Disparities in Children's Use of Oral Health Services

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SYNOPSIS

Objectives. We sought to determine if the recent expansions in Medicaid and the State Children's Health Insurance Program (SCHIP) have resulted in a narrowing of income disparities over time with the use of dental care in children 2 to 17 years of age.

Methods. Six years of data from the National Health Interview Survey were utilized. A trend analysis was conducted using 1983 as a baseline, which predates the expansions, and 2001–2002, the endpoint, which postdates implementation of the expansions. In addition, we examined two intermediate time points (1989 and 1997–1998). We conducted unadjusted and adjusted analyses using logistic regression.

Results. Overall, use of ambulatory dental care has increased dramatically for children over the past two decades. In 1983, more than one in three children (38.5%) had no dental care within the previous 12 months. By 2001–2002, about one-quarter of children (26.3%) were reported to have no dental care within the year, a reduction of 12.2% from 1983 ($p<0.001$). Frequency of unmet dental care remained unchanged between 1997–1998 (the first year this measure was available) and 2001–2002. A reduction in income disparities for use of dental care was found in our unadjusted analysis but this difference became statistically insignificant in the adjusted analysis. No changes in income disparities occurred for unmet dental needs in either the unadjusted or adjusted analyses.

Conclusions. A substantial overall improvement in dental care use has occurred among all income groups, including poor and near poor children. This "keeping up" with their higher-income counterparts represents an important public health accomplishment for children in low-income families. Nevertheless, additional efforts are needed to close remaining disparities in access to dental care.

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Oral health care ranks as the greatest unmet children's health need in the United States and is much more common than unmet need for medical care.[1] Access to dental care is particularly problematic for poor and near poor children.[2] Specifically, children lower in the socioeconomic hierarchy are more likely to have untreated dental caries, and poor children suffer 12 times the number of restricted activity days caused by dental disease as compared to more affluent children.[3] Similarly, 80% of dental caries occur in 25% of the pediatric population, especially in low-income Latino, American Indian, and Alaskan Native children—populations that are overrepresented in the lower socioeconomic strata.[4]

Over the past 20 years, federal and state initiatives have significantly expanded health insurance for low-income children through a series of Medicaid eligibility expansions in the 1980s and 1990s and through the enactment of the State Children's Health Insurance Program (SCHIP) in 1997 (Figure 1). The goal of these initiatives was increasing access to care, including dental care, and ultimately improving the health status of low-income, previously uninsured children. Substantial evidence has demonstrated that the availability of Medicaid has improved access to care among low-income children,[5–7] and early evidence suggests that the SCHIP program is producing similar results.[8] However, the extent to which the Medicaid/SCHIP expansions have improved the health status of low-income children has not been well documented. To date, only three studies have been conducted on this question, with inconclusive results.[9–11] Three additional studies that examined whether insured and uninsured children experience differential health status reported contradictory results.[12–14] Analyses of the 1996 Medical Expenditure Panel Survey on utilization of dental health care services found poor, ethnically diverse children have lower odds of having a yearly dental visit and have less visits per year than non-poor children.[15]

None of the aforementioned studies have conducted a comprehensive evaluation of changes in access and use of dental care before and after the large-scale expansions of public insurance coverage for children. There is thus a need for further study to carefully document whether the expansions in public health insurance coverage over the past two decades have contributed to reductions in health disparities in oral health. In addition to providing policymakers with new information on the role of expansions in public insurance, this project will provide a basis for ongoing monitoring of oral health and health care disparities within the child population.

We hypothesized that the large-scale expansions of pub-

Figure 1. Public insurance expansions for children

Legislation	*Eligibility expansion*
The Omnibus Budget Reconciliation Act of 1986 (OBRA-86)	Gave states the option to expand Medicaid income eligibility thresholds above AFDC levels up to the federal poverty level for pregnant women and infants, effective April 1, 1987. It also gave states the option of phasing in coverage for poor children up to age 5, effective October 1, 1990.
The Omnibus Budget Reconciliation Act of 1987 (OBRA-87)	Allowed states to raise Medicaid income thresholds for pregnant women and infants as high as 185% of the federal poverty level, effective July 1, 1988. It also amended the statute to give states the option of phasing in coverage of poor children up to age 8, effective October 1, 1988.
The Medicare Catastrophic Care Amendments of 1988 (MCCA)	Mandated minimum coverage of pregnant women and infants at the federal poverty level, with a two-year phase-in period, effective for calendar quarters beginning on or after July 1, 1989. Affected states were to raise income limits to 75% of poverty by July 1, 1989, and to poverty level by July 1, 1990. MCCA also added Section 1902 (r)(2) to the Social Security Act, which allows states to use more liberal criteria for Medicaid than is used for the AFDC program to determine Medicaid financial eligibility, effective July 1, 1988. States can disregard specific amounts of income and other resources and allow certain categories of eligible populations to qualify for Medicaid.
The Omnibus Budget Reconciliation Act of 1989 (OBRA-89)	Superseded MCCA's mandate schedule by requiring states to cover, at a minimum, pregnant women and children up to age 6 at 133% of the federal poverty level, effective for calendar quarters beginning on or after April 1, 1990.
The Omnibus Budget Reconciliation Act of 1990 (OBRA-90)	Required states to begin (effective on or after July 1, 1991) to phase in coverage of children born afterSeptember 30, 1983, until all children living below poverty up to age 19 are covered; the upper age limit will be reached by October 2002.
The Balanced Budget Act of 1997 (BBA-97)	Provided $24 billion in federal matching funds over five years to help states expand health care coverage to over 5 million of the nation's uninsured children.

SOURCES: GAO/HEHS-95-175, Medicaid and Uninsured Children and Centers for Medicare & Medicaid Services (US), SCHIP Legislation [cited 2005 Apr 8]

AFDC = Aid to Families with Dependent Children

licly sponsored health insurance coverage during the late 1980s and throughout the 1990s have resulted in improved access and utilization for previously disadvantaged groups of children, particularly children of lower socioeconomic status (SES). Specifically, our research question was as follows: Have expansions in Medicaid and SCHIP resulted in a narrowing of income disparities in use of dental care for children? We expected to see reductions in disparities in receipt of dental care by SES and race/ethnicity to narrow over time given the large-scale expansions in Medicaid and other public insurance programs for children over the past two decades. We used six years of the National Health Interview Survey for our analyses. The initial time point for our trend analysis, 1983, predates the expansions and serves as a baseline. The endpoint, 2001–2002, postdates implementation of the expansions. In addition, we examined two intermediate points (1989 and 1997–1998).

METHODS

Data source

The National Health Interview Survey (NHIS) is a nationally representative household survey conducted annually by trained interviewers from the U.S. Bureau of the Census for the National Center for Health Statistics.[16] The annual sample includes approximately 40,000 households with about 30,000 children under 18 years old. Brief group interviews are conducted for all household members and more in-depth interviews are conducted for one child and one adult randomly selected in each household. Parents or other adult caretakers respond on behalf of children under 17 years old at the time of the survey. The NHIS includes information on oral health care utilization, including the last time a sample child had a dental care visit and whether a sample child experienced an unmet need for dental services due to cost. Table 1 reports the sample sizes used in the current analysis.

The survey is based on a stratified cluster sample and is designed to be representative of the U.S. civilian population. Children residing in correctional facilities, hospitals, and long-term care facilities are excluded. Homeless and other transient children without a permanent address are also excluded. In most years, the overall NHIS response rate has exceeded 90%.[16]

We were interested to learn if improvements were achieved in access and utilization of dental health services—specifically whether the disparities narrowed between low-income and high-income children—following the expansion of Medicaid and the creation of SCHIP. We classified children into four groups based on their family income and family size relative to the federal poverty level (FPL): below 100%, 100%–199%, 200%–299%, and 300% or above. In 2001, the FPL for a family of four was $17,650.[17] These groupings were selected because they generally correspond to income eligibility for the Medicaid and SCHIP programs. Our two measures of access and utilization were the percentage of children reported to have an unmet need for dental care in the previous year due to the cost of care and the percentage of children who went without a dental visit within the previous 12 months.

Our analysis includes six years of NHIS data collected at four time points: Time 1 (1983), Time 2 (1989), Time 3 (1997–1998), and Time 4 (2001–2002). Time 1 predates the health insurance expansions for low-income children. By Time 2, a series of expansions in Medicaid eligibility, targeted primarily at poor children, were underway (Table 1). At Time 3, SCHIP was implemented for near poor children. The final Medicaid expansions enacted in 1990 continued to be phased in for poor children during and after Time 3. Time 4, our final data point, reflects the beginning of the post-expansion era. The Medicaid expansions were fully phased in and all states had operating SCHIP programs by this point.

Table 1. Characteristics of the study population over time

	Time1: 1983 n *(percent)*	*Time 2: 1989* n *(percent)*	*Time 3: 1997–1998* n *(percent)*	*Time 4: 2001–2002* n *(percent)*
Total	12,808	26,703	23,524	22,477
Age				
0 to 4 years	2,460 (19.1)	5,021 (19.0)	4,668 (18.7)	4,357 (18.5)
5 to 11 years	5,313 (41.0)	11,983 (45.1)	9,811 (44.5)	9,390 (44.3)
12 to 17 years	5,035 (39.9)	9,699 (35.9)	9,045 (36.8)	8,730 (37.3)
Race/ethnicity				
Non-Hispanic white	9,229 (71.4)	17,854 (68.7)	12,902 (66.1)	11,988 (64.0)
Non-Hispanic black	1,760 (14.3)	4,654 (14.9)	3,670 (14.8)	3,612 (14.8)
Hispanic	1,399 (10.9)	3,068 (12.0)	6,000 (14.6)	5,956 (16.5)
Other	420 (3.4)	1,127 (4.4)	952 (4.6)	921 (4.7)
Income				
<100% FPL	2,473 (19.5)	4,876 (17.3)	3,695 (15.4)	2,844 (12.2)
100% to 199% FPL	3,104 (24.2)	5,806 (21.7)	4,329 (18.2)	3,905 (16.9)
200% to 299% FPL	2,759 (21.4)	5,659 (21.5)	3,680 (16.5)	3,335 (15.3)
300%+	3,145 (24.5)	7,129 (27.6)	7,926 (34.4)	7,587 (34.9)
Missing	1,327 (10.5)	3,233 (11.9)	3,894 (15.5)	4,806 (20.8)

SOURCE: Authors' tabulations of the National Health Interview Survey

FPL = federal poverty level

Initially, we planned to use two years of combined data for each time point to improve the precision of our estimates. However, questions related to dental care use and unmet need have not been asked on a uniform basis in the NHIS. Data on receipt of dental care are available for all study years, except for 1982 and 1988. Data on unmet dental needs due to cost were added in a questionnaire revision introduced in 1997. Hence, information on unmet dental needs is available for the final two time periods, 1997–1998 and 2001–2002 only. (Figure 2 displays the years in which related questions were asked.) We restricted our analysis of children to those ages 2 to 17 years given the focus on dental care use and access.

Analysis

The primary results of our analyses are presented in Tables 1–3. All estimates presented in the text and tables were statistically weighted to reflect national population estimates. Multivariate analysis was performed to examine whether poverty status (divided into the four categories indicated above) was independently associated with the two outcome variables after controlling for insurance coverage (public, private, none); race/ethnicity (white, black, Hispanic, and other); age; gender; family composition; region of residence; respondent perceived health status of the child; and education level of household reference person. Results from these multivariate analyses are summarized here; detailed multivariate analysis results are available from the authors.

Missing item response rates were below 2% for all variables except education and poverty status. Depending on the study year, up to 2% had unreported education data and up to 22% had unreported income data. These missing data may be systematically related to our analysis variables. We addressed this by including a categorical variable for missing income in our multivariate analyses. Standard errors used in computing test statistics were calculated using variance estimation formulae that account for the complex sample design used in the NHIS.[18]

Finally, we tested our results on dental visits using a trend analysis. The trend test was conducted using piecewise linear regression (sometimes referred to as the "difference in difference" approach). We examined the slopes for each income group stratified by income for each pair of contiguous time points (e.g., Time 1 and Time 2). To test if the slopes for income groups were significantly different from the 300%-and-above FPL income group, we ran interactions between the income groups and time in the combined data set. This procedure took into account what would have happened in the previous time period had Medicaid coverage not been expanded at Time 2 or had SCHIP not been implemented at Time 3. A trend analysis was not conducted for unmet dental care needs since this measure was available only for the final two time points.

RESULTS

Overall trends in access and use of dental care

Use of ambulatory dental care has increased dramatically for children over the past two decades (Figure 3). In 1983, the beginning of our trend analysis, more than one-third of children (39.1%) had no dental care within the previous 12 months. By 2001–2002, about one-quarter of children (26.2%) were reported to have had no care within the year, a reduction of 12.2% from 1983 ($p<0.001$). Interestingly, there was no statistically significant change in the overall proportion of children with unmet need for dental care due to costs of care since NHIS began collecting those data in 1997–1998, with 6% to 7% of children reported as having unmet needs in both time periods (Figure 4).

SES differences in receipt of dental care

In the pre-Medicaid expansion period and the pre-SCHIP periods, wide disparities in use existed among children across poverty categories. In 1983, 53.5% of children with family incomes below the FPL were reported to have had no dental care in the previous year compared to 21.4% of children with family incomes at or above 300% of FPL ($p<0.001$; Table 2).

As indicated in Table 3, children in the lowest income group had 2.5 times higher adjusted odds of going without dental care than children in the highest income group during 1983 (odds ratio [OR]=2.5; 95% confidence interval [CI] 2.00, 3.08). In addition, children with incomes between 100% and 199% of FPL had 3.4 times higher adjusted odds of having no dental visit than higher-income children in 1983 (OR=3.4; CI 3.04, 4.17). After taking into account confounding variables and missing data in the adjusted analysis, these odds ratios attenuated somewhat, though they remained significant.

By 2001–2002, the disparities in receipt of dental care narrowed, as evidenced by the pattern of reductions in the unadjusted odds ratios (Table 3). Specifically, the odds of the lowest-income children having no dental care compared to the highest-income children declined from 4.2 to 3.0 between 1983 and 2001–2002 ($p<0.001$). However, this reduction was not significant after adjusting for confounding.

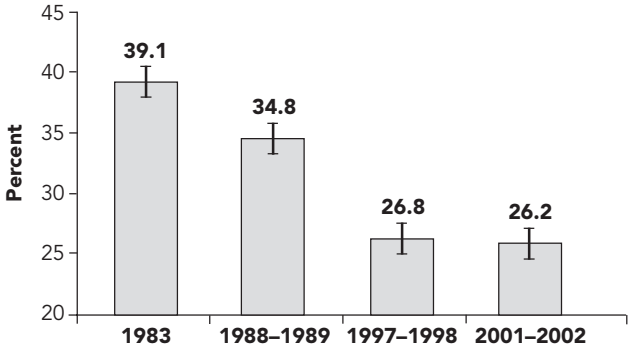
Figure 2. NHIS questions 1983–2001

	1983	*1989*	*1997*	*1998*	*2001*	*2002*
About how long has it been since . . . LAST went to a dentist?	✓	✓			✓	✓
About how long has it been since [S.C. name] last saw or talked to a dentist?			✓	✓		
During the past 12 months, was there any time when . . . needed any of the following but didn't get it because you couldn't afford it: dental care (including check-ups)?			✓	✓	✓	✓

NHIS = National Health Interview Survey

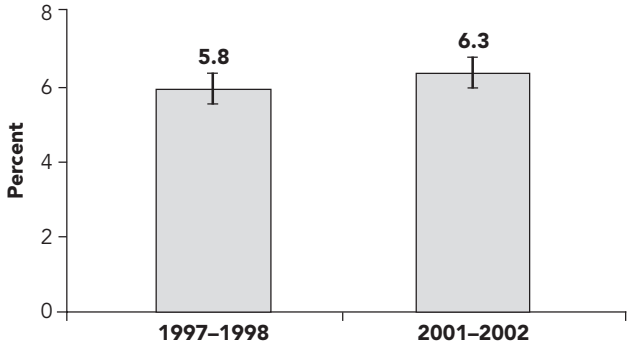
SC = sample child

Figure 3. Percent of children receiving no dental care in the past year



SOURCE: Authors' tabulations of the National Health Interview Survey

Figure 4. Percent of children with an unmet need for dental care due to cost in the past year



SOURCE: Authors' tabulations of the National Health Interview Survey

Among children with incomes between 100% and 199% of FPL, the unadjusted odds declined from 3.4 to 2.7 ($p<0.001$). Again, however, the difference in adjusted OR was insignificant.

In the trends analysis, we found significant trends only for the group below 100% FPL and only between 1988–1989 and 1996–1997 (where a significant downward trend was found) and between 1996–1997 and 2001–2002 (where a significant upward trend was found; results not shown). It should be noted that between 1988–1989 and 1997–1998, two changes occurred in the NHIS that may in part be responsible for any changes observed during this period. First, the wording of the question regarding use of dental services changed slightly (Figure 2) and second, the sampling design changed in 1997. Specifically, the design change included a state-level stratification and over-sampling of the Hispanic population.

SES differences in unmet needs for dental care

Children in the lowest income group were more likely than their higher-income counterparts to have an unmet need for dental care due to costs in 1997–1998, prior to the implementation of SCHIP. During those years, 9.1% of children in families with incomes below the poverty level and 11.4% of children in near poor families (100%–199% of the FPL) had an unmet need for dental care compared to only 2.2% of children in families with incomes at or over 300% of FPL ($p<0.001$ for both comparisons) (Table 2). The adjusted odds of poor children having an unmet need was 4.5 (CI 3.67, 5.61) times higher than for children in the highest

Table 2. Disparities in children's access to dental care by poverty status: percent differences over time

Income	*Time 1: 1983 Percent (SE)*	*Time 2: 1989 Percent (SE)*	*Time 3: 1997–1998 Percent (SE)*	*Time 4: 2001–2002 Percent (SE)*	*Diff T1-T4 Percent*	*Diff T1-T2 Percent*	*Diff T2-T3 Percent*	*Diff T3-T4 Percent*
No dental care in past year								
Total	39.1 (0.83)	34.8 (0.60)	26.8 (0.36)	26.2 (0.42)	12.9[a]	4.3[a]	8.0[a]	0.6
<100%	53.5 (1.43)	52.1 (1.38)	37.2 (0.90)	38.3 (1.19)	15.2[a]	1.4	14.9[a]	−1.10
100% to 199%	49.3 (1.36)	44.2 (1.15)	38.5 (0.89)	35.2 (1.00)	14.1[a]	5.1	5.7[a]	3.30
200% to 299%	32.2 (1.22)	29.9 (0.89)	27.4 (0.83)	28.5 (0.90)	4.7[a]	2.2	2.6	−0.10
300%+	21.4 (1.01)	19.2 (0.54)	16.6 (0.48)	16.9 (0.49)	4.8[a]	2.2	2.6[a]	−0.30
Unmet need for dental care due to cost								
Total			5.8 (0.19)	6.3 (0.22)				−0.43
<100%			9.1 (0.62)	11.3 (0.83)				−2.20[b]
100% to 199%			11.4 (0.61)	11.1 (0.65)				0.30
200% to 299%			6.0 (0.45)	8.1 (0.56)				−2.10[a]
300%+			2.2 (0.17)	2.6 (0.22)				−0.40[c]

SOURCE: Authors' tabulations of the National Health Interview Survey

[a]Statistically significant at *p*-value <0.05

[b]Statistically significant at p-value <0.001

[c]Statistically significant at *p*-value <0.01

SE = standard error

income group (Table 3). Similarly, the odds of near poor children having an unmet dental need was 5.9 (CI 4.80, 7.13) times higher than for children in the highest income category. Hence, at baseline, significant SES-related disparities existed for unmet dental needs.

We expected to see reductions in SES gradients by the endpoint of our analysis period, 2001–2002. At best, however, only suggestive changes occurred. The odds for poor children having an unmet dental need compared to children in the highest income category remained essentially unchanged in both the unadjusted and adjusted models. For near poor children, there was a suggestive but not statistically significant decline in the odds of having an unmet dental need, from 5.9 to 4.7 in the unadjusted model and from 4.0 to 3.3 in the adjusted model (Table 3).

DISCUSSION

Public coverage of low-income children has grown significantly over the past two decades. Since 1985, more than 10 million children have been added to Medicaid and nearly 5 million children have been added to SCHIP.[19] Meanwhile, there have been major overall improvements in children's use of dental care. The proportion of children with no dental care in the past 12 months declined from 39.1% in 1983 to 26.2% in 2001–2002. This overall improvement in dental care use has occurred among all income groups, including poor and near poor children. This represents a major public health accomplishment for children.

Moreover, our findings suggest that disparities in use of dental care may be narrowing over time, at least in absolute

Table 3. Disparities in children's access to dental care by poverty status: unadjusted and adjusted odds ratios

Income	*Time 1: 1983*	*CI*	*Time 2: 1989*	*CI*	*Time 3: 1997–1998*	*CI*	*Time 4: 2001–2002*	*CI*
				Unadjusted OR				
No dental care in the past year								
<100% FPL	4.2[a,b]	(3.61, 4.90)	4.6[a,b]	(4.05, 5.19)	3.0	(2.70, 3.31)	3.0	(2.72, 3.43)
100% to 199% FPL	3.4[a,b]	(3.04, 4.17)	3.3[a,b]	(3.00, 3.74)	3.1	(2.85, 3.49)	2.7	(2.30, 2.98)
200% to 299% FPL	1.7	(1.52, 2.00)	1.8	(1.62, 2.00)	1.9	(1.70, 2.13)	2.0	(1.77, 2.17)
300%+ FPL	1.0		1.0		1.0		1.0	
Unmet need for dental care due to cost								
<100% FPL					4.5	(3.67, 5.61)	4.8	(3.79, 6.00)
100% to 199% FPL					5.9	(4.80, 7.13)	4.7	(3.81, 5.74)
200% to 299% FPL					2.9	(2.30, 3.61)	3.3	(2.61, 4.16)
300%+ FPL					1.00		1.00	2.23
				Adjusted OR[c]				
No dental care in the past year								
<100% FPL	2.5	(2.00, 3.08)	2.49	(2.13, 2.92)	1.8	(1.52, 2.07)	1.8	(1.52, 2.10)
100% to 199% FPL	2.7	(2.21, 3.20)	2.37	(2.10, 2.69)	2.2	(1.94, 2.48)	1.8	(1.55, 2.05)
200% to 299% FPL	1.5	(1.27, 1.72)	1.50	(1.34, 1.68)	1.6	(1.45, 1.84)	1.7	(1.47, 1.87)
300%+ FPL	1.0		1.00		1.00		1.00	
Unmet need for dental care due to cost								
<100% FPL	3.2	(2.40, 4.23)	3.3	(2.40, 4.49)				
100% to 199% FPL	4.0	(3.15, 5.03)	3.3	(2.54, 4.23)				
200% to 299% FPL	2.4	(1.91, 3.01)	2.7	(2.07, 3.40)				
300%+ FPL	1.00		1.00					

SOURCE: Authors' tabulations of the National Health Interview Survey

[a]Statistically significant from Time 2 at *p*-value <0.05

[b]Statistically significant from Time 3 at *p*-value <0.05

[c]Adjusted for the following: type of insurance, race/ethnicity, age, gender, family composition, region of residence, health status, education level of parent, and missing income

CI = confidence interval

OR = odds ratio

FPL = federal poverty level

terms. The unadjusted odds of going without a dental care visit declined significantly among children with incomes below 200% of FPL. Though the significance of this finding did not persist after adjusting for potentially confounding factors, at a minimum, low-income children were able to "keep pace" with their more affluent counterparts. Considering that a significant improvement in use of dental care occurred for children in the higher-income categories, this is an important success story for children in low-income families.

More disappointing, however, is that we found no improvements in the frequency of unmet needs for dental care due to cost overall or among individual income groups. We didn't expect to see a decline among Medicaid-eligible children because any impact of the Medicaid expansions on unmet dental needs would have been largely felt by 1997–1998, but we did expect to observe a decline among SCHIP-covered children (children with incomes between 100% and 200% of FPL). While the gradient between lower-income and highest-income children did shift most acutely among the near poor children targeted for SCHIP, the change was modest and not found to be statistically significant. This is somewhat surprising given that dental insurance coverage has grown steadily over the study period. This may be related to small cell size, but it could also be related to an absence of an actual difference. Perhaps as additional years of data for the post-SCHIP implementation years become available, this trend may become statistically significant. It's also worth noting that many SCHIP programs do not cover dental services, so a lack of major changes related to SCHIP may not be surprising.

There are some limitations to our study. The NHIS is a household survey and hence does not include institutionalized, homeless, or transient children. There is also a significant amount of missing income data. While we have attempted to address this by including the missing cases in our analyses, this remains a shortcoming.

CONCLUSION

Our findings suggest that utilization of dental services has dramatically increased among the child population as a whole and among the low-income children targeted by expansions in public insurance coverage. While a narrowing—if not elimination—of the gaps in utilization between poor and non-poor children is a major goal of extending health insurance to low-income children, it may be that "keeping up" with higher-income children is the best intermediate outcome.

To eliminate the still present disparities, considerably more work is required if improved access to insurance is to be part of the equation. Chief among the tasks is to increase the pool of dentists willing and able to serve children enrolled in public programs. Enrollment in an insurance program does not translate into utilization unless there are providers available to serve the enrollees. Low reimbursement rates, excessive paperwork, and other factors discourage their participation, and these issues must be addressed. Reducing disparities in utilization of oral health services is also dependent on ensuring that eligible children enroll in existing health insurance programs and maintain that coverage. A 2003 review of the literature concluded that retention of children in Medicaid and SCHIP remains "a big problem" nationwide.[20] While solid figures on the number of eligible children who drop out of these programs are not available, it is widely agreed among program administrators as well as advocates, according to the report, that far too many children leave the programs for various reasons. Increasing the pool of dental providers available to low-income children, as well as doing a better job of enrolling and retaining children in existing programs, should go far in reducing disparities in utilization of dental services through insurance coverage.

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