Public Dental Expenditures and Dental Visits Among Children in the U.S., 1996–2004

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SYNOPSIS

Objectives. Congress created the State Children's Health Insurance Program (SCHIP) in 1997 as an expansion of the Medicaid program to provide health insurance to children whose family income is above the Medicaid eligibility standards—generally up to 200% of the federal poverty level (FPL). This article examines changes in the utilization of dental services during a period of increasing public funding of dental services.

Methods. Public dental expenditure estimates came from the Centers for Medicare & Medicaid Services (CMS), and a breakdown of these expenditures by patient age and income level was based on the Medical Expenditure Panel Survey (MEPS).

Results. According to CMS, funding for dental SCHIP and dental SCHIP expansion grew from \$0 prior to 1998 to \$517 million in 2004. According to the MEPS, between 1996 and 2004 there was an increase in the number and percent of children 2 to 20 years of age who reported a dental visit during the past year. These increases were most notable among children in the 100% to 200% FPL category. Approximately 900,000 more children in this income group visited a dentist in 2003–2004 than in 1996–1997. Children in this income group reported an increase in the amount of mean dental charges paid for by Medicaid and a real increase in mean dental charges per patient from \$217 to \$310.

Conclusions. Recent increases in the public funding of dental services targeted to children in the 100% to 200% FPL category were related to increased utilization of dental services among these children from 1996 to 2004.

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The Medicaid program, established as Title XIX of the Social Security Amendments of 1965, was designed to provide health care for all indigent and medically indigent people, with funding shared between federal and state governments. Although states differ in eligibility rules and expenditures for services provided, amendments to the Medicaid program instituted in 1968 required all states to include dental care for individuals younger than 21 years of age as part of the Early and Periodic Screening, Diagnostic, and Treatment Service (EPSDT).

Legislation passed by Congress in 1997 created the State Children's Health Insurance Program (SCHIP). SCHIP complements the Medicaid program by providing health insurance to children whose family income is above the Medicaid eligibility standards—generally up to 200% of the federal poverty level (FPL).

Some states used these funds to expand Medicaid coverage and others designed new programs that may or may not include dental care.¹ Because SCHIP programs vary by state in terms of amount of expenditures, services provided, and children covered, many of the articles focusing on SCHIP and dental services that have appeared in the literature report results based on a particular state. Many of these articles have reported improved access to dental services and increases in the utilization of dental services among children enrolled in SCHIP programs.^{2–4}

One national-level study by Duderstadt et al. examined the impact of SCHIP on children's access and use of health care.⁵ The authors concluded that implementation of SCHIP provided significant benefits in terms of access and utilization for children living in the target income group, defined as those living in families with incomes between 100% and 199% FPL. Their data source was the National Health Interview Survey, using 1997 as a baseline—which predated the implementation of SCHIP—and 2003 as the end point of the analysis.

A recent national-level report focusing on the utilization of dental services, dental expenditures, and dental insurance coverage reported that low-income children (100% to 200% FPL) experienced an increase in the likelihood of a dental visit between 1996 and 2004. Also reported was that children with public dental coverage only had an increase in the likelihood of having a dental visit from 1996 to 2004, and that low-income (100% to 200% FPL) and middle-income (200% to <400% FPL) families were more likely to have public dental coverage in 2004 than in 1996.⁶

This article takes a closer look at national dental expenditures, the utilization of dental services by chil-

dren, and the sources of funding for dental services reported by those children from 1996 to 2004.

METHOD

Public dental expenditure estimates reported in this article came from the following sources.

Centers for Medicare & Medicaid Services (CMS)

Estimated national health expenditures provided by CMS measure spending for health care in the U.S. by type of service delivered (i.e., hospital care, physician services, dental services, nursing home care) and sources of funding for those services (i.e., private health insurance, Medicare, Medicaid, and out-of-pocket spending).⁷ Expenditures for home health care and for services of health professionals (i.e., doctors, dentists, chiropractors, private duty nurses, therapists, and podiatrists) are estimated primarily using a combination of data from the U.S. Census Bureau Services Annual Survey and the quinquennial Census of Service Industries.

Dental expenditure estimates are for dental services provided in establishments operated by a doctor of dental medicine (DMD), doctor of dental surgery (DDS), or doctor of dental science (DDSc). These establishments are classified as NAICS 6212 Offices of Dentists or SIC 802 Offices and Clinics of Dentists.⁸

The population used in the National Health Expenditure Accounts tables is defined as the U.S. Census resident population.

Medical Expenditure Panel Survey

The Medical Expenditure Panel Survey (MEPS) produces nationally representative estimates of health-care use, expenditures, sources of payment, insurance coverage, and quality of care for the U.S. civilian non-institutionalized population. The MEPS is cosponsored by the Agency for Healthcare Research and Quality (AHRQ) and the National Center for Health Statistics (NCHS).⁹ The MEPS is a national probability survey conducted on an annual basis since 1996, and its panel design features several rounds of interviewing covering two full calendar years. The survey consists of three components: the Household Component (HC), the Medical Provider Component (MPC), and the Insurance Component (IC).

The sample sizes for the MEPS-HC were approximately 10,000 families in 1996 and 1998–2000, 13,500 families in 1997 and 2001, and 15,000 families annually beginning in 2002. The full-year household core response rate has generally been about 66%. MEPS-HC

full-year consolidated files contain aggregate annual person-level information on dental visits. Each record represents a MEPS sampled person. Although the MEPS includes an MPC that collects data on medical and financial characteristics of medical and pharmacy events reported by MEPS-HC respondents, information about dental events—including expenditures—is based on household reports.

The poverty variable in the MEPS was constructed by dividing family income by the applicable poverty line (based on family size and composition), with the resulting percentages grouped into five categories: negative or poor (<100% FPL), near poor (100% to <125% FPL), low income (125% to <200% FPL), middle income (200% to <400% FPL), and high income ($\geq$ 400% FPL). Groups 2 and 3 (near poor and low income) were combined for the analysis presented in this article.

The price deflator used in this analysis was the dental component of the consumer price index.¹⁰ A change over time in real dental charges or real dental expenditures using this deflator can be considered a change in the amount of dental services received or expensed. In this article, we focus on MEPS dental expenditures

so they can be compared with CMS expenditures. While both the CMS and MEPS estimates are subject to sampling error, the MEPS data presented in this article for children by poverty level resulted in relatively small cell sizes with relatively large standard errors. When analyzing changes between the two endpoints in this study, we combined two years of MEPS data (1996–1997 and 2003–2004) to reduce year-to-year fluctuations due to sampling error.

We used SUDAAN[®] software to calculate standard errors and perform statistical tests because it includes adjustments for the correlation introduced by the complex sample design used for the 2004 MEPS.¹¹

RESULTS

According to estimates from CMS, public funding for dental services in the U.S., measured in terms of current dollars (nominal), increased from \$2 billion in 1996 to \$5 billion in 2004, or from 4.5% of total dental expenditures to 6.0%. As part of total public funding, funding for dental SCHIP and dental SCHIP expansion grew from \$0 prior to 1998 to \$517 million in 2004. Figure 1 shows these expenditures measured

Figure 1. Trends in the public funding of dental services, 1996–2005^a

^aIn 2004 U.S. dollars

SCHIP = State Children's Health Insurance Program

in constant 2004 dollars (adjusted for inflation). Real public dental expenditures grew from \$3.16 billion in 1996 to \$5.2 billion in 2004, an increase of 64.6%.

A comparison of CMS and MEPS nominal estimates of public dental expenditures is shown in Figure 2. For all years except 2000, the MEPS estimate is lower than the CMS estimate. There is an explanation for why the MEPS estimate should be lower.¹² CMS estimates are intended to represent the resident U.S. population. The MEPS estimates, on the other hand, are constructed for individuals in the civilian, non-institutionalized population. The MEPS does not include people in the military, prisons, long-term care facilities, assisted living facilities, group homes, juvenile facilities, residential treatment centers, and other types of group quarters.

Because the MEPS dental expenditure estimates for 2000 were not consistent with the estimates for other years, MEPS data for the year 2000 are not included in Figures 3 and 4. Also, the MEPS estimate of total public dental expenditures includes some categories of expenditures that are not targeted to the economi-

cally indigent, such as Medicare, Veterans Affairs, and TRICARE. In Figures 3 and 4, expenditures in these categories were removed to focus on MEPS estimates of Medicaid dental expenditures, which includes SCHIP expenditures.

The MEPS allows for a breakdown of Medicaid dental expenditures by patients' age. Figure 3 shows nominal Medicaid dental expenditures based on MEPS divided into two parts: (1) those <21 years of age and (2) those ≥21 years of age. The amount of public funding of dental services going to adults (nominal) increased from \$572.2 million in 1996 to \$1.3 billion in 2004. The real increase in constant 2004 dollars was from \$811.1 million to \$1.3 billion (data not shown). Medicaid funding for adult dental services was 46.7% of the total in 1996. In 2004, it was 43.8% of the total.

As shown in Figure 4, Medicaid dental expenditures reported for children 0 to 20 years of age grew in real terms from \$925 million in 1996 to \$1.7 billion in 2004. Figure 4 also shows these expenditures broken down by family income level. Beginning in 1997, there was a steady real increase in the amount of Medicaid expendi-

Figure 2. Total public funding (nominal) of dental services: CMS vs. MEPS

CMS = Centers for Medicare & Medicaid Services

MEPS = Medical Expenditure Panel Survey

Figure 3. Medicaid funding of dental services (nominal) for children vs. adults, 1996–2004 MEPS^a

^a2000 data not included.

MEPS = Medical Expenditure Panel Survey

tures reported for children in the 100% to <200% FPL group, from \$168.7 million in 1996 to \$551.8 million in 2004. In 1996 (prior to SCHIP), Medicaid accounted for 7.5% of dental expenditures among children at the 100% to <200% FPL group. In 2004, the percentage was 25.8% (data not shown). There was also a real increase in Medicaid dental expenditures reported for children in the 200% to <400% FPL group, from \$87.0 million in 1996 to \$372.8 million in 2004.

In 1996, children in the lowest income group accounted for 70.9% of Medicaid expenditures for this age group (0 to 20 years of age). In 2004, children

in the lowest income group accounted for 43.7% of Medicaid expenditures for this age group.

The MEPS also collects information concerning the utilization of dental services. Table 1 shows the percentage of children aged 2 to 20 years with a dental visit during the past year by family income level. Among children in the <100% FPL group, the percentage of children with a visit during the past year increased from 30.3% in 1996–1997 to 33.5% in 2003–2004. Among children in the 100% to <200% FPL group, the percentage with a visit increased from 32.4% in 1996–1997 to 37.0% in 2003–2004. Among children

Table 1. Percentage of children aged 2 to 20 years with a dental visit during the past year, by family income level, 1996–1997 MEPS vs. 2003–2004 MEPS

	1996–1997 MEPS (percent)	2003–2004 MEPS (percent)	Percent change	P-value
<100% FPL	30.3	33.5	3.2	0.0432
100% to <200% FPL	32.4	37.0	4.6	0.0059
200% to <400% FPL	50.1	51.0	0.0	0.5932
≥400% FPL	63.5	67.1	3.6	0.0418
Total	45.7	49.6	3.9	0.0006

MEPS = Medical Expenditure Panel Survey

FPL = federal poverty level

Figure 4. Real^a Medicaid dental expenditures for children aged 0 to 20 years by family income level, 1996–2004 MEPS^b

^aIn 2004 U.S. dollars

^b2000 data not included.

MEPS = Medical Expenditure Panel Survey

FPL = federal poverty level

in the highest income group, the percentage with a visit increased from 63.5% in 1996–1997 to 67.1% in 2003–2004.

As shown in Table 2, according to the MEPS data, the number of children aged 2 to 20 years increased from 74.8 million in 1996–1997 to 77.9 million in 2003–2004. The number with a dental visit increased from 34.2 million to 38.7 million and the number without a visit dropped from 40.6 million to 39.2 million. The number of children <100% FPL fell from 14.8 million to 13.5 million. The number with a visit increased from 4.49 million to 4.52 million, and the number without a visit fell from 10.3 million in 1996–1997 to 9 million in 2003–2004.

Although the number of children in the 100% to <200% FPL group grew by just 350,000 (from 16.08 million to 16.43 million), 880,000 more children in this poverty category reported a visit in 2003–2004 than in 1996–1997. The number of children in the highest income group (≥400% FPL) rose from 18.7 million to

Table 2. Number of children aged 2 to 20 years with a dental visit during the past year and those with no dental visit, by family income level, 1996–1997 MEPS vs. 2003–2004 MEPS

1996–1997 MEPS	Visit	No visit	Total
<100% FPL	4,490,000	10,320,000	14,810,000
100% to <200% FPL	5,200,000	10,880,000	16,080,000
200% to <400% FPL	12,650,000	12,620,000	25,270,000
≥400% FPL	11,850,000	6,820,000	18,670,000
Total	34,190,000	40,640,000	74,830,000
2003–2004 MEPS			
<100% FPL	4,520,000	8,960,000	13,480,000
100% to <200% FPL	6,080,000	10,350,000	16,430,000
200% to <400% FPL	13,030,000	12,540,000	25,570,000
≥400% FPL	15,030,000	7,380,000	22,410,000
Total	38,660,000	39,230,000	77,890,000

MEPS = Medical Expenditure Panel Survey

FPL = federal poverty level

22.4 million. The number with a visit increased from 11.9 million to 15.0 million. However, the number with no visit also increased from 6.8 million to 7.4 million. According to the MEPS data, 45.7% of children reported a dental visit in 1996–1997. In 2003–2004, almost half (49.6%) reported a visit.

While seldom reported in the literature, the MEPS data can be used to demonstrate the relationship between dental expenditures and the utilization of dental services. Based on the 2004 MEPS, the correlation between expenditures and utilization (number of dental visits reported during 2004) was 0.53 ($p < 0.0001$) among those with at least one visit. Among all children surveyed—with a dental visit or not—the correlation was 0.61 ($p < 0.0001$).

Figure 5 shows changes in four sources of funding for dental expenditures from 1996–1997 to 2003–2004 for children aged 2 to 20 years by family income level. The estimates were adjusted for inflation, and expenditures for orthodontic services were removed because they comprise a large portion of overall dental

expenditures for adolescents and are more likely to be reported for children in higher income categories. The estimates are per patient; that is, these are mean annual expenditures reported for children in each income group who visited a dentist.

Annual mean out-of-pocket dental expenditures declined for children in all income groups from 1996–1997 to 2003–2004. In 2003–2004, mean out-of-pocket expenditures were \$37 for children in the lowest income group, \$58 for children 100% to <200% FPL, \$92 for children 200% to <400% FPL, and \$101 for children in the highest income group. Mean per-patient Medicaid dental expenditures in 2003–2004 were \$147 for children in the lowest income group—down somewhat from \$154 in 1996–1997; \$82 for children 100% to <200% FPL—up from \$23 in 1996; and \$24 for children 200% to <400% FPL—up from \$6 in 1996–1997. Private dental insurance as a source of expenditures rose from a mean of \$157 to \$181 for children in the highest income group, but remained constant for children in other income groups.

Figure 5. Per-patient mean real^a annual dental expenditure by sources of funding for children aged 2 to 20 years, by family income level, 1996–1997 MEPS vs. 2003–2004 MEPS (orthodontic services removed)

^aIn 2004 U.S. dollars

MEPS = Medical Expenditure Panel Survey

FPL = federal poverty level

Figure 6. Change in real^a mean annual dental charges per patient for children aged 2 to 20 years, by family income level, 1996–1997 MEPS vs. 2003–2004 MEPS (orthodontic services removed)^b

^aIn 2004 U.S. dollars

^bExpenditures represent the fully established charges for care and do not reflect actual payments for services.

MEPS = Medical Expenditure Panel Survey

FPL = federal poverty level

Figure 6 shows changes in real mean charges per patient for dental services for children aged 2 to 20 years by family income level, 1996–1997 MEPS vs. 2003–2004 MEPS. Charges in MEPS represent the sum of all fully established charges for care received and usually do not reflect actual payments made for services, which can be substantially lower due to factors such as negotiated discounts, bad debt, and free care. However, charges can be considered as a measure of the amount of dental services received. A large real increase was reported for children in the 100% to <200% FPL group (>\$93).

DISCUSSION

Congress started SCHIP in 1997 as an expansion of the Medicaid program to provide health insurance to children whose family income is above the Medicaid eligibility standard—generally up to 200% FPL. According to CMS, funding for dental SCHIP and dental

SCHIP expansion grew from \$0 prior to 1998 to \$517 million in 2004.

Although the MEPS data allow for a more detailed breakdown of public dental expenditures in terms of those receiving the benefits than is possible with the CMS estimates, it is not possible to distinguish between Medicaid and SCHIP as sources of payment for children in the MEPS data. According to the MEPS, total public dental expenditures targeted to children grew in real terms from \$925.0 million in 1996 to \$1.7 billion in 2004.

What was the result of this increase in the public funding of dental services for children? Utilization of dental services, as measured by the percentage of children reporting a dental visit during the past year, rose in three of the four income groups, but the percentage increase was greatest among those 100% to <200% FPL, from 32.4% in 1996–1997 to 37.0% in 2003–2004. In absolute terms, almost 900,000 additional children utilized dental services in this income group.

The question remains whether this increase was, in fact, due to the increase in public funding. We found support for this hypothesis when we examined the sources of funding for dental services. The increase in the amount paid for by Medicaid was largest among children in the 100% to <200% FPL category, from a mean of \$23 in 1996–1997 to \$82 in 2003–2004, a real dollar increase of \$59 per child with a visit.

We also found that among the same group of children, mean out-of-pocket expenditures decreased from \$65 to \$58. Private insurance, as a source of funding, remained constant at \$92. Uncompensated care increased from \$31 to \$72. Uncompensated care in the MEPS includes discounting, charity care, bad debt, and professional courtesy care, and it was not possible to disaggregate the category into its individual components. Nevertheless, the real value of uncompensated care for whatever reason almost doubled, registering an increase of \$41 per child. More research is needed to further clarify the reasons for the increase in uncompensated care.

Utilization of dental services also can be measured in terms of the dollar value of services received among those who reported a dental visit. We found that the largest increase in mean real dental charges per patient was for children in the 100% to <200% FPL group, from a mean of \$217 in 1996–1997 to a mean of \$310 in 2003–2004 after expenditures on orthodontic services were removed.

The increases in the utilization of dental services reported in this article among the children targeted by SCHIP are based on national means, and these means mask differences among states. States that have increased reimbursement levels and reduced the administrative burdens of public programs have reported improved dentist participation and increases in children's use of dental services.^{2,13} Further improvement at the national level is expected if more states implement changes similar to those reported for Indiana and Michigan.

The data presented in this article suggest that children in the lowest income group did not benefit much from the increase in public spending. Although there was an increase in the percent of children in the lowest income group with a dental visit from 30.3% in 1996–1997 to 33.5% in 2003–2004, the number of children in this group actually fell during this time period. The increase in the number of low-income children with a dental visit was only 30,000 (from 4.49 million in 1996–1997 to 4.52 million in 2003–2004). The mean real charges per patient decreased from \$391 to \$343, and there was a modest decrease in Medicaid as a source of funding.

As mentioned previously, children in the lowest income group accounted for 70.9% of Medicaid expenditures for this group (aged 0 to 21 years) in 1996. In 2004, children in the lowest income group accounted for only 43.7% of Medicaid expenditures. Part of the overall increase in public funding of dental services for children may have gone to children in the 200% to <400% FPL group. This group reported an increase in Medicaid as a source of funding (Figure 5) and an increase in mean charges per patient (Figure 6). The number of children at this family income level reporting a dental visit increased by 380,000 from 1996–1997 to 2003–2004.

Some states have set the income level for the SCHIP program higher than 200% of FPL.¹⁴ While it is true that children in this income group do not utilize dental services at the same level as children in the highest income group, the results presented in this article suggest two policy implications related to higher SCHIP income limits.

First, as a source of payment, private insurance plays a much more important role for children in the 200% to <400% FPL group. An increase in public funding has the potential to crowd out private insurance as a source of funding. Also, because this income category contains the greatest number of children, the impact of any such substitution will be magnified. In addition to reporting that low-income (100% to <200% FPL) and middle-income (200% to <400% FPL) children were more likely to have public dental coverage in 2004 than in 1996, the authors of a recent article found that low- and middle-income children were less likely to have private dental coverage in 2004 than in 1996.⁶

Second, because public dental programs have been traditionally underfunded, there is the risk of spreading the available funding thinly among all eligible children instead of focusing an adequately funded public program on the children who need it most: those in the two lowest income categories.

Based on the results shown in Table 1, 45.7% of the children reported a dental visit in 1996–1997. In 2003–2004, 49.6% reported a visit. The increase in public funding targeted to children was responsible for part of this increase. However, there was also an increase in the percentage with a visit among children in the highest income group—from 63.5% in 1996–1997 to 67.1% in 2003–2004. The number of children in the highest income group also grew from 18.7 million to 22.4 million, or from 24.9% of all children to 28.8% of all children. Economic growth led to fewer children in the lowest income group (with low utilization) and more children in the highest income group (with high utilization). Moving disadvantaged families out

of poverty into higher income levels may also be considered an effective method to bring about an increase in the overall utilization of dental services.

Finally, although not a focus of this article, another group that reported an increase in Medicaid expenditures on dental services was adults ≥ 22 years of age. Under Medicaid law, dental services for adults are classified as an “optional service.” According to a recent estimate from the Kaiser Family Foundation, nine states provided full dental coverage to adults on Medicaid as of 2006, seven states provided no coverage, and the others had either emergency or partial coverage.¹⁵

As reported previously, real Medicaid expenditures on dental services for adults rose from \$1.25 billion in 1996 to \$2.21 billion in 2004. However, as a percentage of total public funding, the percentage spent on adults dropped from 46.7% to 43.8%.

Limitations

While these data and analyses are useful, they do have possible limitations. The MEPS results reported in this article are based on self-reported data (i.e., by the patient), and self-reported data are less accurate than collection by observation or by dental record abstraction. As with all sample surveys, nonrespondents could have different response patterns compared with respondents.

CONCLUSION

Recent increases in public dental expenditures targeted to children in the 100% to 200% FPL income category were related to an increase in the number and percentage of such children receiving dental services. These children reported an increase in Medicaid funding as a source of funding for these services, and an increase in mean annual dental charges per patient. Although children in higher income groups (100% to <200% FPL and 200% to <400% FPL) benefited from increases in public dental funding, the percentage of public funding targeted to children in the lowest income group fell. This was due in part to a decrease in the absolute number of children in the lowest income group.

Economic growth pushed more children into the highest income group where utilization of dental services was found to be highest, and the level of gov-

ernment funding lowest. Economic growth is also an effective method to bring about an increase in overall utilization of dental services.

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