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Effect of Medicaid/SCHIP and WIC on Oral Health of Low-Income Children

by

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Department of Epidemiology and Community Health  
Master of Public Health Program  
MPH Research Project: EPID 691

Virginia Commonwealth University  
Richmond, Virginia

August/2005

**Master of Public Health**  
**Research Project Agreement Form**  
Department of Epidemiology and Community Health

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Number of semester hours (3-6): 3 Semester: Summer Year: 2005

Please complete the following outline. Do not exceed 2 pages (A-H).

**A. PROJECT TITLE:**

Effect of Medicaid and WIC on the Oral Health of Low-Income Children

**B. PURPOSE** (state research question):

The purpose of this study is to examine the impact of two public health programs, Medicaid and WIC, on the prevalence of dental caries among low-income preschool children 2-5 years old who participated in NHANES in 1999-2000 and 2001-2002.

**C. SPECIFIC OBJECTIVES** (list major aims of the study):

- 1) To determine the prevalence of dental caries among children, 2-5 years old.
- 2) To examine how participation in Medicaid and WIC are related to the prevalence of dental caries among children aged 2-5 years old.

**D. DESCRIPTION OF METHODS**

*D.1. Identify source(s) of data (eg, existing data set, data collection plans, etc):*  
NHANES in 1999-2000 and 2001-2002

*D.2. State the type of study design (eg, cross-sectional, cohort, case-control, intervention, etc):*  
Cross-sectional

*D.3. Describe the study population and sample size:*

N=1500 children 2-5 years old who participated in Medicaid only, in both Medicaid and WIC, in WIC only, and in neither.

*D.4. List variables to be included (If a qualitative study, describe types of information to be collected)*

Main outcome variables: oral caries in primary dentition, dental hygiene.

Main Independent Variables: Participation in Medicaid, WIC, both, and neither.

Covariates and Possible Confounders: age; race; gender; poverty index; time elapsed since last dental visit; overall health status; quality of diet; age at weaning; breast/formula fed; birth

weight, BMI-for-age at time of exam; country of birth; parent/referent person's education level; parent/referent person's country of birth; parent/referent person's perception of the child's overall health; parent/referent person's perception of the child's oral health.

*D.5. Describe methods to be used for data analysis (If a qualitative study, describe general approach to compiling the information collected)*

Univariate statistics will be used to describe the data and determine the prevalence of dental caries among the population. Crude OR and 95% CI will be calculated to determine the association between the outcome variables and the covariates. Multivariate Logistic Regression will be used to test the hypothesis with an adjusted OR and 95% CI controlling for possible confounders.

**E. ANTICIPATED RESULTS:**

It is hypothesized that, due to an improved connection to the healthcare system through WIC, children participating in both WIC and Medicaid will have better oral health than the other groups, and those who participate in neither will have the worst.

**F. SIGNIFICANCE OF PROJECT TO PUBLIC HEALTH:**

It is important to assess the impact of these two federally financed programs on children's oral health in order to have an improved understanding of how to utilize a support network of public health programs to battle dental diseases. Although tooth decay is preventable, it is the most prevalent disease among children. Dental caries negatively impacts the quality of life of many children and requires care for associated complications, which incurs great financial costs for society. Children are suffering from deteriorating oral health despite a nationally decreasing trend of dental caries. Special efforts must be made to help low-income children, as they suffer a disproportionate share of oral infections, with 20-25% of all children experiencing 80% of all decayed teeth. Children who develop oral caries lose approximately 52 million school hours a year and are at risk for cavities in permanent teeth. Chronic oral infections are also associated with diabetes, heart and lung disease, stroke, and low-birth-weight premature births.

**G. IRB Status:**

- 1) Do you plan to collect data through direct intervention or interaction with human subjects?  yes  no
- 2) Will you have access to any existing identifiable private information?  yes  no

If you answered "no" to both of the questions above, IRB review is not required.

If you answered "yes" to either one of these questions, your proposed study must be reviewed by the VCU Institutional Review Board (IRB). Please contact Dr. Turf or Dr. Buzzard for assistance with this procedure.

Please indicate your IRB status:

- to be submitted (targeted date \_\_\_\_\_)
- submitted (date of submission \_\_\_\_\_; VCU IRB # \_\_\_\_\_)
- IRB exempt review approved (date \_\_\_\_\_)
- IRB expedited review approved (date \_\_\_\_\_)
- IRB approval not required

**H. PROPOSED SCHEDULE:** Start Date: May 2005 Anticipated End Date: Aug. 8, 2005

**I. INDICATE WHICH OF THE FOLLOWING AREAS OF PUBLIC HEALTH KNOWLEDGE WILL BE DEMONSTRATED:**

1. Biostatistics – collection, storage, retrieval, analysis and interpretation of health data; design and analysis of health-related surveys and experiments; and concepts and practice of statistical data analysis. yes no (if yes, briefly describe):  
This study will utilize statistical software and established descriptive and analytical methods to retrieve, merge, and analyze and interpret NHANES interview and examination data.
  
2. Epidemiology – distributions and determinants of disease, disabilities and death in human populations; the characteristics and dynamics of human populations; and the natural history of disease and the biologic basis of health. yes no (if yes, briefly describe):  
This study will assess the prevalence of dental caries among very young children in the US according to: individual characteristics such as race, income level, and education level and individual practices such as breast/formula feeding. These analyses will also identify risk factors for developing dental caries.
  
3. Environmental Health Sciences – environmental factors including biological, physical and chemical factors which affect the health of a community. yes no (if yes, briefly describe):
  
4. Health Services Administration – planning, organization, administration, management, evaluation and policy analysis of health programs. yes no (if yes, briefly describe):  
This study will assess the association between participation in the federal programs Medicaid and WIC and the outcome of dental caries in children.
  
5. Social/Behavioral Sciences – concepts and methods of social and behavioral sciences relevant to the identification and the solution of public health problems. yes no (if yes, briefly describe):  
This study will assess the association between the parent/referent person's perceptions of the child's oral health and overall health and the child's actual oral health. It also looks at the effect of such behaviors as breast or formula feeding, age at weaning, and eating practices on dental caries.

### SIGNATURE PAGE

#### Master of Public Health Research Project

Preceptor: Name: Tegwyn H. Brickhouse, D.D.S., Ph.D. Title: Assistant Professor

Address: Pediatric Dentistry/VCU School of Dentistry

E-mail: \_\_\_\_\_ Phone: \_\_\_\_\_

Field of expertise: Pediatric Dentistry, Access to Care

*This work is dedicated to my loving husband Mostafa and son Ibraheem.*

## *Table of Contents*

Introduction	1
Objectives	3
Methods	4
Results	8
Discussion	10
Conclusion	14
Tables	15
Appendix: List of Original NHANES Variables	20
References	24

## Abstract

*Objectives.* Oral caries is the most prevalent chronic disease among US children, and disproportionately impacts those of low socioeconomic status. Studies have shown that the Special Supplemental Nutrition Program for Women Infants and Children (WIC) improves access to dental care among Medicaid children. This study investigated the impact of WIC, Medicaid, and the State Children's Health Insurance Program (SCHIP) on the prevalence of dental caries among low-income children.

*Methods.* The 1999-2000 and 2001-2002 NHANES data were utilized for this analysis. Children 2-4 years old who participated in WIC, Medicaid, or SCHIP, or who were uninsured, and for whom both interview and complete oral health exam data were available (n = 597) were included in the study. Multivariate logistic regression modeling was conducted to examine the effects of program participation on caries.

*Results.* There was no statistically significant association between dental caries and participation in public assistance programs. The risk of dental caries for children in Medicaid/SCHIP only was comparable to the risk for children in WIC and Medicaid/SCHIP (OR = 1.04; 95%CI = 0.622, 1.745) and also to uninsured children (OR = 0.96; 95%CI = 0.523, 1.773). Dental caries were not impacted if the child did not have a preventive dental visit in the past 6 months (OR = 0.68; 95% CI = 0.436, 1.063) or did not have a regular dental care provider (OR = 1.15; 95% CI = 0.646, 2.044).

*Conclusions.* Participation in WIC and Medicaid/SCHIP does not improve the oral health of low-income children. Because this population is a high-risk group requiring more specialized efforts, improving access to care is not sufficient to improve oral health. In addition to increased utilization of services, the program partnership between WIC and Medicaid/SCHIP must provide targeted, educational interventions to prevent dental caries. It may also be necessary to increase the recommended number of preventive visits for low-income children.

## Introduction

Dental caries is the most prevalent chronic disease among US children, and disproportionately impacts those of low socioeconomic status.<sup>1-3</sup> Although tooth decay is a preventable disease, it negatively impacts the quality of life of many children and requires care for associated complications, which incurs great financial costs for society. Children who develop dental caries lose approximately 52 million school hours a year and are at risk for cavities in permanent teeth.<sup>8-9</sup> Chronic oral infections are also associated with diabetes, heart and lung disease, stroke, and low-birth-weight premature births.<sup>8</sup>

Special efforts must be made to help low-income children, as they suffer a disproportionate share of oral infections, with 20-25% of children experiencing 80% of all decayed teeth.<sup>9</sup> This prevalence persists despite comprehensive oral health coverage available to the poor through Medicaid's Early Periodic Screening, Diagnosis, and Treatment (EPSDT) benefit. Although children with dental insurance generally have increased access to care, Medicaid enrollees are comparable to the uninsured,<sup>4</sup> with only 20% of eligible children receiving preventive services.<sup>5</sup> The State Children's Health Insurance Program (SCHIP) is another program that was created to cover more uninsured children. SCHIP was created to address the gap in coverage for children of the working poor who earn too much to qualify for Medicaid and too little to afford purchasing insurance. Each state has the option to design its SCHIP program and all but two — Colorado and Delaware — have included a minimum of preventive, diagnostic, basic, and restorative dental services. Florida's SCHIP offers dental services on a county-by-county basis.<sup>29</sup> A child cannot be enrolled in Medicaid and SCHIP simultaneously.

In order to curb the high prevalence of tooth decay among low-income children, efforts are being made to improve utilization of Medicaid/SCHIP benefits. The Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) is a federally funded program that may have the potential to help address this problem.

Each month, WIC assists 8 million low-income women, infants, and children up to age five, by striving to provide nutritious foods to supplement diets, information on healthy eating, and referrals to health care.<sup>10-11</sup> Participation in WIC has been associated with improved birth outcomes,<sup>12-15</sup> initiation, although not duration, of breastfeeding,<sup>16-17</sup> adequate infant growth, household food security,<sup>18-19</sup> higher immunization rates,<sup>21</sup> the likelihood of having at least four well-child visits,<sup>16</sup> and improved nutrition independent of the receipt of food stamps.<sup>19-20</sup>

The “net effect” of both Medicaid and WIC has been shown to be more beneficial than Medicaid alone in the case of improving infant mortality.<sup>22</sup> This combinatorial effect could also play a role in improving oral health outcomes. WIC has the potential to improve children’s oral health, both through its Infant Oral Health Educational Program (IOHEP),<sup>23</sup> and by improving access to dentists through its referral efforts.<sup>7,27-28</sup>

Two studies in North Carolina have shown that children enrolled in Medicaid who also participated in WIC were more likely to utilize Medicaid’s dental benefits,<sup>6</sup> including having a dental visit and using preventive and restorative rather than emergency oral health services.<sup>7</sup> However, it is unknown whether the combinatorial power of WIC and Medicaid exists outside of North Carolina, and, more importantly, it is yet undetermined whether this relationship leads to improved oral health outcomes, namely fewer dental caries. Until now, it has only been speculated that the association between WIC and increased utilization of Medicaid dental services results in improved oral health.

## **Objectives**

The purpose of this study is to investigate the impact of the public assistance programs Medicaid/SCHIP and WIC on dental caries among low-income preschool children 2-4 years old who participated in the National Health and Nutrition Examination Survey (NHANES) in 1999-2000 and 2001-2002.

It is hypothesized that Medicaid/SCHIP and WIC together offer more protection against caries than Medicaid/SCHIP alone. Due to an improved connection to the healthcare system through WIC, combined with the dental coverage offered through Medicaid/SCHIP, children participating in both Medicaid/SCHIP and WIC will have better oral health than children only in Medicaid/SCHIP. It is also expected that children in Medicaid/SCHIP will have better oral health than uninsured children.

## Methods

### *Data*

Data from NHANES 1999-2000 and 2001-2002 were used for this study. NHANES is a cross-sectional survey of a stratified multistage probability sample of U.S. civilian, non-institutionalized persons. NHANES was created to collect health and nutrition information and, beginning in 1999, became a continuous, annual survey rather than a periodic one. As is recommended, this study combines the two cycles to form one study population of 1999-2002 in order to maximize sample size and statistical reliability. The variables collected for the larger analysis are identical between both surveys.

Data were collected through in-home, personal interviews, and in the Mobile-Examination Centers, where participants had physical and dental examinations, and laboratory tests. The specifics of the data collection procedures have been published elsewhere.<sup>(30)</sup>

The two surveys interviewed and examined 19,759 participants, age 2 months and older. The current study excluded participants who were interviewed but not examined (n = 1,245). Data were extracted on children 2-4 years old who participated in Medicaid/SCHIP or who were uninsured, and for whom both interview and complete oral health exam data were available (n = 597).

This age group was selected because: (i) Oral health examinations were conducted on participants who were 2 years of age and older; (ii) Children are eligible to participate in WIC up until their fifth birthday; (iii) This age group has the lowest rates of utilization of dental services;<sup>24</sup> (iv) Early intervention is critical, as children's developmental processes are especially

vulnerable to diseases gone untreated;<sup>9</sup> and (v) Children who receive earlier preventive dental visits incur less dental costs, which translates into substantial savings for their state.<sup>25-26</sup>

### *Measurements*

This study utilized measures of caries experience (dependent variable), participation in Medicaid/SCHIP and/or WIC or uninsured (independent variable), and demographic and behavioral characteristics (covariates) that have previously been identified as potential confounders.

Comparisons were made between the caries experiences of children in three groups: those who participated in Medicaid/SCHIP only, in both WIC and Medicaid/SCHIP, and those who were uninsured.

### *Dental Caries*

The dentition portion of the oral health examination included a Coronal Caries variable for each tooth of each participant, giving detailed information about the condition of the tooth, including if it has erupted and whether or not it has caries. These variables were used to construct a score for each child to represent the sum of decayed and filled primary teeth (dft). The term 'decayed' describes a tooth with untreated caries, while 'filled' refers to a tooth with treated caries. As children have at most 20 primary teeth, the dft index ranges from 0 to a highest possible score of 20.

### *Public Assistance Program Participation*

NHANES collected information on children's participation in Medicaid/SCHIP and WIC and their insurance coverage. These three variables were used to create the main explanatory variable of participation in Medicaid/SCHIP only, in WIC and Medicaid/SCHIP, and uninsured. Participation in WIC was measured by asking if the child received WIC benefits within the 12 months prior to the interview.

### *Individual Characteristics*

The demographic characteristics that were chosen based on their potential to influence caries experience are: race/ethnicity (non-Hispanic White, non-Hispanic Black, Mexican-American, other race including multiracial); mother's age when born (<19, 19 or more); and mother smoked during pregnancy.

Age was coded in months from 2 months to 234 months (19.5 years) and was collapsed into three intervals (2 to <3, 3 to <4, 4 to <5 years). Age was recorded twice, both at the interview and examination. This study used the latter value for age.

The Poverty Income Ratio variable was calculated for each participant by taking a ratio of family income to the Federal Poverty Level (FPL), which is reported annually by the Census Bureau. It is the preferred variable when comparing family incomes over time because it is relatively standardized for the effects of inflation. The poverty categories created for this analysis correspond to those used to determine eligibility for public assistance programs: 'poor' includes children with an adjusted family income at or below 100% of the FPL (PIR of 0 - 1) and 'working poor' includes children with incomes above the FPL (PIR of >1).

Age at weaning was created by combining two variables that asked when the child stopped receiving breast milk and formula. It was categorized by 14 months or less and 15 months or more, in accordance with the American Academy of Pediatric Dentistry's (AAPD) recommendation to wean at 12-14 months of age.<sup>31</sup>

#### *Utilization of Dental Services*

Two dental utilization variables were included as potential covariates. If the child had a preventive dental visit in the 6 months prior to the survey was created by combining the information from two variables: time elapsed since last dental visit and main reason for last dental visit. The second dental utilization covariate was if the child has a regular source of dental care.

#### *Analysis*

Data analysis was performed using SAS Version 9.1. A bivariate analysis was used to describe the data by assessing children's caries experience by the selected covariates. Bivariate comparisons were made between children's caries experience and all selected explanatory variables. This analysis tested the relationship between participation in selected public assistance programs and caries experience using a crude Odds Ratio (OR) and 95% Confidence Interval (CI).

The final analysis fitted a multivariate logistic regression model to the data to control for possible confounders, which permitted an assessment of the independent effects of participation in WIC and Medicaid/SCHIP on children's dental caries. This analysis tested the hypothesis with an adjusted OR and 95% CI.

## Results

The study population included 597 children, of which approximately 27.2% had decayed or filled teeth (mean dft = 1.11, SD = 2.540). Table 1 shows the total number and percent of children in each category and further describes them by their dental caries experience. The population was comprised of 41.2% two-year-olds, 32.7% three-year-olds, and 26.1% four-year-olds. The children were 21.1% White, 34.0% Black, 36.9% Mexican-American, and 8.0% other. Their PIRs were 63.3% poor and 36.7% working poor. Approximately 13.8% of children were weaned after the recommended 14 months of age. In regard to maternal characteristics, 22.5% were 18 or younger at the time of the child's birth and 18.7% smoked during pregnancy. In regard to utilization of dental services, only 17.9% of children had a preventive dental visit in the past 6 months and 65.5% reported having a regular source of dental care. Approximately 23.1% of children participated in Medicaid/SCHIP only, 48.1% in WIC and Medicaid/SCHIP, and 28.8% were uninsured. The prevalence of dental caries was higher among children who reported a preventive dental visit in the past 6 months (38.2%) as compared to those who did not (29.6%). The prevalence of caries also increased with age and decreasing income. The proportion of children who had dental caries was comparable between uninsured children (31.4%) and those enrolled in Medicaid/SCHIP (30.4% and 28.9%)

Table 2 illustrates the likelihood of having dental caries by individual characteristics and dental utilization behavior and also by participation in Medicaid/SCHIP and WIC. Older children were more likely to have dental caries, where, compared to two-year-olds, three-year-old children were more than 2.5 times as likely (OR = 2.76; 95% CI = 1.742, 4.371) and four-year-old children were more than 5.5 times as likely (OR = 5.65; 95% CI = 3.531, 9.036) to have

caries. The likelihood of caries was not impacted by race (compared to white children, Non-Hispanic Black: OR = 0.78; 95% CI = 0.473, 1.275; Mexican American: OR = 1.32; 95% CI = 0.828, 2.116; Other: OR = 0.61; 95%CI = 0.276, 1.348). Poor children were more likely than the working poor to have caries (OR = 1.67; 95% CI = 1.127, 2.487). Not having had a preventive dental visit in the past 6 months was significantly associated with a decreased risk of caries (OR = 0.59; 95% CI = 0.387, 0.902). Dental utilization did not impact caries. Children who did not have had a preventive dental visit in the past 6 months were equally as likely to have caries as those who did (OR=0.68, 95%CI = 0.436, 1.063). Similarly, those who did not report a regular source of dental care were equally as likely to have caries as those who did (OR = 1.15; 95% CI = 0.646, 2.044).

Table 3 presents results from the logistic regression model associating dental caries with participation in Medicaid/SCHIP and WIC after controlling for individual and dental utilization covariates. Compared to participating in Medicaid/SCHIP only, other categories of program participation did not have a significant effect on caries experience (WIC and Medicaid/SCHIP: OR = 1.04; 95% CI = 0.622, 1.745; Uninsured: OR = 0.96; 95% CI = 0.523, 1.773). Age played significant roles in the adjusted analysis. Compared to two-year olds, three-year olds were more than 2.5 times as likely (OR = 2.77; 95% CI = 1.678, 4.560) and four-year olds were 6.5 times as likely to have caries (OR = 6.58; 95% CI = 3.916, 11.050). Poor children were more likely to have caries (OR = 1.88; 95% CI = 1.207, 2.921) than children of the working poor. Caries risk was not impacted by race, age weaned, mother's age when born, or if the mother smoked during pregnancy.

## Discussion

This is the first study to compare the relationship between children's participation in WIC and Medicaid/SCHIP and the outcome of dental caries. Previous studies concluded that children who participated in both WIC and Medicaid had increased access to oral health services via increased utilization of dental services compared to children who were enrolled in Medicaid only.<sup>6,7</sup>

It could be assumed that this relationship would confer protection against dental caries for children who participated in both programs. However, our findings show that program participation did not have an effect on children's dental caries. Children who participated in WIC and Medicaid/SCHIP and who were uninsured were each equally as likely to have dental caries as children who participated in Medicaid/SCHIP only. Furthermore, neither of the two dental utilization variables – having had a preventive dental visit in the last 6 months and having a regular dental care provider – impacted children's dental caries.

These findings indicate that, even if WIC and Medicaid/SCHIP work well together to improve access to dental care, this alone may not be enough to improve the oral health of the high-risk population that these programs serve. It is important for WIC or Medicaid/SCHIP to supplement the services provided by oral health care professionals with education about how to prevent future caries and also to maintain the current fillings in good condition by promoting healthy behaviors.

In addition to incorporating an oral health educational component, the effort to improve low-income children's oral health may also benefit from recommending more frequent dental

visits. Having one preventive dental visit every 6 months, which is the recommended number for the general population, may not be sufficient to meet the oral health care needs of this high-risk group. After being treated by a dentist, children with poor oral hygiene, especially when combined with a poor diet high in acidic sodas and other sugary foods can quickly develop new carious lesions as well as compromise the integrity of existing fillings. Poor children suffer a disproportionate risk of these poor oral health behaviors<sup>36-37</sup> and so need more specialized education and more preventive visits.

Another obstacle to improving this population's oral health is the belief that poor oral health among children is to be expected,<sup>32</sup> which leads to the utilization of oral health services in response to emergency situations, rather than for preventive treatment. Restorative care is much more expensive and time consuming to treat and also more painful for the child than is preventive care.<sup>25-26</sup> Despite this knowledge, only 20.7% of the children had the recommended preventive visit in the past 6 months, and surprisingly, they were not less likely to have dental caries. Those children who reported having a regular dental caregiver were also not less likely to have caries. These findings may indicate that children's caretakers are waiting until caries have developed before beginning a relationship with an oral health care provider. In order to benefit most from preventive efforts, it is widely recommended that children make their first visit to the dentist by 1 year of age. The AAPD, American Dental Association (ADA), and the American Public Health Association (APHA) recommend that children be seen by a dentist after the first tooth erupts, but no later than 1 year of age. The American Academy of Pediatrics (AAP) recommends that every child begin receiving oral health risk assessments by 6 months of age from a pediatrician or qualified pediatric health care professional. The AAP further recommends

that every infant identified as being at high risk for developing caries be entered into an aggressive anticipatory guidance and intervention program provided by a dentist at 6-12 months of age.<sup>33</sup>

An additional explanation for the finding of the ineffectiveness of preventive visits is that having a preventive dental visit does not mean that the child received treatment of existing caries. Dentists commonly conduct examinations first and, if the case is not an emergency, schedule a second appointment to provide necessary restorative treatment. This practice may be problematic for this population, as children enrolled in Medicaid are known to frequently miss appointments.<sup>34</sup>

A recent study that identified the important role that caregivers play in children's oral health suggests that oral health problems could be alleviated if providers, Medicaid administrators, and schools work together to supplement professional preventive dental care with the assignment of responsibility to the caregiver for children's overall health.<sup>32</sup> We add to this recommendation the involvement of the WIC program to help empower mothers to protect their children from dental caries and associated complications. Not all WIC clinics have initiatives to improve oral health, and those that do have different program components. One WIC clinic in Texas has succeeded in reducing early childhood caries through the Infant Oral Health Educational Program (IOHEP).<sup>23</sup> Because IOHEP has proven effectiveness, it may be beneficial to expand this program to be offered at all WIC clinics.

### *Limitations*

One limitation of this study is that the data are cross-sectional. Because dental caries is a chronic condition that develops over time, it would be ideal to consider children's participation

in these public assistance programs since birth rather than at one point in time. Participation in WIC was determined based on whether the child had received any WIC benefits in the 12 months prior to the survey. A more accurate determination of WIC participation would have taken into account the frequency and duration of participation over the child's lifetime.

A second limitation is that all of the variables except for dental caries were self-reported, which make it susceptible to recall bias.

The dental utilization variables are limited in both of these ways. While it is informative to know if the child had a preventive visit in the past 6 months or currently has a regular source of dental care, it is more beneficial to know the type, frequency, and time of dental visits over the child's lifetime. It would have also been helpful to know when children began to have a regular source of dental care. These variables are also limited because of the recall bias associated with self-report data. Furthermore, more than half of the children have missing values for the regular source of dental care variable.

In addition, not all SCHIP programs offer dental coverage, although a large majority of them do. Because of this, the findings may have underestimated the impact of WIC on the oral health of children enrolled in Medicaid/SCHIP programs that do have dental coverage.

## Conclusions

These results confirm earlier findings that the oral health of children in Medicaid/SCHIP is comparable to the uninsured.<sup>4</sup> These findings also indicate that the partnership between WIC and Medicaid/SCHIP does not confer improved oral health over Medicaid/SCHIP alone. Previous studies have indicated that the collaboration between Medicaid and CHIP improves access to dental care, but this is not enough to significantly improve the oral health of low-income children. Neither having a regular dental care provider nor having had a preventive dental visit in the past 6 months impacted children's dental caries risk, which is likely because low-income children constitute a high-risk group requiring specialized, targeted interventions. It is recommended that low-income children's oral health can be improved by: (1) supplementing dental treatment with education, possibly with an expansion of WIC's IOHEP and (2) increasing the current recommendation of two yearly preventive visits to meet the greater oral health care needs of this high-risk population.

**Table 1: Percentage of Preschool-Aged Children with Selected Characteristics by Dental Caries, NHANES 1999-2000 and 2001-2002**

	Total		Any Caries (dft > 0)	
	N	(%)	N	(%)
<b><u>Control Variables</u></b>				
<b>Individual Characteristics</b>				
Age, y				
2	246	41.2	37	15.0
3	195	32.7	64	32.8
4	156	26.1	78	50.0
Race/Ethnicity				
Non-Hispanic White	126	21.1	38	30.2
Non-Hispanic Black	203	34.0	51	25.1
Mexican-American	220	36.9	80	36.4
Other Race, Including Multiracial	48	8.0	10	20.8
Family Poverty Income Ratio				
Poor (0-1)	343	63.3	117	34.1
Working Poor (>1)	199	36.7	47	23.6
Age Weaned Off Breast/Bottle (months)				
≤ 14 months	511	86.2	148	29.0
> 14 months	82	13.8	30	36.6
Mother's Age When Born (years)				
<19	134	22.5	41	30.6
19 or greater	461	77.5	138	29.9
Mother Smoked During Pregnancy				
No	484	81.3	140	28.9
Yes	111	18.7	38	34.2
<b><u>Dental Utilization</u></b>				
Had a preventive dental visit in past 6 months				
Yes	102	17.9	39	38.2
No	469	82.1	139	29.6
Has regular source of dental care				
Yes	135	65.5	60	44.4
No	71	34.5	34	47.9

**Continued on next page.**

**Table 1 (Continued): Percentage of Preschool-Aged Children with Selected Characteristics by Dental Caries, NHANES 1999-2000 and 2001-2002**

	Total		Any Caries (dft > 0)	
	N	(%)	N	(%)
<b><u>WIC and Medicaid/SCHIP Variable</u></b>				
Child Participated in:				
Medicaid/SCHIP only	138	23.1	42	30.4
WIC and Medicaid/SCHIP	287	48.1	83	28.9
Uninsured	172	28.8	54	31.4

*Note.*

All children were at least 2 and less than 5 years old.

dft = total number of decayed or filled primary teeth.

PIR=Poverty Income Ratio, a ratio of individual income to the Federal Poverty Level.

**Table 2: Crude Odds Ratios for Control Variables and Participation in WIC and Medicaid/CHIP by Caries Experience for Preschool-Aged Children in NHANES 1999-2000 and 2001-2002**

	<u>OR</u>	<u>95% CI</u>		<u>p-value</u>
<b><u>Control Variables</u></b>				
<b>Individual Characteristics</b>				
Age, y				
2	1.00			
3	2.76	1.742	4.371	<.0001
4	5.65	3.531	9.036	<.0001
Race/Ethnicity				
Non-Hispanic White	1.00			
Non-Hispanic Black	0.78	0.473	1.275	0.3181
Mexican-American	1.32	0.828	2.116	0.2420
Other Race, Including Multiracial	0.61	0.276	1.348	0.2213
Family Poverty Income Ratio				
Poor (0-1)	1.67	1.127	2.487	0.0108
Working Poor (>1)	1.00			
Age Weaned Off Breast/Bottle				
≤ 14 months	1.00			
> 14 months	1.42	0.868	2.306	0.1635
Mother's Age When Born (years)				
<19	1.03	0.679	1.567	0.8827
19 or greater	1.00			
Mother Smoked During Pregnancy				
No	1.00			
Yes	1.28	0.825	1.983	0.2713

**Continued on next page.**

**Table 2 (Continued): Crude Odds Ratios for Control Variables and Participation in WIC and Medicaid/CHIP by Caries Experience for Preschool-Aged Children in NHANES 1999-2000 and 2001-2002**

<u>Dental Utilization Variables</u>	<u>OR</u>	<u>95% CI</u>		<u>p-value</u>
Had a preventive dental visit in last 6 months				
Yes	1.00			
No	0.68	0.436	1.063	0.0905
Has regular source of dental care				
Yes	1.00			
No	1.15	0.646	2.044	0.6374
 <b><u>WIC and Medicaid/SCHIP Variable</u></b>				
Child Participated in:				
Medicaid/SCHIP only	1.00			
WIC and Medicaid/SCHIP	0.93	0.597	1.449	0.7483
Uninsured	1.05	0.644	1.699	0.8558

*Note.*

All children were at least 2 and less than 5 years old.

PIR=Poverty Income Ratio, a ratio of individual income to the Federal Poverty Level.

**Table 3: Multivariate Logistic Regression Model for Participation in WIC and Medicaid/CHIP, by Caries Experience for Preschool-Aged Children in NHANES 1999-2000 and 2001-2002**

<u>WIC and Medicaid/SCHIP Variable</u>	OR	95% CI		p-value
<b>Child Participated in:</b>				
Medicaid/SCHIP only	1.00			
WIC and Medicaid/SCHIP	1.04	0.622	1.745	0.8751
Uninsured	0.96	0.523	1.773	0.9030
<b>Control Variables</b>				
<b>Individual Characteristics</b>				
<b>Age, y</b>				
2	1.00			
3	2.77	1.678	4.560	<.0001
4	6.58	3.916	11.050	<.0001
<b>Race/Ethnicity</b>				
Non-Hispanic White	1.00			
Non-Hispanic Black	0.80	0.450	1.419	0.4441
Mexican-American	1.31	0.732	2.326	0.3674
Other Race, Including Multiracial	0.77	0.309	1.923	0.5770
<b>Family Poverty Income Ratio</b>				
Poor (0-1)	1.88	1.207	2.921	0.0052
Working Poor (>1)	1.00			
<b>Age Weaned Off Breast/Bottle (months)</b>				
≤ 14 months	1.00			
> 14 months	1.21	0.648	2.158	0.5077
<b>Mother's Age When Born (years)</b>				
<19	1.02	0.630	1.646	0.9417
19 or greater	1.00			
<b>Mother Smoked During Pregnancy</b>				
No	1.00			
Yes	1.52	0.885	2.622	0.1289

*Note.*

All children were at least 2 and less than 5 years old.

PIR=Poverty Income Ratio, a ratio of individual income to the Federal Poverty Level.

Appendix:  
NHANES Variable Labels and Reference Codes for All Original Variables  
Extracted for Study

<b>Variable</b>	<b>Label</b>
SEQN	Respondent sequence number
RIDSTATR	Interview/Examination Status
RIAGENDR	Gender - Adjudicated
RIDAGEEX	Exam Age in Months < 20 yrs - Recode
RIDRETH2	Linked NH3 Race/Ethnicity - Recode
DMDBORN	Country of Birth - Recode
DMDDEDUC	Education - Recode
INDFMPIR	CPS Family PIR
SEQN	Respondent sequence number
BMXWT	Weight (kg)
BMXRECUM	Recumbent Length (cm)
BMXHT	Standing Height (cm)
BMXBMI	Body Mass Index (kg/m**2)
SEQN	Respondent sequence number
OHAEXSTS	Overall Oral Health Exam Status
OHASCST3	Dentition Status Code
OHD08CTC	Coronal Caries: Tooth count #8
OHD08CSC	Coronal Caries: Surface condition #8
OHD07CTC	Coronal Caries: Tooth count #7
OHD07CSC	Coronal Caries: Surface condition #7
OHD06CTC	Coronal Caries: Tooth count #6
OHD06CSC	Coronal Caries: Surface condition #6
OHD05CTC	Coronal Caries: Tooth count #5
OHD05CSC	Coronal Caries: Surface condition #5
OHD04CTC	Coronal Caries: Tooth count #4
OHD04CSC	Coronal Caries: Surface condition #4
OHD03CTC	Coronal Caries: Tooth count #3
OHD03CSC	Coronal Caries: Surface condition #3
OHD02CTC	Coronal Caries: Tooth count #2
OHD02CSC	Coronal Caries: Surface condition #2
OHD09CTC	Coronal Caries: Tooth count #9
OHD09CSC	Coronal Caries: Surface condition #9
OHD10CTC	Coronal Caries: Tooth count #10
OHD10CSC	Coronal Caries: Surface condition #10
OHD11CTC	Coronal Caries: Tooth Count #11

OHD11CSC	Coronal Caries: Surface condition #11
OHD12CTC	Coronal Caries: Tooth count #12
OHD12CSC	Coronal Caries: Surface condition #12
OHD13CTC	Coronal Caries: Tooth count #13
OHD13CSC	Coronal Caries: Surface condition #13
OHD14CTC	Coronal Caries: Tooth count #14
OHD14CSC	Coronal Caries: Surface condition #14
OHD15CTC	Coronal Caries: Tooth count #15
OHD15CSC	Coronal Caries: Surface condition #15
OHD24CTC	Coronal Caries: Tooth count #24
OHD24CSC	Coronal Caries: Surface condition #24
OHD23CTC	Coronal Caries: Tooth count #23
OHD23CSC	Coronal Caries: Surface condition #23
OHD22CTC	Coronal Caries: Tooth count #22
OHD22CSC	Coronal Caries: Surface condition #22
OHD21CTC	Coronal Caries: Tooth count #21
OHD21CSC	Coronal Caries: Surface condition #21
OHD20CTC	Coronal Caries: Tooth count #20
OHD20CSC	Coronal Caries: Surface condition #20
OHD19CTC	Coronal Caries: Tooth count #19
OHD19CSC	Coronal Caries: Surface condition #19
OHD18CTC	Coronal Caries: Tooth count #18
OHD18CSC	Coronal Caries: Surface condition #18
OHD25CTC	Coronal Caries: Tooth count #25
OHD25CSC	Coronal Caries: Surface condition #25
OHD26CTC	Coronal Caries: Tooth count #26
OHD26CSC	Coronal Caries: Surface condition #26
OHD27CTC	Coronal Caries: Tooth count #27
OHD27CSC	Coronal Caries: Surface condition #27
OHD28CTC	Coronal Caries: Tooth count #28
OHD28CSC	Coronal Caries: Surface condition #28
OHD29CTC	Coronal Caries: Tooth count #29
OHD29CSC	Coronal Caries: Surface condition #29
OHD30CTC	Coronal Caries: Tooth count #30
OHD30CSC	Coronal Caries: Surface condition #30
OHD31CTC	Coronal Caries: Tooth count #31
OHD31CSC	Coronal Caries: Surface condition #31

SEQN	Respondent sequence number
OHASCST5	Referral Status Code
OHQ160	Past 30 days / painful tooth?
OHQ170	How many days / painful tooth?
OHAREC	Overall recommendation for care
OHAROCDT	Untreated Caries / Restorative needs
OHARNF	No significant needs

SEQN ACD080	Respondent sequence number Mother's country of birth
SEQN DBQ010 DBD020 DBD030 DBD050 DBD080 DBQ390	Respondent sequence number Ever breastfed or fed breastmilk Age started eating other foods(days) Age stopped breastfeeding(days) Age stopped receiving formula(days) Age started eating solid foods(days) School lunch free, reduced or full price
SEQN ECD010 ECQ020 ECQ080 ECQ090 FSQ121	Respondent sequence number Mother's age when born Mother smoked when pregnant Weight more/less than 5.5 lbs Weight more/less than 9.0 lbs Now attend headstart
SEQN FSD160 FSD180 FSD190 FSD200 FSD655 FSD660C FSD665 FSQ650 FSD660M FSD670 HHfdsec CHfdsec	Respondent sequence number Household WIC received Authorized for fd stmps in last 12 mos No. mos authorized in last 12 mos Currently authorized for fd stmps Child received WIC in past 12 months Child currently receives WIC How long child receiving WIC? Mom received WIC in past 12 months Mom currently receives WIC How long mom receiving WIC? Household food security category Child food security category
SEQN HID010 HID030A HID030C  HID030D HID040 HIQ210	Respondent sequence number Covered by health insurance Covered by private insurance Covered by Medicaid/CHIP Covered by other government insurance Dental coverage included Time when no insurance in past year?
SEQN HUQ010	Respondent sequence number General health condition

SEQN	Respondent sequence number
OHQ010	General condition of mouth and teeth
OHQ030	When did you last visit a dentist
OHQ033	Main reason for last dental visit
OHQ040	Routine checkups over past 3 yrs
OHQ050	Routine checkups frequency past 3 yrs
OHQ060	Regular dentist/lab you visit for care

SEQN	Respondent sequence number
SMD410	Does anyone smoke in the home
SMD415	Total number of smokers in home

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