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Dental visits and access to dental care among Maryland schoolchildren

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Regular dental visits provide an opportunity for oral health professionals to diagnose illness, provide primary preventive services, and treat diseases and other health-related problems. Although there is no standard for the frequency of dental visits, a number of guidelines exist. The American Academy of Pediatric Dentistry

recommends that children should see a dentist when their first tooth appears or no later than their first birthday.¹ The U.S. Department of Health and Human Services also recognizes the importance of regular dental visits.² National health objectives for Healthy People 2010² call for an increase in the proportion of those aged 2 years or older who use the oral health care system at least one time each year and an increase in the proportion of low-income people younger than 19 years of age who received any type of preventive service in the previous year. Most practitioners suggest that each child visit the dentist every six months to one year.³

Not all children have equal access to oral health care services. National studies have shown that dental visits among U.S. children are associated with age, race/ethnicity, dental insurance status and socioeconomic status (SES).⁴⁻⁸ In general, these studies have shown that younger children were less likely to have visited the dentist than were older children,⁴ minority

The population group that was the most likely to receive regular, preventive oral health care services was children of parents or guardians who recognized the importance of primary prevention.

Background. Regular dental visits afford an opportunity for dentists to provide preventive services and to diagnose and treat disease. Not all children, however, have equal access to these services.

Methods. The authors conducted this study to describe access to and utilization of oral health care services for Maryland schoolchildren in kindergarten and third grade. They obtained data from a questionnaire filled out by parents or guardians participating in the Survey of the Oral Health Status of Maryland School Children, 2000-2001 (N = 2,642). Outcome variables included having a dental visit in the last year, prophylaxis in the last year, usual source of medical care and usual source of dental care. Descriptor variables included region, grade, race/ethnicity, eligibility for free or reduced-fee meals, parents' or guardians' education and dental insurance status.

Results. Overall, general dental visit and dental prophylaxis visit rates were similar (74.1 and 71.3 percent, respectively). Schoolchildren, however, were more likely to have had a usual source of medical care than of dental care (96.0 and 82.9 percent, respectively). Third graders, those ineligible for free or reduced-fee meals and those with some dental insurance coverage were more likely to have received a prophylaxis in the last year and were more likely to have a usual source of dental care. Non-Hispanic white and non-Hispanic black schoolchildren also were more likely to have had a usual source of dental care than were Hispanics.

Conclusions. Schoolchildren most likely to have received regular preventive dental care were those who had parents or guardians with financial resources. Medicaid and State Children's Health Insurance Program (SCHIP) provide safety nets, but these programs could be improved.

Practice Implications. Dentistry's challenge is to determine which characteristics are unique to those who visit the dentist regularly and use this information to help meet the needs of the underserved.

Key Words. Schoolchildren; epidemiology; health services accessibility; health survey; Maryland.

children were less likely to have visited than were non-Hispanic white children,⁵ and financially and educationally disadvantaged parents or guardians were less likely to have taken their children to a dentist than were more financially and educationally advantaged parents or guardians.^{4,5} Studies also have shown that children with private dental insurance coverage were more likely to have had a dental visit than were those without insurance.⁶⁻⁸

Not all forms of oral health care utilization are equal. Those who schedule regular dental visits for preventive and diagnostic services usually have better oral health status than those who seek oral health care services for emergency care.⁹ Therefore, simply describing the proportion of the population who has had a dental visit in the previous year may not be sufficiently meaningful, particularly in terms of health promotion. A more constructive way to characterize the quality of a dental visit is to describe whether it involved a preventive service, such as prophylaxis.

Although there are abundant national data that describe access to and utilization of oral health care services, there are few data describing access and utilization at the state level.¹⁰

The purpose of our investigation was to describe access to and utilization of oral health care services for Maryland public schoolchildren in kindergarten and third grade, as well as to compare general dental visit rates with dental prophylaxis visit rates, to compare having a usual source of medical care with having a usual source of dental care, to describe which schoolchildren are more likely to have an annual dental prophylaxis visit and describe which schoolchildren are more likely to have a usual source of dental care. While the findings are specific to Maryland schoolchildren, results can be useful to practitioners and policy-makers throughout the United States who must design ways to improve access to care and increase the number of preventive and restorative dental visits.

METHODS, MATERIALS AND SUBJECTS

We obtained the cross-sectional data for this investigation from the Survey of the Oral Health Status of Maryland School Children, 2000-2001 (Maryland Survey 2000-2001). This survey contained two components: an oral screening phase

and questionnaire phase. The oral screening phase assessed dental caries experience, treatment need, presence of dental sealants and fluorosis. The questionnaire phase consisted of a 15-question survey instrument that documented dental visit and prophylaxis histories, existence of a usual source of medical and dental care, history of tooth pain, dental insurance status and various sociodemographic factors. For this investigation, we used only the questionnaire phase of Maryland Survey 2000-2001, as we did not relate questionnaire data to the oral screening data.

Sample design. The Maryland Survey 2000-2001 used a two-stage sampling design to select its study sample. In the first stage, 50 elementary schools were selected from five geographic regions in the state, according to a probability-proportional-to-size (PPS) sampling design. Implicit stratification was used to ensure a proportional geographic distribution of sample

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schools. Specifically, the stratification procedure included systematic PPS selection from a list of schools that were ordered geographically by county within geographic region and city (and by ZIP code within larger cities). The PPS design allowed schools with larger enrollments to have a greater probability of being selected into the study. Differing probabilities in the first stage of the selection step were offset by selection of a set number of classrooms during the second stage of the selection step. In the second stage, two kindergarten and two third-grade classrooms were selected randomly from all such classrooms at the selected schools. All students present in the selected classrooms were recruited into the survey. Two schools that refused to participate in the study were replaced using a PPS method by which a substitute school was selected from the same sampling interval in the sampling frame as the refusing school.

In Maryland, school districts equate to 23 counties and Baltimore City. Two of these 24 school districts chose not to participate in the study, because they did not want to take time away from the curriculum. Consequently, the study sample was representative of kindergarten and third-grade public schoolchildren in 22 of the 24 districts in Maryland, across the five geographic regions of the state. A complete description of Maryland Survey 2000-2001 has been published elsewhere.¹¹

Questionnaire. The questionnaire contained several questions about dental visits, usual source of medical care and usual source of dental care that were similar to those used in the 1999 National Health Interview Survey,¹² as well as other questions that were developed specifically for this investigation. Before its distribution, researchers at the University of Maryland Dental School checked the questionnaire for content and face validity to determine if the questions measured what they were intended to measure and if there was sufficient information obtained from the questions to address the hypotheses of interest. Only minor changes were made to question wording and order before it became a part of Maryland Survey 2000-2001. The questions were written in English and at the fifth-grade reading level.

Schoolchildren in the study sample were given the questionnaire, an information packet, introductory letter and consent form to take home to their parents or guardians. Children in kindergarten and third grade received the same questionnaire. Parents or guardians who answered the questions returned the questionnaire to the school via their children.

Study variables. The outcome variables were having a dental visit in the previous year, having a dental prophylaxis visit in the previous year, having a usual source of medical care and having a usual source of dental care. The dental visit variable came from a questionnaire item that asked, "When was the last time your child went to the dentist?" When we recorded the response categories, we combined "less than six months ago" and "six months ago to less than one year ago" to represent a dental visit in the previous year. The dental prophylaxis visit variable came from a questionnaire item that asked, "When was the last time your child had his/her teeth cleaned by a dentist or hygienist?" When we recorded the response categories, we combined "less than six months ago" and "six months ago to less than one year ago" to represent a dental prophylaxis visit in the previous year. The usual source of medical care and usual source of dental care variables came from questionnaire items that asked, "Is there one physician or medical clinic that your child usually goes

to when he/she needs medical care?" and "Is there one dentist or dental clinic that your child usually goes to when he/she needs dental care?", respectively.

Descriptor variables included region (I—Western, II—Central D.C., III—Southern, IV—Central Baltimore, V—Eastern Shore), grade level (kindergarten, third grade), race/ethnicity (non-Hispanic white, non-Hispanic black, Hispanic), eligibility for free or reduced-fee meals at school (eligible, ineligible), parents' or guardians' level of education (less than 12th grade, 12th grade, greater than 12th grade) and dental insurance status (private, Medicaid or Maryland Children's Health Program [MCHP], no insurance). Eligibility for free or reduced-fee meals and parents' or guardians' education level are two measures of SES, and we referred to them as such throughout the article. The Western region represented four Maryland school districts, the Central

D.C. region represented three, the Southern region represented three, the Central Baltimore region represented four, and the Eastern Shore region represented eight. MCHP is Maryland's version of the federal State Children's Health Insurance Program (SCHIP), and it provides an extension of Medicaid benefits to children living in the 100 to 200 percent range of the federal poverty level.

Analysis. We entered questionnaire responses into a proprietary data entry software program. We used the SAS statistical software

program for Windows (Release 8.0, SAS Institute, Cary, N.C.) to recode dependent and independent variables. We used the SUDAAN statistical software program for Windows (Release 8.0., Research Triangle Institute, Research Triangle Park, N.C.) to produce bivariate and multivariate estimates, because this software accounts for the complex, multistage sample design when deriving standard errors and confidence intervals (CIs). We used full sample weights to produce bivariate and multivariate estimates that were representative of the target kindergarten and third-grade public schoolchildren in Maryland.

The response rate was 66.4 percent (3,294 kindergarten and third-grade public schoolchildren of the 4,964 kindergarten and third-grade public school children in the study sample). We

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eliminated children of unknown race/ethnicity or those of non-Hispanic other race/ethnicity (n = 357), those with unknown eligibility for free or reduced-fee meals at school (n = 315), those whose parents' or guardians' education level was unknown (n = 145), those with an unknown dental insurance status (n = 194), those with an unknown presence of a usual source of dental care (n = 141) and those with an unknown dental visit history (n = 95) from the final sample owing to small sample sizes across these subcategories. The final sample for this investigation was 2,642 children, representing 93,776 kindergarten and third-grade public schoolchildren in Maryland.

We entered variables into the multivariate model according to a priori hypotheses and support for possible statistical associations from previous studies in the literature. Adjusted odds ratios (ORs) show the association between a study variable and the outcome variable, controlling for other variables in the multivariate model. Adjusted ORs greater than 1 show that one level of the study variable is more likely to lead to the outcome than is the reference level. Adjusted ORs less than 1 show that one level of the study variable is less likely to lead to the outcome than is the reference level.

Ninety-five percent CIs show the range of adjusted ORs that might be expected 95 percent of the time if the study were repeated using different samples from the same target population. CIs that include 1 show that there is no statistically significant association between the study variable and the outcome.

RESULTS

Table 1 shows the sample and weighted population characteristics. The majority of the sample represented schoolchildren in the Central Baltimore region, third-grade students, non-Hispanic

whites, those ineligible for free or reduced-fee meals, those with parents' or guardians' having more than 12 years of education, and those with private dental insurance coverage. Less than 10 percent of the sample represented schoolchildren from the Southern and Eastern Shore regions, Hispanics and those with parents' or guardians' with less than 12 years of education. The sample percentages changed when we applied sample weights during the analysis so that the weighted population would match more closely the actual population of the state, in terms of region and age (grade level).

Table 2 describes the prevalence of a dental visit in the previous year and the prevalence of a dental prophylaxis visit in the previous year, stratified by sociodemographic variables. The proportion of schoolchildren who were most likely to have reported any type of dental visit in the last year were those in the Southern region, third-grade students, non-Hispanic whites, those ineli-

TABLE 1

SAMPLE DISTRIBUTION.*†		
CHARACTERISTIC	SAMPLE SIZE (%)	WEIGHTED POPULATION (%)
Overall	2,642 (100.0)	93,776 (100.0)
Region		
I—Western	208 (7.9)	9,718 (10.4)
II—Central D.C.	908 (34.4)	32,780 (35.0)
III—Southern	183 (6.9)	6,120 (6.5)
IV—Central Baltimore	1,118 (42.3)	38,950 (41.5)
V—Eastern Shore	225 (8.5)	6,208 (6.6)
Grade Level		
Kindergarten	1,299 (49.2)	42,026 (44.8)
Third grade	1,343 (50.8)	51,750 (55.2)
Race/Ethnicity		
Non-Hispanic white	1,699 (64.3)	51,962 (55.4)
Non-Hispanic black	760 (28.8)	35,734 (38.1)
Hispanic	183 (6.9)	6,080 (6.5)
Free or Reduced-Fee Meals		
Eligible	734 (27.8)	33,483 (35.7)
Ineligible	1,908 (72.2)	60,293 (64.3)
Parents' or Guardians' Education Level		
Less than 12 years	148 (5.6)	6,516 (6.9)
12 years	592 (22.4)	23,515 (25.1)
More than 12 years	1,902 (72.0)	63,745 (68.0)
Dental Insurance Status		
Private	1,723 (65.2)	57,539 (61.4)
Medicaid/Maryland Children's Health Program	491 (18.6)	22,163 (23.6)
No insurance	428 (16.2)	14,073 (15.0)

* Source: Macek and colleagues.¹¹
† Children with unknown eligibility for free or reduced-fee meals, parents' or guardians' education level, dental visit history, usual source of dental care, dental insurance status, as well as children with unknown or non-Hispanic other race/ethnicity, were excluded from the analysis.

TABLE 2

WEIGHTED PREVALENCE OF ANY DENTAL VISIT AND DENTAL PROPHYLAXIS VISIT AMONG SCHOOLCHILDREN (N = 2,642).^{*†}		
SCHOOLCHILD CHARACTERISTIC	ANY DENTAL VISIT IN PREVIOUS YEAR (% [STANDARD ERROR])	DENTAL PROPHYLAXIS VISIT IN PREVIOUS YEAR (% [STANDARD ERROR])
Overall	74.1 (2.2)	71.3 (2.4)
Region		
I—Western	82.3 (3.8)	78.4 (3.9)
II—Central D.C.	71.7 (2.6)	69.3 (2.8)
III—Southern	86.7 (2.6)	82.1 (2.5)
IV—Central Baltimore	72.3 (4.5)	69.5 (4.9)
V—Eastern Shore	72.8 (5.0)	71.2 (3.9)
Grade Level		
Kindergarten	72.1 (2.4)	68.8 (2.5)
Third grade	75.8 (2.5)	73.3 (2.6)
Race/Ethnicity		
Non-Hispanic white	82.9 (2.1)	80.7 (2.3)
Non-Hispanic black	63.1 (2.5)	59.5 (2.5)
Hispanic	63.6 (3.7)	60.4 (3.4)
Free or Reduced-Fee Meals		
Eligible	58.1 (2.4)	54.2 (2.5)
Ineligible	83.0 (1.8)	80.8 (1.9)
Parents' or Guardians' Education Level		
Less than 12 years	55.0 (5.3)	51.3 (5.4)
12 years	62.7 (3.5)	59.3 (3.9)
More than 12 years	80.2 (2.1)	77.8 (2.2)
Dental Insurance Status		
Private	80.9 (2.2)	78.5 (2.3)
Medicaid/Maryland Children's Health Program	63.2 (2.4)	59.0 (2.6)
No insurance	63.3 (4.4)	61.3 (4.3)

^{*} Source: Macek and colleagues.¹¹
[†] Children with unknown eligibility for free or reduced-fee meals, parents' or guardians' education level, dental visit history, usual source of dental care, dental insurance status, as well as children with unknown or non-Hispanic other race/ethnicity, were excluded from the analysis.

gible for free or reduced-fee meals at school, those with parents' or guardians' having more than 12 years of education, and those with private dental insurance coverage. Similar patterns existed for the prevalence of dental prophylaxis visits.

The prevalence of having a usual source of medical care and the prevalence of having a usual source of dental care are listed in Table 3. In general, non-Hispanic white schoolchildren, those with higher SES, and those with private dental insurance coverage were the most likely to have a usual source of medical and dental care. In addition, the overall prevalence of having a usual source of medical care was higher than the prevalence of having a usual source of dental care.

The range of values across subpopulations was greater for the prevalence of a usual source of dental care than it was for the prevalence of a usual source of medical care. Regarding the usual source of medical care variable, the ranges of prevalence values for region and grade level were small (5.0 and 0.8 percentage points, respectively); however, the ranges of prevalence values for the usual source of dental care variable were 12.2 for region and 7.7 for grade level. In addition, within the race/ethnicity category, the range of values for prevalence of a usual source of medical care was 14.9 percentage points, whereas the range of values for prevalence of a usual source of dental care was 28.3 percentage points.

Table 4 (page 530) describes the adjusted ORs for having had a dental prophylaxis visit in the previous year among schoolchildren. When we controlled for other variables in the multivariate model, we found that only region, grade level, eligibility for free or reduced-fee meals at school and dental insurance status remained signifi-

cantly associated with having had a dental prophylaxis visit in the previous year. Specifically, when we controlled for the effects of other variables, schoolchildren residing in the Southern region were more likely to have reported having a dental prophylaxis visit in the previous year than were those residing in the Eastern Shore region, third graders were more likely to have reported having a dental prophylaxis visit than were kindergarteners, those ineligible for free or reduced-fee meals were more likely to have reported having a dental prophylaxis visit than were eligible schoolchildren, and those with private or Medicaid/MCHP dental insurance coverage were more likely to have reported having a

dental prophylaxis visit than were those with no insurance.

The adjusted ORs for having a usual source of dental care are listed in Table 5 (page 531). Multivariate results show that grade level, race/ethnicity, eligibility for free or reduced-fee meals at school and dental insurance status were significantly associated with a usual source of dental care. Specifically, when we controlled for the effects of other variables, we found that third graders were more likely to have had a usual source of dental care than were kindergarteners, non-Hispanic white and non-Hispanic black children were more likely to have had a usual source of dental care than were Hispanic children, those ineligible for free or reduced-fee meals were more likely to have had a usual source of dental care than were eligible schoolchildren, and those with either private or Medicaid/MCHP dental insurance coverage were more likely to have had a usual source of dental care than were those with no insurance.

DISCUSSION

One problem with describing utilization using the answers to a question that asks only whether a dental visit occurred in the previous year is that this simplistic approach does not give a sense of whether the visits were preventive or episodic in nature. Our study showed that utilization of oral health care services was relatively high among Maryland public schoolchildren in kindergarten and third grade, and there was little difference between utilization for any type of service and utilization for a preventive dental prophylaxis service. This finding demonstrates that the majority of Maryland public schoolchildren are visiting the dentist for preventive services each year, which suggests favorable visit patterns. These findings were consistent with national esti-

mates for those younger than 19 years of age, as the 1996 Medical Expenditure Panel Survey (MEPS) showed that approximately 80 percent of dental visits in the United States were for a preventive or diagnostic service.¹³

Although our findings are consistent with 1996 MEPS, they showed a much higher correlation (96 percent) between the reporting of a preventive or diagnostic dental visit and the reporting of any type of dental visit. It is possible that our study participants overreported preventive dental visits; however, there was no way for us to assess this possibility, as the Maryland Survey 2000-2001 did not have access to claims data or patient records for validation purposes. Whether these

TABLE 3

WEIGHTED PREVALENCE OF USUAL SOURCE OF MEDICAL CARE AND USUAL SOURCE OF DENTAL CARE AMONG SCHOOLCHILDREN (N = 2,642). *†		
SCHOOLCHILD CHARACTERISTIC	USUAL SOURCE OF MEDICAL CARE (% [STANDARD ERROR])	USUAL SOURCE OF DENTAL CARE (% [STANDARD ERROR])
Overall	96.0 (0.6)	82.9 (1.9)
Region		
I—Western	97.1 (0.7)	87.8 (3.5)
II—Central D.C.	93.8 (1.3)	81.4 (2.8)
III—Southern	98.4 (0.9)	93.2 (0.5)
IV—Central Baltimore	96.8 (0.7)	81.0 (3.4)
V—Eastern Shore	98.8 (0.6)	85.3 (6.5)
Grade Level		
Kindergarten	96.5 (0.8)	78.6 (2.5)
Third grade	95.7 (0.8)	86.3 (1.9)
Race/Ethnicity		
Non-Hispanic white	98.2 (0.4)	90.0 (1.5)
Non-Hispanic black	95.0 (1.0)	76.0 (2.4)
Hispanic	83.3 (3.3)	61.7 (4.1)
Free or Reduced-Fee Meals		
Eligible	91.9 (1.1)	69.3 (2.4)
Ineligible	98.3 (0.4)	90.3 (1.3)
Parents' or Guardians' Education Level		
Less than 12 years	85.4 (3.1)	68.1 (6.2)
12 years	94.7 (1.0)	73.7 (3.6)
More than 12 years	97.6 (0.5)	87.7 (1.5)
Dental Insurance Status		
Private	98.0 (0.5)	89.6 (1.5)
Medicaid/Maryland Children's Health Program	94.9 (0.9)	73.7 (2.8)
No insurance	89.6 (2.2)	69.4 (4.5)

* Source: Macek and colleagues.¹¹
† Children with unknown eligibility for free or reduced-fee meals, parents' or guardians' education level, dental visit history, usual source of dental care, dental insurance status, as well as children with unknown or non-Hispanic other race/ethnicity, were excluded from the analysis.

TABLE 4

ADJUSTED ODDS RATIOS FOR HAVING HAD A DENTAL PROPHYLAXIS VISIT IN THE PREVIOUS YEAR AMONG SCHOOLCHILDREN (N = 2,642). *†		
CHARACTERISTIC	ADJUSTED‡ ODDS RATIO	95% CI§
Region		
I—Western	1.2	0.8 to 1.9
II—Central D.C.	1.2	0.9 to 1.6
III—Southern	1.5¶	1.1 to 2.0¶
IV—Central Baltimore	1.2	0.8 to 1.8
V—Eastern Shore	Reference	—
Grade Level		
Third grade	1.3¶	1.1 to 1.6¶
Kindergarten	Reference	—
Race/Ethnicity		
Non-Hispanic white	1.5	0.9 to 2.4
Non-Hispanic black	0.8	0.5 to 1.2
Hispanic	Reference	—
Free or Reduced-Fee Meals		
Ineligible	2.1¶	1.5 to 3.0¶
Eligible	Reference	—
Parents' or Guardians' Education Level		
More than 12 years	1.7	0.9 to 3.1
12 years	1.1	0.5 to 2.2
Less than 12 years	Reference	—
Dental Insurance Status		
Private	1.8¶	1.3 to 2.5¶
Medicaid/Maryland Children's Health Program	1.7¶	1.2 to 2.6¶
No insurance	Reference	—

* Source: Macek and colleagues.¹¹
† Children with unknown eligibility for free or reduced-fee meals, parents' or guardians' education level, dental visit history, usual source of dental care, dental insurance status, as well as children with unknown or non-Hispanic other race/ethnicity, were excluded from the analysis.
‡ Controlling for other variables in the multivariate model.
§ CI: Confidence interval.
¶ Statistically significant odds ratios are at the $P \leq .05$ level.

findings reflected true preventive care utilization, it is likely that the majority of Maryland's kindergarten and third-grade public schoolchildren who visited the dentist followed regular dental visit patterns as opposed to episodic visit patterns. Had we been able to measure the receipt of diagnostic services, instead of dental prophylaxes, the findings likely would have been similar.

Despite favorable and high utilization patterns overall, our study's findings also showed that disparities in utilization existed across sociodemographic groups. When we controlled for other variables in the multivariate model, we found that older children were more likely to have had a dental prophylaxis visit in the previous year than were younger children, and those who were ineligible for free or reduced-fee meals and those with

some form of dental insurance were more likely to have had a dental prophylaxis visit than were children who were eligible for free or reduced-fee meals and those without insurance. The relation between grade level (or age) and the likelihood of receiving a prophylaxis might have been explained by the fact that older children were more likely to visit a dentist than were younger children.¹⁴ The correlation between SES and the likelihood of receiving a dental prophylaxis likely was due to a direct interplay between SES and health-seeking behaviors reported in other studies.¹⁵ The association between SES and having received a dental prophylaxis also was consistent with estimates from the 1996 MEPS, which showed that nonpoor children and adolescents were significantly more likely to have received a preventive or diagnostic service than were their poor and near-poor counterparts.¹⁶ The statistically significant association between having some form of dental insurance and receipt of dental prophylaxis was not surprising, given that dental prophylaxis is a covered benefit in most dental insurance plans.

Another explanation for the disparities in utilization, especially among those in the low SES populations, was the lack of public awareness and appreciation for oral health care among the poor. A 2000 study of Maryland Head Start children showed that 40 percent of parents who had never taken their child to a dentist reported that their child was too young,¹⁷ a finding that is contrary to recommendations by the American Academy of Pediatric Dentistry.¹

We found that Maryland public schoolchildren in kindergarten and third grade were more likely to report having a usual source of medical care than they were to report having a usual source of

some form of dental insurance were more likely to have had a dental prophylaxis visit than were children who were eligible for free or reduced-fee meals and those without insurance. The relation between grade level (or age) and the likelihood of receiving a prophylaxis might have been explained by the fact that older children were more likely to visit a dentist than were younger children.¹⁴ The correlation between SES and the likelihood of receiving a dental prophylaxis likely was due to a direct interplay between SES and health-seeking behaviors reported in other studies.¹⁵ The association between SES and having received a dental prophylaxis also was consistent with estimates from the 1996 MEPS, which showed that nonpoor children and adolescents were significantly more likely to have received a preventive or diagnostic service than were their poor and near-poor counterparts.¹⁶ The statistically significant association between having some form of dental insurance and receipt of dental prophylaxis was not surprising, given that dental prophylaxis is a covered benefit in most dental insurance plans.

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We found that Maryland public schoolchildren in kindergarten and third grade were more likely to report having a usual source of medical care than they were to report having a usual source of

dental care. In addition, we found that there were fewer disparities across population subgroups for having a usual source of medical care than there were for having a usual source of dental care. These findings might have been indicative of the number of medical care safety nets that exist for low-SES children in the United States as compared with the relatively small number of dental care safety nets. Although Medicaid and SCHIP provide both medical and dental benefits to poor and near-poor children in the United States, children are much more likely to receive medical care.

The reasons for disparities in health care coverage in the United States are multifactorial and complex. Foremost is the considerably lower amount of federal and state funding for Medicaid and SCHIP for oral health care as compared with funding for Medicaid and SCHIP for medical care.¹⁸ The relatively lower level of funding and consequentially lower reimbursement rates for oral health care services have resulted in a short supply of dentists participating in Medicaid and SCHIP. In addition, in many states, Medicaid oral health care benefits tend to be more limited in scope than are Medicaid medical benefits, which puts additional constraints on practicing dentists.¹⁸

Another reason for disparities in health care coverage is that Medicaid-eligible children in need of oral health care are very young. General dentists reported not being trained adequately to deal with the needs of young children and chose not to accept them into their practices as a result.¹⁹ While young children would benefit from the specialized services of pediatric dentists, few of these specialists treat Medicaid-eligible young children in their practices.²⁰ By contrast, pediatri-

cians are more willing to provide medical care to Medicaid-eligible young children.²¹

The findings from our study were subject to three limitations. The first was that we had no way to validate the self-reported dental visit data via review of claims data, patient records or both. The second limitation was related to the difficulty respondents might have had in correctly identifying a "usual source of care." For example, it was possible that respondents who visited a dentist in the previous year would classify this practitioner as his or her usual source of dental care simply because they had visited the practitioner in the recent past. Our findings showed that the presence of this "simultaneity bias"²² was at least pos-

TABLE 5

ADJUSTED ODDS RATIOS FOR HAVING A USUAL SOURCE OF DENTAL CARE AMONG SCHOOLCHILDREN (N = 2,642).*†		
SCHOOLCHILD CHARACTERISTIC	ADJUSTED‡ ODDS RATIO	95% CI§
Region		
I—Western	1.0	0.3 to 3.0
II—Central D.C.	1.0	0.4 to 2.6
III—Southern	1.7	0.7 to 4.4
IV—Central Baltimore	0.9	0.4 to 2.4
V—Eastern Shore	Reference	—
Grade Level		
Third grade	2.0¶	1.5 to 2.8¶
Kindergarten	Reference	—
Race/Ethnicity		
Non-Hispanic white	3.0¶	1.9 to 5.0¶
Non-Hispanic black	1.8¶	1.0 to 3.1¶
Hispanic	Reference	—
Free or Reduced-Fee Meals		
Ineligible	2.5¶	1.6 to 3.9¶
Eligible	Reference	—
Parents' or Guardians' Education Level		
More than 12 years	1.2	0.6 to 2.6
12 years	0.9	0.4 to 1.9
Less than 12 years	Reference	—
Dental Insurance Status		
Private	3.1¶	2.3 to 4.1¶
Medicaid/Maryland Children's Health Program	2.5¶	1.6 to 3.9¶
No insurance	Reference	—

* Source: Macek and colleagues.¹¹
† Children with unknown eligibility for free or reduced-fee meals, parents' or guardians' education level, dental visit history, usual source of dental care, dental insurance status, as well as children with unknown or non-Hispanic other race/ethnicity, were excluded from the analysis.
‡ Controlling for other variables in the multivariate model.
§ CI: Confidence interval.
¶ Statistically significant odds ratios are at the $P \leq .05$ level.

sible, since the multivariate regression models for dental visits and presence of a usual source of dental care were similar. One indication that simultaneity bias might not have affected our investigation, however, was the fact that race/ethnicity was significantly associated with having a usual source of dental care, but it was not significantly associated with having had a dental prophylaxis visit.

The third limitation of our study was that the response rate was relatively low, and this low rate was not distributed evenly across population subgroups. Census statistics for Maryland²³ showed that the study sample had a higher proportion of Hispanic participants than existed in the state's actual population (7 and 4 percent, respectively). In addition, sample schoolchildren were more likely to be ineligible for free or reduced-fee meals at school, more likely to have parents or guardians with more than 12 years of education, and more likely to have private dental insurance coverage than were the average schoolchildren comprising the state's actual population.⁶ Although we weighted the survey data to account for sample design factors and response rates, the sample weights used in the analysis may not have accounted completely for differences between the sample and the target population, in terms of race/ethnicity and SES.

While these three limitations existed, this investigation had its strengths. Even though two school districts chose not to participate, the study findings were representative of the remaining kindergarten and third-grade public schoolchildren in Maryland. In addition, the multivariate analysis of predictors for having had a dental prophylaxis visit in the previous year and having a usual source of dental care controlled for potential confounding and provided a clearer picture of the influence that study variables had on the outcomes.

CONCLUSIONS

The population group that was the most likely to receive regular, preventive oral health care services was children of parents or guardians who recognized the importance of primary prevention and translated that awareness into action. Gibson and colleagues²⁴ described the cognitive processes of parents or guardians who seek services in a cycle of six phases: recalling, responding, inducing, waiting, inducing again and telling. The possible outcomes of this cycle are maintaining

oral health, sustaining oral health and an additional checking cycle.

The challenge for dentistry and dental public health professionals is to determine which characteristics are unique to those who regularly schedule dental appointments versus those who receive only emergency or episodic care. Additional research is needed to understand the dynamic and complex nature of this six-phase cycle and how it affects behavior change. In addition, research is needed to understand the relationship between the public's attitudes toward and awareness of oral health care and utilization of services. ■

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1. American Academy of Pediatric Dentistry. Frequently asked questions. Chicago: American Academy of Pediatric Dentistry, 2003. Available at: "www.aapd.org/providers/faq.asp". Accessed June 10, 2003.

2. U.S. Department of Health and Human Services. Healthy people 2010. 2nd ed. With understanding and improving health and objectives for improving health. Washington: Government Printing Office, 2000:21-27-21-9.

3. Soxman JA. The first dental visit. *Gen Dent* 2002;50(2):148-55.

4. Macek MD, Edelstein BL, Manski RJ. An analysis of dental visits in U.S. children, by category of service and sociodemographic factors, 1996. *Pediatr Dent* 2001;23:383-9.

5. Edelstein BL, Manski RJ, Moeller JF. Pediatric dental visits during 1996: an analysis of the federal Medical Expenditure Panel Survey. *Pediatr Dent* 2000;22(1):17-20.

6. Manski RJ, Macek MD, Moeller JF. Private dental coverage: who has it and how does it influence dental visits and expenditures? *JADA* 2002;133:1551-9.

7. Yu SM, Bellamy HA, Schwalberg RH, Drum MA. Factors associated with use of preventive dental and health services among U.S. adolescents. *J Adolesc Health* 2001;29:395-405.

8. Manski RJ, Edelstein BL, Moeller JF. The impact of insurance coverage on children's dental visits and expenditures, 1996. *JADA* 2001; 132:1137-45.

9. U.S. Department of Health and Human Services, National Institutes of Health, National Institute of Dental and Craniofacial Research. Oral health in America: A report of the surgeon general. Washington: U.S. Department of Health and Human Services; May 2000:61-93.

10. Vargas CM, Ronzio CR. Relationship between children's dental needs and dental care utilization: United States, 1988-1994. *Am J Public Health* 2002;92:1816-21.

11. Macek MD, Wagner ML, Goodman HS. Survey of the oral health

status of Maryland school children, 2000-2001. Baltimore: University of Maryland Dental School; 2002.

12. U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Health Statistics. Survey questionnaires. National Health Interview Survey, 1999. Available at: "ftp://ftp.cdc.gov/pub/Health_Statistics/NCHS/Survey_Questionnaires/NHIS/1999". Accessed Nov. 19, 2003.

13. Manski RJ, Moeller JF. Use of dental services: an analysis of visits, procedures, and providers, 1996. *JADA* 2002;133(2):167-75.

14. Bloom B, Gift HC, Jack SS. Dental services and oral health: United States, 1989. Hyattsville, Md.: U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control and Prevention; 1992:23-8. DHHS publication no. (PHS)93-1511. *Vital Health Stat*; series 10, no. 183.

15. Adler NE, Newman K. Socioeconomic disparities in health: pathways and policies. Inequalities in education, income, and occupation exacerbate the gaps between the health 'haves' and 'have-nots.' *Health Aff(Millwood)* 2002;21(2):60-76.

16. Watson MR, Manski RJ, Macek MD. The impact of income on children's and adolescents' preventive dental visits. *JADA* 2001;132:1580-7, 1597.

17. Vargas CM, Monajemy N, Khurana P, Tinanoff N. Oral health status of preschool children attending Head Start in Maryland, 2000.

Pediatr Dent 2002;24:257-63.

18. Manski RJ, Moeller JF, Maas WR. Dental services. A analysis of utilization over 20 years. *JADA* 2001;132:655-64.

19. Cotton KT, Seale NS, Kanellis MJ, Damiano PC, Bidaut-Russell M, McWhorter AG. Are general dentists' practice patterns and attitudes about treating Medicaid-enrolled preschool age children related to dental school training? *Pediatr Dent* 2001;23(1):51-5.

20. Edelstein BL. Dental care considerations for young children. *Spec Care Dentist* 2002;22(3 supplement):11S-25S.

21. Berman S, Dolins J, Tang SF, Yudkowsky B. Factors that influence the willingness of private primary care pediatricians to accept more Medicaid patients. *Pediatrics* 2002;110(2 Pt 1):239-48.

22. Davidson PL, Cunningham WE, Nakazono TT, Anderson RM. Evaluating the effect of usual source of dental care on access to dental services: comparisons among diverse populations. *Med Care Res Rev* 1999;56(1):74-93.

23. U.S. Census Bureau. United States Census 2000. Census 2000 data for the state of Maryland. Available at: "www.census.gov/census2000/states/md.html". Accessed June 14, 2003.

24. Gibson BJ, Drennan J, Hanna S, Freeman R. An exploratory qualitative study examining the social and psychological processes involved in regular dental attendance. *J Public Health Dent* 2000;60(1):5-11.