



Child dental expenditures: 1996

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Abstract

Purpose: Because little has been reported about child dental expenditures, federal data were used to estimate dental care expenditures for U.S. children by age, sex, ethnic/racial background, family income, parental education and parental employment.

Methods: Parentally reported data on dental expenditures and sources of expenditures were extracted from the most recent available federal healthcare expenditures studies, the 1996 federal Medical Expenditure Panel Survey (MEPS). Using the survey's large sample and complex design, these data represent the entire U.S. child population.

Results: Nearly 12 billion dollars were expended for children's dental care averaging \$375 per child who obtained care. Overall sources of payment were 47% out of pocket, 45% insurance and 8% "other" including primarily Medicaid. Disproportionately little spending was made on behalf of low-income and minority children despite their higher disease experience. The proportion of spending that was paid out of pocket was high for all groups of children including those eligible for Medicaid even though Medicaid prohibits cost sharing.

Conclusions: Dental care for children accounts for approximately one-quarter of U.S. dental spending and is a major component of child health care costs. Income and racial disparities in expenditures favor higher income children despite Medicaid coverage for lower income children. High levels of reported out-of-pocket costs for Medicaid eligible children suggest that Medicaid fails to meet families' needs in obtaining care. Meeting the oral health needs of poor children will require considerably greater expenditures, particularly through improved Medicaid financing and administration. (*Pediatr Dent* 24:11-17, 2002)

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Various approaches have been used to estimate dental expenditures in the U.S., but little is known about dental spending for children. The federal Centers for Medicare and Medicaid Services (CMS, formerly Health Care Financing Administration) regularly estimates historical and prospective health care spending by category of service, including dental care, and by source of expenditure, both public and private.¹⁻² The American Dental Association's Survey of Dental Practice estimates dental expenditures by selected dentist and dental practice characteristics.³ Federal governmental surveys conducted in 1987 and 1996 estimate expenditures by selected population demographics and have been analyzed for dental spending.⁴⁻⁷ Additional studies have paid special attention to dental expenditures among seniors⁸⁻¹⁰ and the impact of

their spending on dental practice,⁸ but none has explored children's expenditures and their implications for dental practice.

While there is some variation in these various estimates,³ all confirm that dental spending accounts for about 5% of overall spending within the U.S. health care market which now exceeds one trillion dollars.¹ These sources and studies also confirm that dental care, unlike medical care, is financed overwhelmingly by private "out-of-pocket" dollars and by private insurance and only marginally by governmental programs including Medicaid.

Previous analyses of the Medical Panel Expenditure Survey (MEPS) found that children of low-income families, children of parents with limited education, and minority children were less likely than more socially advantaged

children to have a dental visit during the year.¹¹ If they did obtain care, they experienced fewer visits¹¹ and obtained fewer services at those visits.¹² These findings raise concern about disadvantaged children's opportunity to benefit from essential dental care since they also experience higher levels of dental disease.¹³ This article further examines MEPS data to characterize national expenditures for children's dental care in 1996, the latest year for which such data are available. Data are analyzed to determine the amount and source of spending as well as the roles of age, sex, race, family income and parental education in order to identify disparities in expenditures and determine potential clinical and public policy implications involved in improving dental care for low-income children.

Children's oral health in the U.S. is the best it has ever been, yet there remains a subset of children who manifest significant and consequential levels of untreated caries.¹⁴ These children tend to be from families with incomes low enough to qualify them for Medicaid. Nearly one-in-four children in the U.S. is eligible for Medicaid's comprehensive dental benefits under EPSDT (the Early and Periodic Screening Diagnosis and Treatment program), yet this program chronically fails to meet their dental treatment needs.^{15,16} Given the low rates of service by this population and the typically low payment rates offered by Medicaid in most states,¹⁷ we hypothesized that expenditures for low-income children would be modest compared with expenditures for higher income children. Because Medicaid prohibits cost-sharing, we further anticipated that out-of-pocket expenditures for low-income children would be negligible.

Methods

The Department of Health and Human Services (DHHS) has sponsored the administration of several national expenditure surveys since 1977.¹⁸ The 1996 Medical Expenditure Panel Survey (MEPS) is the third in a series of nationally representative health surveys of the U.S. community-based population that is sponsored by the Agency for Healthcare Research and Quality (AHRQ; formerly AHCPR and NCHSR). MEPS collects health care expenditure, use and payment source data, along with socioeconomic, demographic, and health insurance data similar to its predecessor surveys. It differs from previous federal medical expenditure surveys in that data on household respondents in each panel are collected for two consecutive years and the survey is fielded continuously—that is, a new panel is selected every year. The target for the 1996 MEPS was a sample of 10,500 households and 21,571 individuals selected from participants in the National Health Interview Survey. To collect health expenditure and use data for 1996, each MEPS household was interviewed in person three times over an approximate 18-month period with the third round administered some time between February and May of 1997. The combined full-year 1996 response rate of the MEPS sample through the third round was 70%.

The focus of this analysis is on dental expenditures for the civilian non-institutionalized population of children in the United States during 1996. Specifically, national estimates are provided for expenditures for each of several socioeconomic and demographic categories during 1996. All estimates and statistics reported were computed, taking into account the complex sampling design of MEPS with the use of the software package SUDAAN.¹⁹ Parents interviewed by MEPS reported how much was expended for their children's dental care out-of-pocket, through private dental benefit plans and through other sources, primarily Medicaid. The MEPS survey designates expenditure sources as "out of pocket," "private insurance" and "other," with the last category primarily comprised of publicly funded insurance such as Medicaid, Medicare, and SCHIP. Since SCHIP was implemented after these data were collected and Medicare provides virtually no dental coverage, the "other" category represents primarily Medicaid spending.

Results

There were 6,595 participants under age 18 in the 1996 MEPS representing 75,326,026 non-institutionalized U.S. children. Of these, approximately half of the participants were female (49%, N=3,235); approximately one-third were in each age cluster birth to six (30.6%, N=2018), six to 12 (33.6%, N=2213) and 12 to 18 (35.8% 2364); 16% (N=1,051) were black and 29% (N=1,933) were Hispanic.

Americans spent approximately \$12 billion for children to receive dental care during 1996. Table 1 shows expenditures and sources of payments for dental services by socioeconomic and demographic characteristics. For children with a dental visit, the mean total expenditure was \$375 dollars. Mean expenditures increased with age and were higher for whites than non-whites and for children of employed parents than unemployed parents. Mean expenditures for poor and near-poor children were less than half of mean expenditures for higher income children. As a percentage of total expenditures, whites, blacks and Hispanics reported similar ($P>.05$) levels of private insurance payments. Poorer respondents reported lower ($P<.05$) mean out-of-pocket and private insurance payments for dental services than respondents from middle- and high-income families but higher governmental payments. Governmental programs accounted for nearly half (49%) of dental expenditures for poor children.

Table 2 further details the effect of age on dental expenditures. It provides data on the sources of payments for dental services as a percent of total expenditures by socioeconomic and demographic characteristics for three age groups: early childhood, childhood and adolescence. Overall, while differences ($P<.05$) are observed between the youngest and oldest age groups in out-of-pocket payments and other payments types including Medicaid, differences were not observed ($P>.05$) among the different age groups in insurance payments. The youngest age group (birth to six years) reported the lowest out-of-pocket payments and the

Table 1. Expenditures and Sources of Payments for Dental Services for Children Birth to 18: Total, Mean and Percent Expense Per Person with Expense, by Selected Population Characteristics, United States, 1996

Population characteristic	Expenditures		Out-of-pocket		Source of payments ^e			
	Total(\$000,000)	Mean(\$)	Mean(\$)	Percent	Mean(\$)	Percent	Mean(\$)	Percent
Total ^a	11,993	374.8	176.2	47.0	167.0	45.0	31.6	8.0
Standard error	931	23.3	13.6	2.0	13.6	2.0	4.9	1.3
Age in years								
Under 6	624	124.1	43.6	35.0	59.4	48.0	21.1	17.0
Standard error	58	8.8	5.6	3.3	5.9	3.5	3.4	2.7
6 to 12	3,346	257.8	105.7	41.0	123.7	48.0	28.4	11.0
Standard error	316	20.5	13.9	3.4	12.3	3.2	3.7	1.6
12 to 18	8,023	573.3	289.2	50.0	245.8	43.0	38.3	7.0
Standard error	829	47.9	27.7	2.8	28.5	2.8	10.0	1.8
Sex								
Male	5,551	342.5	166.5	49.0	151.1	44.0	24.9	7.0
Standard error	616	32.9	20.0	3.0	18.6	3.0	3.8	1.3
Female	6,442	407.8	186.1	46.0	183.3	45.0	38.4	9.0
Standard error	588	32.5	19.2	2.7	18.0	2.6	8.7	3.9
Ethnic/racial background								
White ^b	10,320	402.7	190.6	47.0	182.8	45.0	29.4	7.0
Standard error	880	26.8	14.9	2.2	16.5	2.2	5.9	1.4
Black	735	237.4	115.5	49.0	91.9	39.0	30.0	13.0
Standard error	260	79.3	57.6	8.6	25.4	5.1	5.0	5.0
Hispanic	938	286.0	121.1	42.0	114.5	40.0	50.4	18.0
Standard error	154	42.4	27.1	4.9	21.8	4.4	8.7	3.9
Family income by poverty status ^c								
Poor	936	215.3	86.3	40.0	24.4	11.0	104.5	49.0
Standard error	170	36.2	34.7	10.0	6.6	3.3	11.3	8.7
Near poor	982	210.6	106.6	51.0	72.7	35.0	31.4	15.0
Standard error	126	23.3	19.7	5.7	10.9	4.9	8.2	3.8
Middle income	5,151	403.6	187.9	47.0	202.3	50.0	13.3	3.0
Standard error	603	39.2	22.7	3.0	23.1	3.0	4.0	1.0
High income	4,924	481.4	231.5	48.0	226.5	47.0	23.4	5.0
Standard error	617	49.9	25.6	3.5	32.4	3.6	12.4	2.5
Education ^d								
Some or no school	6,859	357.5	158.5	44.0	161.3	45.0	37.7	11.0
Standard error	746	33.1	17.7	2.6	20.3	2.7	4.8	1.7
College graduate	4,955	406.1	207.6	51.0	182.1	45.0	16.3	4.0
Standard error	507	31.4	21.3	3.3	17.9	3.1	9.2	2.2
Employment ^d								
Employed	11,332	389.7	185.9	48.0	181.1	46.0	22.7	6.0
Standard error	917	25.0	14.4	2.1	14.9	2.1	4.8	1.3
Not employed	349	174.9	37.9	22.0	25.1	14.0	111.8	64.0
Standard error	55	20.2	16.6	8.7	12.1	6.2	18.0	10.4

Note: Standard errors appear in second line of each category. ^a Includes persons in families with negative income. ^b White includes all other ethnic/racial groups. ^c Where poor refers to incomes below the Federal poverty line; near poor, over 100% to 200% of the poverty line; middle income, over 200% to 400% of the poverty line; and high income, over 400% of the poverty line. ^d Refers to parent's education and employment. ^e For children with a visit. ^f Includes Medicaid, other public programs and other similar sources. * Relative standard error is equal to or greater than 30%. Source: Medical Expenditure Panel Survey 1996.

Table 2. Sources of Payments for Dental Services for Children Birth to 18: Percent of Mean Total Payment Per Person with Expense, by Selected Population Characteristics and by Age Groups, United States, 1996

Population characteristic	Source of payments ^e Percent of mean total payment								
	Out-of-pocket			Private insurance			Other ^f		
	0 to 6	6 to 12	12 to 18	0 to 6	6 to 12	12 to 18	0 to 6	6 to 12	12 to 18
Total ^a	35.0	41.1	50.0	48.0	48.0	43.0	17.0	11.0	7.0
Standard error	3.4	3.4	2.8	3.5	3.2	2.8	2.7	1.6	1.8
Sex									
Male	36.0	39.0	53.0	49.0	47.0	43.0	15.0	14.0	4.0
Standard error	4.7	3.5	4.3	4.6	3.6	4.3	2.8	2.5	1.4
Female	34.0	42.0	48.0	47.0	49.0	43.0	19.0	9.0	9.0
Standard error	5.0	5.3	3.5	4.7	4.7	3.3	4.3	1.9	3.0
Ethnic/racial background									
White ^b	40.0	43.0	50.0	49.0	49.0	44.0	11.0	8.0	7.0
Standard error	4.2	3.9	3.0	4.2	3.7	3.1	2.8	1.5	2.0
Non-white	17.0	29.0	56.0	44.9	41.0	38.0	38.0	29.0	6.0
Standard error	4.3	3.9	5.6	5.5	4.5	4.8	6.1	5.0	2.0
Family income by poverty status ^c									
Low income	14.0	41.0	55.0	24.0	26.0	21.0	62.0	34.0	24.0
Standard error	3.9	9.9	6.9	5.3	4.8	4.4	7.0	6.8	5.0
Middle and high income.	42.0	41.0	50.0	55.0	55.0	46.0	3.0	4.0	4.0
Standard error	4.0	3.1	3.0	4.1	3.2	3.0	1.1	1.2	1.9
Education ^d									
Some or no school	35.0	38.0	48.0	41.0	45.0	45.0	24.0	16.0	7.0
Standard error	4.7	5.3	3.3	5.0	4.5	3.5	4.1	2.6	1.9
College graduate	36.0	44.0	55.0	60.0	53.0	40.0	3.0	3.0	4.0
Standard error	4.5	4.0	4.6	4.5	3.9	4.3	2.1	1.6	3.2

Note: Standard errors appear in second line of each category. ^a Includes persons in families with negative income. ^b White includes all other ethnic/racial groups. ^c Where low income refers to incomes below the 200% of the Federal poverty line and middle and high income, over 2,400% of the poverty line. ^d Refers to parent's education and employment. ^e For children with a visit. ^f Includes Medicaid, other public programs and other similar sources. ^{*} Relative standard error is equal to or greater than 30%.

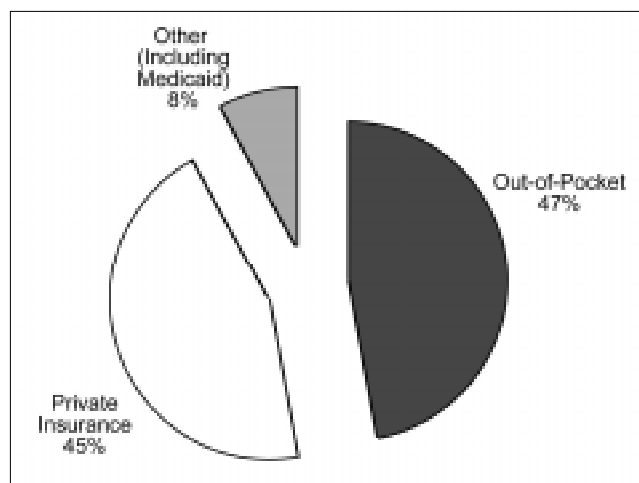


Fig 1. Sources of payments as a percent of total expenditures. Source: Medical Expenditure Panel Survey 1996.

highest governmental payments as a percentage of total expenditures. Poorer respondents reported lower ($P < .05$) levels of private insurance payments than children with more income for each age group. Additionally, while younger poor children reported out-of-pocket payments substantially below children with more income, older poor children (ages 6 to 12 years and 12 to 18 years) reported out-of-pocket payments to be similar ($P > .05$) to older children with more income.

Approximately 47% or \$5.6 billion was paid out of pocket, 45% or \$5.3 billion was paid by insurance, and 8% or \$600 million was paid by all other sources including Medicaid (Fig 1). White children, who comprise 66% of the child population, incurred 86.1% of actual expenditures while spending on black and Hispanic children represented 6.1% and 7.8% of actual expenditures, respectively (see Fig 2 for comparative expenditures). Poor children (eg, those living in families of four with gross annual 1996 incomes less than the 1996 federal poverty level of \$16,036) accounted for 7.8% of expenditures or \$940 million. Children

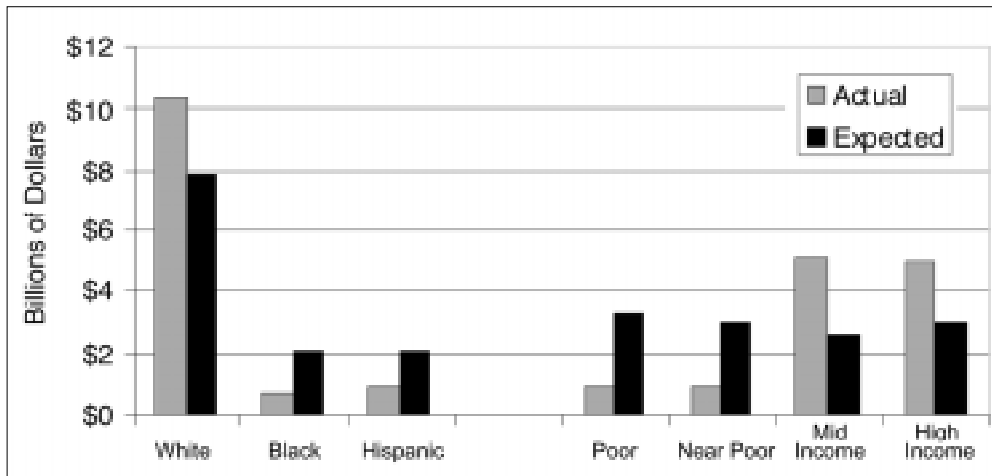


Fig 2. "Actual" and "expected" dental expenditures for children, 1996. Out-of-pocket expenditures as a percent of total expenditures by income for children's dental care 1996. "Expected" expenditures are proportionate to the percentage of children in each subgroup.

from "near-poor" families (eg, \$16,036 to \$32,071 annual income in 1996 for a family of four) accounted for 8.2% or \$980 million; those from middle income families (eg, \$32,071 to \$48,108 annual income in 1996 for a family of four) for 43.0% or \$5.2 billion; and those from high-income families (eg, \$48,108 or greater annual income in 1996 for a family of four) for 41.1% or \$4.9 billion.

Out-of-pocket expenses were substantial at all income levels and all ages. As a proportion of total spending, out-of-pocket expenditures were higher for adolescents than younger children at all economic levels (Fig 3) and were particularly high for near-poor adolescents.

Discussion

The \$12 billion of child dental health expenditures in 1996 represents 27.8% of total U.S. dental care expenditures (\$43.1 billion²⁰) for the same calendar year. This data analysis compared with CMS data reveal that children's care, compared to adult care, was paid less by insurance and more by government, but a similar proportion was paid out-of-pocket. The smaller contribution from private insurance may be explained by the fact that most private insurance is employment-based and may not include dependent coverage. The higher governmental contribution is likely explained by the fact that Medicaid mandates comprehensive dental care for enrolled children but allows states to elect lesser coverage and benefits for adults.

The importance of insurance in funding dental care has been modeled by health economists and shown to be a significant driver of per-capita dental spending in the U.S.²¹ Comparisons of the 1996 MEPS with the previous ARHQ sponsored expenditure surveys, the 1987 National Medical Expenditure Survey (NMES),⁵ show that over time the proportion of total population expenditures paid by insurance appears to have increased (from 35.9% to 48% for preschoolers and from 36.5% to an average for older groups of 45.5%) and the proportion paid out of pocket has apparently decreased (from 39.1% to 35.0% for preschoolers and from 53.5% to an average of 45.5% for older children).

reasonably comprehensive dental coverage in their SCHIP plans. It is likely that out-of-pocket expenses for near-poor children will decrease and governmental payments will increase as the SCHIP program becomes widely implemented.

The \$12 billion in dental spending comprises a significant proportion of health care spending for children, roughly equivalent to the amounts paid for treatment of injuries and for respiratory problems. Using NMES, Miller et al²² calculated that \$86 billion in 1993 inflation-adjusted dollars were expended for children's medical care, excluding dental and nursing home costs. The two top ranked pediatric medical expenditures (excluding costs associated with pregnancy and birth) were \$12 billion for treatment of injury and \$10 billion for treatment of respiratory conditions including asthma.

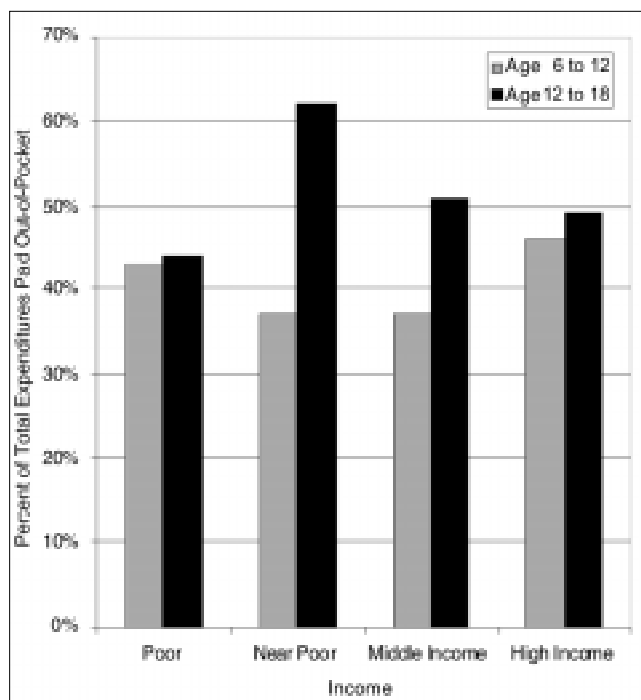


Fig 3. Percent of dental expenditures paid out of pocket for school-aged and adolescent children, 1996

Insurance spending trends specific to children are not known since child-specific findings have not been reported for NMES.

Out-of-pocket expenditures account for a substantial portion of child health expenditures for all groups of children, but especially for near-poor adolescents. In 1997 Congress enacted the State Child Health Insurance Program (SCHIP) to provide health insurance to near poor children. All but one state included

Other analyses of NMES showed that dental spending accounted for 22% of health costs for those aged 2 through 12 and 28% for those aged 13 through 18.²³ Using an actuarial modeling approach rather than an historic spending approach, the proportion of child health care costs attributable to dental care was reported in a 1998 study to be 21% of all child health expenditures.²⁴ The model's estimated mean annual cost of \$256 per year per child is low compared with the actual mean spending of \$375 in 1996 evident in the current MEPS analysis.

Actual dental expenditures for racial subgroups of children differed markedly from the proportion these subgroups represent in the U.S. child population (Fig 2). White children comprise 66% of all white, black, and Hispanic children in the US but consumed 86.1% of expenditures, while black and Hispanic children each comprise 17% of the population but consumed 6.1% and 7.8% of actual expenditures, respectively. This profound disparity is likely explained in part by the greater percentage of minority children who are low-income and covered by Medicaid which pays at markedly lower rates and in part by lower numbers of visits obtained by minority children.¹¹

Similar disparities occur across income groupings. Roughly one-quarter of U.S. children live in households at each income level (28% of children in families with incomes of 0% - 100% of the federal poverty level, 25% from 101% - 200% FPL, 22% from 201% - 300% FPL, 25% from >300% FPL)¹³ but actual expenditures were 5.3 times greater for middle and high-income children than for poor and near-poor children (\$10.1 billion expended for middle and high income children, \$1.9 billion expended for poor and near poor children). Again, low Medicaid rates and low utilization are likely to account for much of this disparity.

Preschoolers, children, and adolescents each account for about one-third of the U.S. child population. However, only 5.2% of dollars were expended for preschoolers while adolescents accounted for 66.9%. Disease and treatment patterns may explain these disparities, since caries progression is cumulative with age and orthodontic expenditures are highest for adolescents.

Unexpected is the finding that dental care for poor children is substantially paid "out of pocket," despite these children's eligibility for Medicaid, which provides a comprehensive dental benefit and prohibits cost-sharing except for occasional non-covered services. Fully 40 cents of every dollar expended on dental care for poor children was paid by families themselves. Since Medicaid-participating dentists cannot accept out-of-pocket payments for Medicaid-covered services from enrolled children, either the dentists treating many of the poor children are not Medicaid providers or families are not enrolling or identifying their children as covered by Medicaid. Families in poverty paid out-of-pocket for a greater proportion of their young children's dental care than did near-poor and middle-income families and almost as great a proportion as high income families.

These observations further substantiate that Medicaid fails to assure ready access to participating dentists as required by federal law.²⁶ The average out-of-pocket expenditure for low-income children was \$86.30, which represents more than a quarter of a week's total gross income for a poor family of four. Despite this financial hardship, the absolute dollar amount expended is far less than the cost typically needed to obtain comprehensive care. These out-of-pocket expenditures likely represent payments made for relief of symptoms rather than comprehensive care, since pain is a common reason low income children access dental care, accounting for 19.4% of poor children's dental visits.²⁷

While these data and analyses are useful, they do have limitations. For instance, self-reporting of data is less accurate than collection by observation or by dental record abstraction. In addition, temporal comparisons between NMES and MEPS require recognition that their design and methodology are not identical. Nonetheless, these federal data provide useful estimates that are nationally representative. As such, these data are unique, provide important information and establish a mechanism from which child dental expenditures can be analyzed.

Conclusions and practice implications

Profound disparities exist within the \$12 billion pediatric dental expenditures made in 1996 among various social and demographic groupings of children. Private dental insurance plays a substantial role in financing children's dental care for all subsets of children except those living in poverty and those whose parents are unemployed. Disproportionately greater expenditures are made for white and higher-income children than non-white and lower-income children despite their having less dental disease. Government programs, particularly Medicaid, account for a greater proportion of child expenditures than adult expenditures, reaching nearly half for children living in poverty. Yet, out-of-pocket expenditures are high for all groups of children, even for those who are categorically eligible for Medicaid, suggesting that poor children access a substantial portion of their limited dental care outside of this program.

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