

Dental Caries Prevalence and Dental Health Care
of Mexican-American Workers' Children.Dental caries prevalence and dental health
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The 1990 census estimated that there were 20.8 million persons of Hispanic ancestry in the United States.¹ Currently, Hispanics are the second largest minority in the United States. By the year 2000, 11.5 million Hispanic children will represent the largest population of minority children.² Contributing to this population growth is the youthfulness and fertility rate among Hispanics.³ Despite the increasing number of Hispanics in the United States, the data currently available provide only a weak foundation for understanding the general health of Hispanics and, in particular, their oral health.^{4,9} Recent studies of the oral health status of Mexican-American migrants have documented a significantly high prevalence of dental caries and unmet restorative treatment needs in the children of these families.^{10,11}

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The first national estimates on a variety of health indicators for the Hispanic and non-Hispanic population were derived from the National Health Interview Survey (NHIS).¹² Regarding illness and utilization of health services, the NHIS found that among the Hispanics, the percentage of four-to-sixteen-year-old Mexican-Americans never receiving dental care was three times that of white persons and twice that of other Hispanic persons. Mexican-Americans with annual family incomes of \$10,000 or more were 1.5 times more likely to have visited a dentist than were Mexican-Americans with incomes below \$10,000.¹²

A second survey, the Hispanic Health and Nutrition Examination Survey (HHANES) was conducted by the National Center for Health Statistics (NCHS) between 1982 and 1984, with the goal to produce estimates of the three major Hispanic subgroups (Mexican-Americans, Puerto Ricans, and Cuban-Americans), which accounted for approximately 76 percent of the Hispanic origin population in the United States in 1980.¹³

Ismail *et al* found that a relatively small percentage of the Mexican-American children who were examined in HHANES were highly susceptible to dental caries.¹⁴ Children from low-income families had a substantially higher incidence of decayed teeth and a lower percentage of restored teeth than children from the high-income families.



Reports of caries prevalence in migrant children of varying ethnic backgrounds in the United States have demonstrated disturbing trends.¹⁵⁻²⁰ The Mexican-American migrant population experiences a high percentage of decayed teeth, a low level of restorative care, and poor oral hygiene.^{10,11,21,22} Studies have compared the dental health of migrant children (Mexican-American, Hispanic, African Americans, and Native American) with that of national studies and that of urban schoolchildren.^{15,17-19} In these it was noted that migrant children had a low prevalence of dental restorations and a high rate of dental caries. None has compared the dental health of Mexican-American migrant workers' children to HHANES, which was one of the purposes of this investigation.

According to the National Agricultural Workers Survey (NAWS) data, there are an estimated 2.5 million farm workers hired in the United States.²³ The farm workers are predominantly male (82 percent), Hispanic (94 percent), born in Mexico (80 percent), and married with an average of approximately two children (52 percent).²⁴

These migrant workers tend to be socioeconomically disadvantaged, as reflected in their low education, language problems, low income, and high unemployment rates, compared with the United States population as a whole.²⁵ Their average annual income is \$5,500 for a family of 5.3 members.²⁶ These and other factors of Mexican-Americans have given rise to a series of barriers to obtaining health services.

In recent years, Mexican-American migrant workers have been coming to central and northern Alabama in ever-increasing numbers. Data on the dental health of Mexican-American migrant workers' children in the state of Alabama, however, are not available.

The purposes of this study were to investigate the prevalence of dental caries, to investigate the overall oral health in a population sample of Mexican-American migrant workers' children, and to assess their dental health care. The study also compared the results with Mexican-American children from the Southwestern HHANES, conducted by the NCHS between 1982 and 1984.

METHODS AND MATERIALS

One hundred and thirty Mexican-American children, ages three to sixteen from the Blount County Migrant Program, Alabama, who were enrolled in the course, "English as a Second Language" (ESL), in the summer of 1995, were involved in this study. The procedures,

possible discomforts, risks, and confidentiality of the study, as well as possible benefits, were explained fully to the parents, and their informed consent was obtained before the study was begun. A questionnaire targeted at obtaining information concerning demographics and dental care was given verbally to all the parents and recorded by Spanish-speaking ESL staff or by the principal investigator. The study had been approved by the Institutional Review Board for Human Use of the University of Alabama at Birmingham.

A demographic questionnaire requested the following information: complete name, age (birth date), gender, places of birth, parents' place of birth, parents' levels of education, father's occupation, number of children in the family, total family income in the last twelve months, and the ability of the child and parents to speak English. Information was also obtained regarding the child's oral health and dental history. The questions, place of birth, language spoken, total family income, and dental history, were matched with those used in HHANES.¹³

All children had a routine dental examination, consisting of a visual, tactile examination, using a dental mirror, sickle-shaped explorer, a portable chair, and an artificial light. No radiographs were taken. The dental examination was performed by a single examiner previously standardized, using the NIH diagnostic criteria and the Simplified Oral Hygiene Index (OHIS).^{27,28} The oral examination included the following items:

- Dental Caries Evaluation by decayed and filled primary teeth and surfaces (dft and dfs) and Permanent Decayed Missing and Filled Teeth and Surfaces (DMFT and DMFS);
- Oral Hygiene Evaluation (OHIS).

Data analysis

The data were collected and entered into a database, using a customized Oral Health Software Package.²⁹ This file was used to perform statistical analyses using the SAS Statistical Software Package.³⁰ The data were summarized by generating descriptive statistics for the selected factors for the population sample by age-group and gender. The level of statistical significance was set at $p < .05$. The data were analyzed using the Chi-square test for the demographic variables and the ANOVA test with the Fisher's Protected Least Significant Difference test for the dental examination results. The results of this study were compared with the results of 3,241 Mexican-American children, three through sixteen years of age, from the HHANES survey of 1982-84.

RESULTS

Demographics

The population was distributed in the Alabama Mexican-American migrant children (Alabama-MAMC) study as follows: 67/130 (51.5 percent) were males and 63/130 (48.5 percent) were females. The mean age was 8.25 (range 3-16).

Most of the children and parents were born in Mexico (children 72 percent, fathers 84 percent, and mothers 79 percent). The mean number of children in each family was 3.6 (SD 2.0). Ability to speak English and the educational levels of parents and children, in general, were limited. Only 42 percent of the children, 40 percent of the fathers, and 9 percent of the mothers spoke English. The percentage of mothers who had an educational level above elementary school, was 30 percent, and the percentage above high school was 8 percent. The fathers with education above elementary school were 25 percent, and those above high school were 2 percent. Most of the families (60 percent) had an average annual income of less than \$10,000.

Dental history

Only 46 percent of the children had ever seen a dentist before: 7 percent before they were four years of age, and 24 percent visited the dentist in the last twelve months. The percentage of children covered by some type of dental insurance was 24 percent. Most of the children (72 percent) brushed their teeth and used toothpaste, but only 10 percent flossed.

A significant relationship was found between having visited the dentist and the child's place of birth and the language spoken ($p < 0.05$) (Table 1). Of the children born in the United States, 64 percent had been to the dentist compared with 40 percent of the children born in Mexico. Of the children who spoke English, 57 percent had been to the dentist, compared to 34 percent of the children who only spoke Spanish.

The age of the child at the first visit to the dentist had an association with the place of birth ($p < 0.001$) and language spoken ($p < 0.05$) (Table 1). Only 1 percent of the children born in Mexico had been to the dentist when they were younger than four years, compared to 25 percent of the children born in the United States. Of the children who spoke English, 4 percent had been to the dentist when they were younger than four years old, and 47 percent when they were older than four years, compared with 11 percent of the children who spoke

Table 1 □ Percentage of distribution by place of birth and language spoken by children in the Alabama-MAMC study, having visited the dentist before and age at first visit.

	Place of birth		Language spoken	
	Mexico	USA	Spanish	English
Had visited the dentist				
	40%*	64%*	34%*	57%*
	60%*	36%*	66%*	43%*
	100%	100%	100%	100%
	1%*	25%*	11%*	4%*
	34%*	36%	19%	47%*
	60%*	36%*	66%*	43%*
	5%	3%	4%	6%
	100%	100%	100%	100%

* ($p < 0.05$) between place of birth, language spoken with having visited the dentist before and age at first visit.

Spanish and were younger than four years, and 19 percent who were older than four years at their first dental visit.

There was an association between the total family income and the ages of the children on their first visit to the dentist ($p < 0.0001$), and the frequency of visits to the dentist every year ($p < 0.05$). Only 5 percent of the children from families with incomes of less than \$10,000 in the last twelve months; and 13 percent of the children from families with incomes of more than \$10,000, but less than \$19,999, had been to the dentist before four years of age. Of the children from families with incomes of less than \$10,000 in the last twelve months, 25 percent saw the dentist twice a year, compared to 56 percent of the children from families with incomes of more than \$10,000, but less than \$19,999.

There was an association between dental insurance and place of birth ($p < 0.0001$). Of the children born in the United States, 44 percent had some type of dental insurance, compared with 18 percent of the children who were born in Mexico.

Dental examination

The results of the dental examination are shown in Tables 2, 3, and 4. In the primary dentition the decayed component was the highest and the most prevalent of both; dft (88 percent), with a mean of 3.6 (SD 3.7), and dfs (80 percent), with a mean of 6.5 (SD 7.6). The posterior teeth had 76 percent of the total dft and 78 percent of the total dfs. The distribution of pitted and smooth decayed and filled surfaces was 37 percent in pitted surfaces and 63 percent in smooth surfaces.

Similar to the primary dentition, in the permanent dentition the Decayed component was more prevalent than the Filled component; the Missing component was

not present in this study. The Decayed component was 94 percent of the total DMFT with a mean of 2.2 (SD 2.37), and 94 percent of the total DMFS with a mean of 3.0 (SD 3.5). The posterior teeth had 92 percent of the total DMFT and 94 percent of the total DMFS. The distribution of pitted and smooth Decayed Missing and Filled surfaces was 56 percent in pitted surfaces and 44 percent in smooth surfaces.

The OHIS for the Alabama-MAMC study was 1.4 (SD 0.7) and was distributed as follows: The Debris Index was 0.7 (SD 0.4), and the Calculus Index was 0.7 (SD 0.4).

Comparison of demographics and dental conditions

Correlation of demographic information with the dental conditions for the Alabama-MAMC study was performed with the ANOVA with Fisher's Protected Least Significant Difference test. Significant statistical difference was found between the Place of Birth and Dental Caries in the variables as follows: Primary decayed and filled teeth ($p < 0.05$), Permanent Decayed Teeth ($p < 0.0001$), Permanent Decayed Missing and Filled Teeth ($p < 0.0001$), Permanent Decayed Surfaces ($p < 0.001$) and Permanent Decayed Missing and Filled Surfaces ($p < 0.001$). A higher rate of decay was present in the children who were born in Mexico; the children born in the United States had a higher rate of decay only in the variable of primary decayed and filled teeth. Almost all the children who were born in Mexico (99 percent) had a decayed or filled surface compared with 88 percent of the children who were born in the United States ($p = 0.008$).

Comparison of demographics and dental health between the Alabama-MAMC and HHANES

Several questions were matched with those utilized in HHANES, and comparisons were made between the two studies, using the Chi-square test. Significant statistical difference between the two studies was found in relation to the place of birth ($p < 0.001$) (Table 5). The HHANES population was born predominantly in the United States (83 percent), while the Alabama-MAMC sample (72 percent) was born predominantly in Mexico. A significant difference in the distribution of income between the two studies was found ($p < 0.001$) (Table 5). In the Alabama MAMC sample, 60 percent of the population had an income of less than \$10,000 compared with 31 percent of the HHANES population.

There was a significant difference in the two studies ($p < 0.001$) (Table 6) regarding the percentage of the population that had visited the dentist. In the Alabama-MAMC, 46 percent of the population had previously seen a dentist, compared to 62 percent of the HHANES population. There was a significant difference in the two studies ($p < 0.001$) (Table 6) regarding the age at the first visit to the dentist. In the Alabama-MAMC sample, 7 percent of the children had their first visit to the dentist when they were four years or younger, compared with 15 percent in the HHANES population. There was a significant difference in the frequency of visits to the dentist in the last twelve months between the two studies ($p < 0.001$) (Table 6). In the Alabama-MAMC, 24 percent of the population had been to the dentist in the last twelve months, compared with 53 percent in the HHANES population. There was a statistical difference in the percentage of children who had some type of dental insurance ($p < 0.001$). Only 24 percent of the children in the Alabama-MAMC sample had dental insurance compared with 38 percent of the HHANES population.

Comparison of dental caries between the Alabama-MAMC and HHANES

The Alabama-MAMC and HHANES were analyzed for statistical differences in relation to dental caries. All pairwise comparisons were tested with the ANOVA test, using the Fisher's Protected Least Significant Difference test. The results of the primary, permanent decayed filled teeth and surfaces, the anterior and posterior (dfs, DMFS), and the smooth and pitted (dfs, DMFS) for the studies are shown in the Tables 2, 3 and, 4.

There were significant statistical differences between the Alabama-MAMC study HHANES in relation to decayed teeth, the total dft, decayed surfaces, and the total dfs ($p < 0.0001$). In the Alabama-MAMC study, the decayed component was higher and more prevalent than the filled component, compared with HHANES (see Table 2 for mean differences between the groups).

The distribution of the dft in the anterior and posterior teeth and the distribution of dfs in smooth and pitted surfaces had a significant statistical difference between the Alabama-MAMC and HHANES ($p < 0.05$) (see Table 3 for mean differences between the groups).

There was a significant statistical difference between the Alabama-MAMC and HHANES in relation to the Decayed teeth, the total Decayed Missing and Filled Teeth, the Decayed Surfaces, and the total Decayed Missing and Filled Surfaces DMFS ($p < 0.0001$). In the

Table 2 □ Mean (\pm S.D.) of decayed and filled permanent, primary teeth and surfaces in each study.

Status	Alabama-MAMC n=130		+HHANES n=3,241	
	Mean	\pm S.D.	Mean	\pm S.D.
decayed surfaces	3.6*	3.7	0.6*	1.7
filled surfaces	0.6	1.8	0.7	1.8
df surfaces	4.2*	4.0	1.3*	2.5
decayed teeth	6.4*	7.6	1.2*	3.6
filled teeth	1.9	6.8	1.6	4.7
df teeth	8.3*	9.9	2.8*	6.0
	2.2*	2.4	0.5*	1.3
	0.1*	0.8	0.9*	2.0
	2.3*	2.5	1.4*	2.5
	2.9*	3.5	0.7*	2.0
	0.3*	1.2	1.5*	3.7
	3.2*	3.8	2.3*	4.5

* Significant ($p < .05$) difference between Alabama-MAMC study and HHANES study.

+HHANES was the only group who presented a Missing component. This was 1.6% of the DMFT (mean of 0.02 ± 0.2), and 4% of the total DMFS (mean of 0.1 ± 0.8).

Table 3 □ Mean (\pm S.D.) of decayed and filled primary and permanent surfaces by type of tooth surface in each study.

Status	Alabama-MAMC n=130		HHANES+ n=3,241	
	Mean	\pm S.D.	Mean	\pm S.D.
	1.8*	3.9	0.4*	1.9
	6.5*	7.5	2.4*	5.1
	5.2*	7.8	1.5*	3.9
	3.1*	2.9	1.3*	2.6
Anterior DMFS	0.2	0.6	0.1	1.0
Posterior DMFS	3.0*	3.6	2.2*	4.2
Smooth DMFS	1.4*	2.0	0.5*	1.9
Pitted DMFS	1.8	2.2	1.8	3.2

+HHANES was the only group that presented a Missing component (mean 0.1 ± 0.8).

*Significant ($p < .05$) difference between Alabama-MAMC study and HHANES study.

Table 4 □ Percentage distribution of primary and permanent decayed and filled, anterior and posterior and smooth and pitted surfaces in each study.

Status/Surfaces	Alabama-MAMC n=130		HHANES+ n=3,241	
	Primary	Permanent	Primary	Permanent
Decayed	77%	94%	50%	30%
Filled	23%	6%	50%	70%
Total	100%	100%	100%	100%
Anterior df/DMF	22%	8%	14%	7%
Posterior df/DMF	78%	92%	86%	93%
Total	100%	100%	100%	100%
Smooth df/DMF	63%	44%	54%	22%
Pitted df/DMF	37%	56%	46%	78%
Total	100%	100%	100%	100%

+HHANES was the only group that presented a Missing component. This was 1.6% of the DMFT (mean of 0.02 ± 0.2), and 4% of the total DMFS (mean of 0.1 ± 0.8).

Table 5 □ Percentage distribution by place of birth and total family income in the last twelve months of the Alabama-MAMC study and the Mexican-American children from Southwestern HHANES (1982-84).

Study	Place of birth			Income (in thousands)			
	Mexico	USA	Total	<10	10-19	>19	Total
Alabama-MAMC	72%*	18%*	100%	60%*	39%	1%*	100%
HHANES	17%*	83%*	100%	31%*	37%	32%	100%

($p < 0.0001$) between the two studies.

Table 6 □ Percentage distribution of the Alabama-MAMC study children and the Mexican-American children from Southwestern HHANES (1982-84) having visited the dentist before, age at first visit, and having visited the dentist in the last twelve months.

Study	Visited before	Visited <4yr	Visit within 12mo
Alabama-MAMC	46%*	7%*	24%*
HHANES	62%*	15%*	53%*

($p < 0.0001$) between the two studies.

Alabama-MAMC, the Decayed component was higher and more prevalent and the Filled component was less prevalent compared with HHANES (see Table 2 for mean differences between the groups).

The distribution of the DMFS in the posterior teeth and smooth surfaces had a significant statistical difference between the Alabama-MAMC and HHANES ($p < 0.05$) (see Table 3 for mean differences between the groups).

Oral hygiene

There was a statistical difference in the OHI between the Alabama-MAMC and HHANES sample ($p < 0.0001$). The Alabama-MAMC had an OHI of 1.4 while HHANES had an OHI of 0.9.

DISCUSSION

The results of this study revealed that the Mexican-American migrant workers in this study have a lower rate of dental services, a disproportionate prevalence of decayed teeth, and an urgent need for dental treatment compared with the Mexican-American children from HHANES. The demographic findings of this study support the information from NAWs showing that most of the general population of farm workers are born in Mexico, and most of them had just recently immigrated from Mexico. The population of children examined was evenly distributed; children older than twelve years of age, however, comprised only 10 percent of the population, reflecting that many children of these ages were working in the summer months and not enrolled in the

school program, because the family's yearly income must be earned by all family members. Low income, lack of education, and limited knowledge of the English language were constantly found. The average annual income was below the poverty level. The shortages of bilingual and bicultural staff in Alabama, compared with the Southwest or other areas with a higher density of bilingual population, is a factor that could inhibit this population from accessing the health-care delivery system.

The results obtained from the questionnaire provide evidence that there is a general lack of dental care, dental insurance, dental prevention, and dental education, when compared with the HHANES population. The association between the place of birth and language spoken with having dental insurance and having visited the dentist before agrees with the findings by Ismail *et al* that children who were born in Mexico and spoke and wrote only Spanish with a low acculturation status had sought significantly less dental care and were less likely to be covered by dental insurance than those who were born in United States or spoke English.⁴ In this study, almost half of the children had never been to the dentist and only a fourth had dental insurance.

Areas of dental health knowledge that were particularly lacking included the role of fluorides and dental floss, and the relation between sweets in the diet and caries (47 percent of the children ate snacks, and not allowing toddlers to sleep with a bottle was reported only 0.8 percent as a second best way of preventing caries). The use of sealants was not mentioned by the parents, and only 7 percent of the population in this study had sealants. The results of primary and permanent decayed, filled teeth, and surfaces of this and previous studies of oral health that have identified Hispanics or Mexican-American migrant workers show a disproportionate prevalence of decayed teeth and a prevalent need of dental treatment, because of the almost nonexistent treatment of these teeth. The percentage of caries-free children in this study was 4.6 percent.

Our results demonstrate dental caries rates five times greater than in the HHANES population. The greatest statement of dental need in this study is evidenced in the permanent dentition, where the Decayed component accounted for 94 percent of the total DMFT and DMFS. The decayed component of the dfs or dft was above 80 percent, indicating that three of four decayed teeth are untreated. The caries rate in the primary dentition in this study is comparable to published national data on Head Start low-income children ages three to five in whom the decayed teeth frequently exceeded 60 per-

cent.³¹ The filled teeth component in this study was only 12 percent of the dft and 6 percent of the DMFT, reflecting the lack of dental treatment provided to these children. In HHANES, half of the teeth had been treated. An interesting finding was that the total primary decayed and filled teeth of the children born in the United States in this study was statistically higher than the children born in Mexico, a mean of 5.4 of dft compared with 3.7. A possible explanation for this is the change in diet to one with more carbohydrates in the form of refined sugars, a characteristic of diets in industrialized countries. In the permanent dentition the decayed teeth were double and the decayed surfaces almost tripled in the children born in Mexico compared with the children born in the United States. The distribution of the caries in smooth and pitted surfaces in the primary dentition reflects a higher concentration of caries in the smooth surfaces. In this study, three of five surfaces of the decayed surfaces are found in the smooth surfaces, when compared with half in HHANES. This indicates a possible increased frequency of carbohydrates and sugar in the diet and a lack of fluoride exposure.

The children in the HHANES population reside in the Southwest where naturally fluoridated water is widely available. In this study we were not able to determine the exposure of these children to the benefits of fluoride, because this population is mobile. One of four decayed or filled primary surfaces in this study was found in the anterior teeth, compared with one of six in HHANES, suggesting a tendency for Early Childhood Caries in these children, as reported by Weinstein *et al*.³²

Another interesting finding was the distribution of pitted and smooth surfaces in this study compared with the HHANES population. Fifty-five percent of the decayed and filled surfaces were concentrated in the pitted surfaces while HHANES reported almost 80 percent. This strongly suggests that the children in this study would be helped by a sealant program, as was observed by Ismail *et al* in the HHANES population.⁴ The need for the provision of restorative services for these children, however, should also be emphasized. The OHIS in this study was double of what was reported by HHANES. Even though periodontal disease was not evaluated in this study, the calculus index was almost half of the total OHI. This shows a predisposition later in life to periodontal disease. This also supports the HHANES finding that 77 percent of the children suffered from gingivitis.¹⁴

Children's dental caries is unevenly distributed, with a small percentage of children demonstrating the majority of carious tooth surfaces.^{31, 33} The popular state-

ment that half of United States school children have never experienced tooth decay grew out of the 1986-87 national survey of the oral health of school children by the NIDR, in which the dental disease in the primary dentition was ignored, failing profoundly to reflect the extremity and severity of this highly prevalent condition of childhood.³¹ The National Health Promotion and Disease Prevention Objectives of "Healthy People 2000" published by the NIH pointed out the need for assurance that primary and secondary prevention services for oral health are reaching all segments of the population and that information on health status and risk factors has been placed as a high priority need for all life stages and particularly for specific race, ethnic, and socioeconomic groups.³⁴ Also populations lacking dental insurance have been placed as high-priority research needs to describe their characteristics. The findings, particularly among children with low education and low-income status parents, point toward the urgent need for improved policy to target educational and prevention programs for those at greatest disease risk and treatment need. These findings should be continually presented to community and business leaders and funding agencies, so that they will recognize that dental caries has not been relegated to the status of an occasional disease, especially for minority children, like the Mexican-American migrant workers' children.

CONCLUSIONS

- Dental caries is a major problem for migrant children, and the unmet dental caries need remains a problem to be addressed.
- Aggressive preventive and restorative services remain a priority with migrant children.
- A topical fluoride supplementation program is recommended due to the high caries experience.
- A need for dental public health programs of service and education for these families to make this population aware and to translate the need of dental treatment to demand for dental treatment is strongly supported by this study.
- The association between higher decayed values and place of birth and language spoken requires special efforts in order to understand this population and to devise ways to ease the transition and integration into the American health care system.
- The generalized lack of dental insurance, which places these children in a more difficult situation to receive dental treatment, points toward the urgent need for an improved policy in relation to this issue.

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PREDICTORS OF DENTAL CARE UTILIZATION

Although dental decay has been significantly reduced over the past 30 years, dental disease continues to be a substantial health problem for many low-income and minority Americans. Low-income and minority Americans experience greater levels of oral disease and are less able to obtain dental care, less likely to be covered by dental insurance and less likely to seek care than higher-income and nonminority Americans....

Several studies examining dental care utilization have been conducted. Most of these studies focused on children and older people. For instance, Gift and Newman analyzed the 1989 National Health Interview Survey, or NHIS, and reported on the use of dental services for U.S. children. They reported that 57 percent of black children visited the dentist during the past year as compared with 72 percent of white children, and 57 percent of Hispanic children visited the dentist during the past year as compared with 71 percent of non-Hispanic children. Gift and Newman reported that these differences persisted even when controlling for income, the education level of the responsible adult in insurance.

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