*	1.7	10.7	1.2	10.3*	2.0	11.5*	2.2	9.9*	2.8	5.2*	3.1	0.32
	55–64	Male	24.0	1.6	18.1*	2.6	32.5*	6.9	27.3	3.0	24.7*	3.9	14.3*	3.9	27.8*	6.9	31.4*	12.1	0.10
		Female	13.5	1.2	12.6*	2.5	8.7*	2.2	12.5	1.9	18.8*	4.0	12.4*	2.4	14.6*	4.2	22.0*	9.5	0.25
	65–74	Male	23.3	2.8	16.6*	4.9	28.6*	7.9	28.3*	5.7	33.7*	6.9	26.3*	8.5	12.9*	8.8	-	-	0.18
		Female	13.2	2.2	10.8*	4.3	12.3*	5.2	18.9*	4.2	9.0*	4.1	23.1*	8.4	12.5*	7.3	2.1*	2.2	0.35

All values are weighted for study design and nonresponse and are age standardized to the 2010 US Census population

*P-values based on stratum with ≤50 participants should be interpreted with caution.