XI. The Prevalence of Total Tooth Loss, Dental Caries, and Periodontal Disease among Mexican Americans, Cuban Americans, and Puerto Ricans: Findings from HHANES 1982–1984

AMID I. ISMAIL, BDS, MPH, DRPH, AND SUSAN M. SZPUNAR, RDH, DRPH

Abstract: This paper describes the prevalence of total tooth loss, dental caries, and periodontal disease in 2,226 Puerto Ricans, 1,192 Cuban Americans, and 5,983 Mexican Americans, ages five to 74 years, who were examined during the 1982–84 Hispanic Health and Nutrition Examination Survey (HHANES). The prevalence of total tooth loss was 2.60, 6.10, and 2.80 percent among Mexican Americans, Cuban Americans, and Puerto Ricans, respectively. After adjusting for the confounding effects of age, sex, income, and education status, no statistically significant differences were found in the mean number of decayed teeth among the three groups of Hispanics. Puerto Rican children had an average of 2.09 filled teeth compared with an average of 1.39 and 1.43 filled teeth for Mexican Americans and Cuban Americans, respectively. In adults, Puerto Ricans and Cuban Americans had at least 40 percent higher mean number of filled teeth than Mexican Americans. Cuban American and Puerto Rican adults had about twice as many missing teeth as Mexican Americans. The pit-and-fissure tooth surfaces in children accounted for the majority of sites affected by caries.

All Hispanics had a higher prevalence of gingivitis than American adults as estimated during the 1985–86 National Institute of Dental Research (NIDR) survey of American adults. Puerto Ricans had the highest level of periodontal disease and the highest Debris Index scores among the Hispanic groups. [*Am J Public Health* 1990; 80(Suppl):66–70.]

Introduction

Dental public health practice in the United States is now facing new challenges. In addition to the political and economic changes that have affected public health programs in the last decade, there has been a significant increase in the numbers of the elderly and minorities, such as Hispanics.[1,2] As the proportion of minorities in the US increases, data on their oral health status will be needed to plan the treatment and preventive services required to meet their health needs.

Data from recent national surveys show a disturbing pattern of untreated dental caries in Blacks and Mexican Americans.[3–5] In the 1985–86 national survey conducted by the National Institute of Dental Research (NIDR),[3] Blacks had a higher mean number of decayed tooth surfaces than White non-Hispanics in all age groups between 18–19 and 60–64 years of age. The differences in mean numbers of decayed tooth surfaces between White and Black Americans ranged from 66 percent in adults 30–34 years of age to 419 percent in those 60–64 years of age. Despite the higher level of decayed teeth in Blacks, their mean number of permanent decayed and filled tooth surfaces (DFS) was lower than that of Whites, because of the lower mean number of filled teeth in Blacks. These differences between Black and White adults were similar to those found during the first National Health and Nutrition Examination Survey (NHANES I) conducted between 1971 and 1974,[6] where Blacks had a 93 percent higher mean number of decayed teeth than non-Hispanic Whites. In 1971–74, the latter had three times higher mean numbers of filled teeth than Blacks.

Information about the oral health status of Puerto Ricans, Cuban Americans, Mexican Americans, and other minorities in the United States is sparse. In a 1972–73 survey in New York City by Nikias and co-workers,[7] Puerto Ricans had a lower number of filled teeth than non-Hispanic Whites, but the mean number of filled teeth of Puerto Ricans was not different from that of Blacks. Non-Hispanic White New Yorkers had a lower mean number of decayed teeth than Blacks and Puerto Ricans. Puerto Ricans also had a higher level of gingival inflammation than non-Hispanic Whites and Blacks. Other geographically limited surveys of dental caries prevalence of Puerto Ricans and other Hispanics have reported similar findings.[8,9]

As described elsewhere in this supplement,[10] the National Center for Health Statistics (NCHS) responded to the lack of information on the health and nutritional status of Hispanics in the United States by conducting the Hispanic Health and Nutrition Examination Survey (HHANES) between 1982 and 1984. Previous reports described the prevalence of dental caries and periodontal disease of Mexican Americans living in five Southwestern states.[4,5] Dental data on Puerto Ricans and Cuban Americans became available for analysis in 1987. This report describes the prevalence of total tooth loss, dental caries, periodontal disease, and oral hygiene status in Cuban American and Puerto Rican children and adults, ages five years or older. Because of the small number of Cuban Americans and Puerto Ricans examined during HHANES compared with Mexican Americans, the age groups used in previous reports could not be used in this analysis.[4,5] Therefore, a re-analysis of the Mexican Americans' dental data was carried out in order to provide a comparison group to both Cuban Americans and Puerto Ricans.

Methods

A description of the HHANES sample design and data collected is presented elsewhere in this supplement.[10] Previous reports have summarized the criteria used during HHANES to measure the prevalence of dental caries, periodontal disease, and oral hygiene status.[4,5]

In this report, data will be presented for 5,983 Mexican Americans, 1,192 Cuban Americans, and 2,226 Puerto Ricans between the ages of five and 74 years with dental data. All those who identified themselves as Mexican Americans in Arizona, California, Colorado, New Mexico, and Texas; as Puerto Ricans in the New York City area; and as Cuban Americans in Dade County, Florida, were included in this study. Out of those medically examined, only 2.97, 1.25, and 2.36 percent of Mexican Americans, Cuban Americans, and Puerto Ricans, respectively, between six months through 74

Note: Author affiliations are listed elsewhere under CONTRIBUTORS.

years of age, did not receive a dental examination. Only the dental status of the permanent teeth is described in this paper.

All means, percentages, and regression coefficients presented were computed using sampling weights as described by Delgado and co-workers[10] and Landis, *et al.*[11] Also, adjustment for clustering effects was carried out when standard errors of the means, percentages, and regression coefficients were computed using the design effects provided by the NCHS and published in Public Use Data Tape Documentation (Dental Health, Tape number 6505). The dental variables used in the analysis were: total tooth loss; number of decayed, filled, and missing teeth (and tooth surfaces) for each individual; the Periodontal Index (PI) scores,[12] and periodontal classification based upon the PI score (no periodontal disease, gingivitis only, periodontal pockets) and Debris Index (DI) and Calculus Index (CI) scores for those with at least one tooth in their mouth.[13]

Differences in the dental status among the three Hispanics groups were considered present only if they remained after adjusting for the confounding effects of age, sex, income, and education. Multiple linear regression analysis was used during adjustment when continuous variables were compared, and logistic regression analysis was used when a dichotomous variable was the dependent variable. This approach was used because of the differences among the three groups in age, income, and education levels: the Puerto Rican sample included a higher percentage of individuals with an average family income below $10,000 than the other groups and about 43 percent of the Puerto Ricans examined were below the poverty line (computed by dividing the total household income by the total income determined necessary [from federal guidelines] to maintain a family on a nutritionally adequate diet; a ratio of 1.0 was considered as the poverty line) compared with about 29 and 22 percent of the Mexican and Cuban Americans, respectively.

All analyses were carried out using OSIRIS. IV, supported by the Institute for Survey Research, University of Michigan.

Results

Total Tooth Loss

Cuban Americans had a significantly higher prevalence of total tooth loss than both Mexican Americans and Puerto Ricans (Table 1). When the confounding effects of age, sex, income, and education status were accounted for using a logistic regression model, however, no significant differences in the prevalence of total loss among the three groups were found (data available on request to authors).

TABLE 1—Number of Mexican Americans, Cuban Americans, and Puerto Ricans, Ages Five through 74 Years, by Edentulous Status and Age, HHANES, 1982–84

	Mexican Americans		Cuban Americans		Puerto Ricans	
Age (years)	N*	%E**	N	%E	N	%E
5–17	2,528	.00	294	0.00	939	.00
18–44	2,252	.30	390	1.30	799	1.40
45–74	1,203	14.40	508	14.90	528	12.90
All Ages	5,983	2.60	1,192	6.10	2,266	2.80

*N = Total Number of Hispanics ages 5 through 74 years.
**%E = Percent edentulous (with total tooth loss) and, henceforth, were not included in Tables describing the status of individuals with teeth.

Dental Caries Prevalence

Among dentate Hispanics, ages five through 44 years, Puerto Ricans had a significantly higher mean number of decayed teeth than Cuban Americans (Table 2), but not Mexican Americans; this difference disappeared, however, when age, sex, income, and education status were accounted for using a multiple linear regression model (data available on request to authors). In older Hispanics, Mexican Americans had a significantly higher mean number of decayed teeth than either Cuban Americans or Puerto Ricans but, again the difference disappeared after accounting for the confounding effects of age, sex, income, and education status, using a multiple linear regression model (Table 3). Hispanic adults had significantly higher mean number of decayed teeth than Hispanic children.

Puerto Rican children had an average of 2.09 filled teeth compared with an average of 1.39 and 1.43 filled teeth for Mexican American and Cuban American children, respectively, a difference which remained statistically significant in the regression analysis (data available on request to authors). In adults, Puerto Ricans and Cuban Americans had at least 40 percent higher mean number of filled teeth than Mexican Americans (Table 2). In Hispanics older than 45 years, the mean number of filled teeth of Cuban Americans and Puerto Ricans was significantly higher in the regression analysis than that of Mexican Americans, with Cuban Americans having the highest mean number of filled teeth of the three groups.

Cuban American and Puerto Rican adults had approximately two times more missing teeth than Mexican Americans (Table 2). This difference did not disappear after accounting for the previously described confounding variables. Mexican American adults (18–74 years of age) who were

TABLE 2—Mean Number of Decayed, Missing, and Filled Permanent Teeth (and 95 Percent Confidence Intervals) of the Means of Dentate Mexican Americans, Cuban Americans, and Puerto Ricans by Age, HHANES, 1982–84

Age in Years	Decayed	Missing	Filled
Mexican Americans			
5–17	.70	.04	1.39
	(0.64, 0.76)	(0.03, 0.05)	(1.21, 1.57)
18–44	1.45	1.52	4.56
	(1.31, 1.59)	(1.39, 1.65)	(4.18, 4.94)
45–74	1.49	5.24	3.97
	(1.26, 1.71)	(4.85, 5.63)	(3.45, 4.49)
Total	1.19	1.56	3.36
	(1.11, 1.27)	(1.46, 1.66)	(3.15, 3.57)
Cuban Americans			
5–17	.51	.13	1.43
	(0.35, 0.66)	(0.07, 0.19)	(1.13, 1.73)
18–44	1.02	3.93	7.70
	(0.80, 1.24)	(3.46, 4.39)	(7.15, 8.24)
45–74	0.85	9.19	6.50
	(0.70, 1.00)	(8.59, 9.78)	(6.00, 6.99)
Total	0.85	4.87	5.88
	(0.74, 0.96)	(4.52, 5.21)	(5.56, 6.20)
Puerto Ricans			
5–17	.76	.11	2.09
	(0.67, 0.88)	(0.06, 0.16)	(1.80, 2.38)
18–44	1.40	3.58	7.43
	(1.27, 1.53)	(3.09, 4.07)	(6.89, 7.96)
45–74	.97	10.43	5.53
	(0.78, 1.16)	(9.25, 11.42)	(5.00, 6.06)
Total	1.10	3.26	5.15
	(1.00, 1.20)	(2.90, 3.62)	(4.83, 5.47)

TABLE 3—Multiple Linear Regression Coefficients of the Relation between Number of Decayed Teeth and Hispanic Identifier, Sex, Income, and Education: Age Group 45 to 74 Years of Age, HHANES 1982–84

Variables	Regression Coefficient	Standard Error*
Constant	2.66	.42
Hispanic Group		
Mexican American	.37	.23
Cuban American	−.04	.32
Sex (males, females)	−.48	.14
Income (Less than $10,000, $10,000–<$20,000, $20,000+)	−.16	.09
Education (Never, primary, high school, college)	−.31	.10

*Standard errors were adjusted for clustering effects (see Methods section). Confidence intervals were computed with adjustment for design effects as described in the Delgado, *et al.*, paper.[10]

below the poverty line had a significantly higher mean number of decayed teeth and a lower mean number of filled teeth than those above the poverty line. Differences in the mean numbers of decayed and filled teeth, by age groups, between Puerto Ricans and Cuban Americans below and above the poverty line were inconsistent because of small sample sizes.

Table 4 presents the distribution of dental caries by the type of tooth surface affected in Hispanic children. Puerto Ricans ages five to 17 years had significantly higher DFS (decayed and filled tooth surfaces) scores on occlusal surfaces than Mexican and Cuban Americans. In the buccal and lingual tooth surfaces of posterior teeth, Cuban American children had a significantly lower mean DFS than did Mexican Americans and Puerto Ricans. No significant differences were found among the children of the three Hispanic groups in the DFS of mesial and distal tooth surfaces of posterior or anterior teeth. Puerto Rican children had 58 percent of the carious activity occurring on occlusal surfaces, and the Cuban American and Mexican American children had 56 and 53 percent, respectively. If the buccal and lingual tooth surfaces are included, then the percent age of pits-and-fissures of posterior tooth surfaces affected by dental caries will increase to about 79, 85, and 85 percent of the total DFS scores in Cuban Americans, Puerto Ricans, and Mexican Americans, respectively.

Periodontal Disease

Puerto Ricans, ages five through 44 years of age, had a significantly higher prevalence of gingivitis than Cuban Americans and Mexican Americans (Table 5). In the oldest age group, Puerto Ricans and Mexican Americans had a significantly higher prevalence of periodontal pockets than Cuban Americans. Puerto Ricans, 18 to 74 years of age, also had significantly higher mean DI scores than Cuban Americans (Table 6). In a regression model controlling for the confounding effects of age, sex, diabetes (presence or absence of diagnosed diabetes), and oral hygiene status, Puerto Ricans remained with the highest prevalence of periodontal disease relative to the other two Hispanic groups. Diabetes status was included because it has been shown in a longitudinal study that diabetics had more gingivitis and periodontal pocketing than non-diabetics.[14]

Discussion

Untreated dental caries in Hispanic children and adults and the relatively high mean number of missing teeth in Cuban American and Puerto Rican adults compared with Mexican Americans and other Americans[3] are the two most important oral health problems facing Hispanics. It is important to note that Hispanic adults had twice higher mean number of decayed teeth than Hispanic children. This finding suggests that there is a strong cohort effect in the Hispanic population with different age groups experiencing different exposure to preventive and dental services. The presence of decayed teeth, however, does not mean that treatment of all carious lesions is urgently needed. Unfortunately, the criteria used during HHANES to measure caries[15] do not provide information about the severity of the carious lesions and therefore a decision on what mix of preventive and treatment services will be needed cannot be made. Also, the NIDR Restorative Treatment Need Index,[15] used during HHANES, does not provide information about the need for fissure sealants and whether small carious lesions should be restored or followed with recommendation for fluoride application to arrest the progress of the lesion. Given the concentration of carious activity in the pits and fissures of posterior teeth in Hispanic children, however, the effectiveness of fissure sealants in preventing dental caries on those surfaces will be higher than other preventive methods.

In a previous analysis of National Health Interview Survey (NHIS) data collected during 1978–80, Mexican Americans, Cuban Americans, and Puerto Ricans visited the dentist less frequently than White non-Hispanics.[16] Mexican Americans had the lowest proportion of persons who went to a dentist within a year compared with Puerto Ricans and Cuban Americans. Mexican American use of dental services resembled the pattern of dental care received by Black

TABLE 4—Mean Number of Decayed and Filled Tooth Surfaces (DFS) by Type of Tooth Surface Affected in Dentate Mexican Americans, Cuban Americans, and Puerto-Rican Children, 5–17 Years of Age, HHANES, 1982–84

	Posterior Teeth			Anterior Teeth	
	Occlusal	BL	MD	BL	MD
Mexican Americans	1.79 (1.64, 1.94)	1.06 (0.97, 1.15)	.30 (0.24, 0.36)	.10 (0.07, 0.13)	.10 (0.06, 0.14)
Cuban Americans	1.67 (1.38, 1.96)	.66 (0.51, 0.81)	.38 (0.23, 0.53)	.09 (0.03, 0.15)	.14 (0.04, 0.24)
Puerto Ricans	2.56 (2.28, 2.83)	1.29 (1.12, 1.46)	.36 (0.25, 0.47)	.06 (0.03, 0.09)	.10 (0.05, 0.15)

Occ = Occlusal
BL = Buccal, Lingual
MD = Mesial, Distal

TABLE 5—Percent Distribution of Dentate Mexican Americans, Cuban Americans, and Puerto Ricans by Periodontal Disease Status* and Age, HHANES, 1982–84

Age (years)	Gingivitis Only			Periodontitis		
	Mexican American (95% CI)	Cuban American (95% CI)	Puerto Rican (95% CI)	Mexican American (95% CI)	Cuban American (95% CI)	Puerto Rican (95% CI)
5–17	76.6 (73.4, 79.8)	65.1 (59.4, 70.8)	90.0 (87.3, 92.7)	.2 (−.14, .54)	.0 —	.1 (−.2, .4)
18–44	82.4 (79.3, 85.5)	81.2 (77.1, 85.3)	90.0 (87.1, 92.9)	7.0 (4.9, 9.1)	2.1 (.6, 3.6)	8.2 (5.5, 10.9)
45–74	59.1 (53.2, 65.0)	72.3 (67.9, 76.7)	65.1 (58.9, 71.3)	35.7 (29.9, 41.5)	20.8 (16.8, 24.8)	32.4 (26.3, 38.5)

*Periodontal Disease Status is based on Periodontal Index Scores.[12] Those with no periodontal disease are not included and therefore the percentages do not add up to 100.

TABLE 6—Mean Number of Debris Index (DI) and Calculus Index (CI) Scores[13] (and 95 Percent Confidence Intervals) of the Means for Dentate Mexican Americans, Cuban Americans, and Puerto Ricans, Ages Five through 74 Years, HHANES, 1982–84

Age (years)	Mexican American	Cuban American	Puerto Rican
Debris Index scores			
5–17	.80 (0.76, 0.84)	.72 (0.66, 0.78)	.78 (0.74, 0.82)
18–44	.75 (0.70, 0.80)	.62 (0.57, 0.67)	.86 (0.81, 0.91)
45–74	.94 (0.84, 1.04)	.72 (0.65, 0.79)	1.04 (0.95, 1.13)
Calculus Index scores			
5–17	.09 (0.08, 0.10)	.04 (0.02, 0.06)	.16 (0.13, 0.19)
18–44	.67 (0.63, 0.71)	.43 (0.37, 0.49)	.77 (0.70, 0.84)
45–74	1.30 (1.22, 1.38)	.75 (0.68, 0.82)	1.23 (1.11, 1.35)

Americans. Puerto Ricans were the only group for whom dental visits were not significantly influenced by family income level. In this study, the dental caries prevalence of Mexican Americans parallels that found in Black Americans during the 1985–86 NIDR survey.[3] (Comparisons between HHANES findings and other national surveys are limited by the differences in sampling strategies. Examination criteria used during HHANES, however, were those used by NIDR, and the training of the dental examiners in HHANES was also carried out by NIDR staff.) Puerto Ricans and Cuban Americans had a dental caries distribution that was in between those of Mexican Americans and Blacks, and White Americans in the NIDR survey. The influence of dental visit patterns, income, and dental education may partly explain the differences in the mean number of missing teeth among the three Hispanic groups.

The results of the analysis of HHANES dental data reported here raise a number of methodological questions about the meaning of the DMF score. Conventionally, the DMF score has always been analyzed as a single composite index. Moreover, analysis of the DMF score of an individual assumed that all filled teeth have been treated because they were previously carious. The filled component of the DMF index represents a decision made previously by the dentist of the examinee. As has been documented by several investigators[17,18] the diagnostic criteria used by dentists to decide on need for restorative treatment are plagued with considerable variations. In a study in Scotland, where 15 general practitioners examined 18 patients and estimated their restorative treatment needs, the range of teeth needing treatment for each patient varied according to the examining dentist.[17] For the 18 patients together, the costs of the treatment planned by the 15 dentists ranged between 92.5 and 478.6 British pounds. These findings raise doubts about the validity of analytic methods for the DMF index that combine the three components of the index as a single variable.

As in Mexican Americans, the prevalence of gingival inflammation and periodontitis in Puerto Ricans and Cuban Americans is higher than national averages.[3] Puerto Ricans had the highest prevalence of gingivitis. Puerto Ricans and Mexican Americans also had a higher prevalence of calculus and debris than Cuban Americans. The level of DI and CI scores in Mexican Americans and Puerto Ricans, 18–74 years of age, is higher than that determined to be compatible with an acceptably low level of periodontal disease.[19]

In conclusion, the oral health status of Hispanic-Americans can be summarized as follows:

- Total tooth loss is not a public health problem in Hispanic Americans examined during HHANES. However, the dentate Cuban American and Puerto Rican adults have about twice as many missing teeth than White non-Hispanics.
- In children, while the prevalence of dental caries is low, using the World Health Organization criteria,[20] the tooth surfaces most affected by dental caries are the pits and fissures of posterior teeth rather than smooth tooth surfaces. These findings support the need for sealant programs to prevent dental caries.
- Hispanic adults had twice higher mean number of decayed teeth than Hispanic children. Puerto Ricans and Cuban Americans had a higher mean number of filled and missing teeth than Mexican Americans. The distribution of dental caries in Mexican Americans was similar to that found in Blacks in 1985–86.[3] Puerto Ricans and Cuban Americans had a dental caries distribution between that of Black and White Americans.[3]
- The prevalence of gingivitis in Hispanics is higher than that found in White non-Hispanics.[3] Puerto Rican children and adults had the highest prevalence of gingivitis among the Hispanic groups.

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