Objective: To examine whether income-related disparities in the burden of children’s out-of-pocket health care expenditures have diminished with the expansions in public insurance for children in low-income families.

Design: We compared absolute financial burden (out-of-pocket expenditures per child) and relative financial burden (out-of-pocket expenditures per child as a proportion of family income) among children aged 0 to 18 years in 6 poverty level groups using the 1980 National Medical Care Utilization and Expenditure Survey and the 2000 Medical Expenditure Panel Survey. Regression models were used to assess whether disparities in financial burden diminished between 1980 and 2000.

Results: There were significant reductions ($P < .01$) in absolute burden over time for children above 200% of the federal poverty level. Relative financial burden decreased significantly ($P < .01$) for all of the income groups, ranging from a reduction of 36.49% for those below 100% of the federal poverty level (95% CI, −49.54% to −20.07%) to a reduction of 46.69% for those at or above 300% of the federal poverty level (95% CI, −54.43% to −37.62%). For low-income children, relative financial burden was 49.49% less with public insurance (95% CI, −66.24% to −24.35%) and 79.14% greater with private insurance (95% CI, 9.31% to 193.59%) than relative financial burden for low-income children without insurance.

Conclusions: While the financial burden of children’s out-of-pocket health care expenditures has decreased for all of the income groups over time, socioeconomic disparities persist. However, public insurance coverage appears to mitigate the financial burden for low-income children.

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Much has been written about socioeconomic disparities in health and health care among children. These studies show that considerable income gradients exist for a variety of health measures, including both acute and chronic conditions, and for many measures of health care access and use, including usual source of care, unmet health needs, and use of physician services. Children in low-income families are also more likely to have financial barriers to health care as compared with nonpoor children, and these barriers may adversely affect health care use and health outcomes.

While there is some evidence that poor families pay a greater proportion of their income for out-of-pocket medical expenditures than do nonpoor families, few studies have examined the financial burden of health care expenditures for children. One earlier study by Newacheck and Halson used data from the 1980 National Medical Care Utilization and Expenditure Survey (NMCUES) to examine variation in out-of-pocket health care expenditures for children in several income groups categorized according to poverty thresholds. That study revealed that total out-of-pocket expenditures increased progressively with family income. However, when measured relative to the ability to pay, a regressive pattern appeared, as out-of-pocket health care expenditures consumed a larger proportion of family income for children in low-income families than for those in more advantaged families. The study also showed that Medicaid coverage effectively ameliorated the higher relative financial burden of poor children.

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We expected that the large-scale expansions of Medicaid coverage enacted in the 1980s and implemented throughout the 1990s should have eliminated or reduced the previous pattern of regressive...
financial burden. By 1992, all of the children up to age 6 years in families with incomes of up to 133% of poverty and all of the children up to age 9 years in families with incomes of up to 100% of poverty were eligible for Medicaid coverage.13 By 2000, virtually all of the children living in families with incomes below the poverty level were eligible for Medicaid. The number of children enrolled in Medicaid more than doubled from just under 10 million in 1985 to 20 million in 2000.14

Disparities in financial burden should also be reduced by the State Children’s Health Insurance Program (SCHIP). This program, enacted in 1997 to provide low-cost health insurance to low-income children who did not qualify for Medicaid, covers children in families with incomes of up to 200% of poverty in most states and contains provisions that limit cost sharing to 5% of family income for all of the children (excluding premiums).15 Between 1998 and 2000, the number of children enrolled in SCHIP more than doubled to 3 million.14

In light of these expansions, we compared patterns of out-of-pocket health care expenditures and their associated financial burden using the same poverty thresholds for 1980 and 2000. Our objective was to determine whether a change occurred from 1980 to 2000 in income-related disparities in children’s out-of-pocket health care expenditures and in the proportion of family income devoted to children’s out-of-pocket health care expenditures.

METHODS

DATA SETS
Two data sets, the 1980 NMCUES16 and the 2000 Medical Expenditure Panel Survey (MEPS),17 were used for this study. The NMCUES collected data about the health status, use of services, associated charges, and sources of payment for the US civilian noninstitutionalized population. Data were collected on use and expenditures for ambulatory and inpatient hospital care, prescription medications, dental services, and other medical equipment (eg, eyeglasses).18,19 This survey comprised 6000 randomly selected households interviewed 5 times over a 14-month period. Participants in the NMCUES maintained diaries of their health care use, expenditures, and charge information. Results were summed across individuals and families to produce annualized expenditures for 1980. One adult per household also maintained a diary of health care use and charge information for families. Of the 17,123 persons surveyed, 5662 were children aged 0 to 18 years. The compound response rate was 64%.20

The 2000 MEPS,17,21 also a panel survey, represents the US civilian noninstitutionalized population. Data for individual family members were collected in 5 rounds of interviews over a 30-month period. The household component sample collected data on use and expenditures for office- and hospital-based care, home health care, dental services, vision aids, and prescribed medications. Data were collected for each sample person at the event level and were summed across rounds to produce the annual use and expenditure data for 2000.21 An adult respondent maintained diaries of illness episodes, health care use, and charge information for all of the family members. The response rate for combined panels was 66% in the 2000 MEPS. The sample for the full-year MEPS comprised 23,839 individuals, 7267 of whom were children aged 0 to 18 years.

The 1980 NMCUES and the 2000 MEPS have many similarities. Both surveys (1) represent the same population; (2) collected data on health care use and expenditures during 5 rounds of interviews; (3) used diaries to improve the reporting of use and expenditures for all of the family members; and (4) defined families as a group of persons sharing a common household who are related by blood, marriage, adoption, or a formal foster-care relationship. Although there are some differences in the collection of expenditure data between the 2 surveys, those differences should have little impact on our analysis of out-of-pocket expenditures.

ANALYSIS VARIABLES

Two primary measures of financial burden were used: (1) the absolute burden, defined as out-of-pocket dollars spent per child; and (2) the relative burden, defined as out-of-pocket dollars spent per child for each $1000 of family income. To remove the influence of outlier ratio values, we excluded from the analyses 30 children in 1980 and 136 children in 2000 with family incomes of less than $1000. Financial burden estimates were computed by averaging the financial burden experienced for individual families with children (excluding those with incomes less than $1000). To compare absolute out-of-pocket health care expenditures between 1980 and 2000, the 1980 out-of-pocket expenditures were adjusted to 2000 dollars using the Consumer Price Index for urban consumers. No adjustments were made for relative burden since it measures the proportion of family income spent out-of-pocket in each year, a comparable metric in both time periods. Out-of-pocket health care expenditures were the sum of the amount spent for 8 types of health care events for the child: medical provider visits, hospital stays, hospital outpatient visits, emergency department visits, dental visits, home health care, prescription medications, and other services.17,21 Insurance premium expenditures were excluded, as they were not collected in the NMCUES.

Adult household members reported income on a source-by-source basis rather than as a single lump sum. Income data were collected using comparable detailed methods in both surveys. Family income was calculated by summing incomes across individual household members. Missing income data were imputed by the data collection agencies. Children were classified into 6 poverty categories: (1) below 100% of the federal poverty level (FPL); (2) 100% to 149% of the FPL; (3) 150% to 199% of the FPL; (4) 200% to 249% of the FPL; (5) 250% to 300% of the FPL; and (6) at or above 300% of the FPL.

We also examined the role of insurance coverage in explaining financial burden. In both years, insurance was defined as private if the child had continuous private coverage, and it was defined as public if the child had continuous public coverage. A mixed group included children who had a mix of private and public insurance or part-year insurance coverage. The uninsured were those without private or public coverage for all of the year.

ANALYTIC APPROACH

We used both bivariate and multivariate analyses to assess whether gradients were present during 2000 in absolute and relative financial burden across the 6 poverty groups, and whether the gradient changed between 1980 and 2000. Bivariate results are presented in bar charts (Figure 1 and Figure 2) and were used to assess differences between 1980 and 2000 for each poverty group using t tests.

We conducted a set of multivariate analyses controlling for age, race/ethnicity, sex, and insurance status, since changes in the distribution of out-of-pocket spending could be affected by changing demographics of the child population over time. Separate regressions were estimated for each poverty group using pooled 1980
3 to 4 times those of children in the lowest-income family income category having out-of-pocket expenditures of $100, averaging $200 per child. Figure 1 shows total out-of-pocket health care expenditures for children younger than 19 years exceeded $15 billion, during 2000, total out-of-pocket health care expenditures declined significantly (P < .01) over time in relative financial burden (−36.49%, 95% CI, −49.54% to −20.07). Financial burden of out-of-pocket health care expenditures, as a share of family income, was more than 2 times greater for children below poverty than for children with the highest family incomes in both 1980 and 2000 (P < .001). The t tests indicate a significant difference (P < .01) between 1980 and 2000 in the relative financial burden experienced by children only in poverty levels of 100% to 149% of the FPL and greater than 300% of the FPL. Visually, the 2000 data continued to show the same regressive pattern found in 1980, suggesting that although progress has been made in reducing the relative financial burden of out-of-pocket health care expenditures, the disparity among the different poverty groups remains.

**MULTIVARIATE ANALYSIS**

Table 1 summarizes the multivariate findings for the financial burden outcomes. After controlling for possible changes in population demographics and insurance status, the distribution and gradient of the absolute and relative financial burdens did not change in the expected direction. Financial burden of out-of-pocket health care spending declined significantly (P < .01) between 1980 and 2000 for all of the income groups. Although children living in poor and near-poor families (<100% of the FPL and 100%-149% of the FPL, respectively) who were the primary targets for Medicaid and SCHIP expansions experienced a significant reduction (P < .01) over time in relative financial burden (−36.49%, 95% CI, −49.54% to −20.07%), and −40.49%, 95% CI, −55.43% to −20.55%, respectively), it was not appreciably more than that found for the other income groups.

**RESULTS**

**BIVARIATE ANALYSIS**

During 2000, total out-of-pocket health care expenditures for children younger than 19 years exceeded $15 billion, averaging $200 per child. Figure 1 shows total out-of-pocket expenditures that increased with family income for both time periods, with children in the highest-income category having out-of-pocket expenditures of 3 to 4 times those of children in the lowest-income families (P < .001 for both 1980 and 2000). Although the chart suggests that all of the income groups experienced reductions in out-of-pocket expenditures between 1980 and 2000, differences were not significant for those children living in families incomes below 200% of the FPL. The overall shape and slope of the gradient remain largely unchanged between 1980 and 2000.

When out-of-pocket expenditures are measured relative to family income, a regressive pattern is visible at both time points. Data in Figure 2 demonstrate that out-of-pocket expenditures were skewed, we log-transformed that data for the regression models and then back-transformed the results for ease of interpretation. In the log transformation, “$1” was added to the sum of out-of-pocket expenditures so that all of the observations (including those with no out-of-pocket expenditures) could be used. All of the analyses were conducted using Stata version 8.0 (Stata Corp, College Station, Tex), which adjusts for the complex sample design of the surveys. This study was granted exempt status by the institutional review board at the University of California at San Francisco.
ROLE OF INSURANCE

Recognizing that children in low-income families (<200% of the FPL) experience a much higher financial burden than those in high-income families, we conducted a separate analysis of the 2000 MEPS data to determine whether the presence and type of insurance were associated with financial burden. The results in Table 2 demonstrate that those with continuous public insurance experienced a 61.36% decrease in absolute financial burden (95% CI, −74.74% to −40.84%) and a 49.49% decrease in relative financial burden (95% CI, −66.24% to −24.35%) as compared with continuously uninsured children. Those with continuous private insurance experienced a 134.43% increase in absolute financial burden (95% CI, −41.91% to 286.90%) and a 79.14% increase in relative financial burden (95% CI, 9.31% to 193.59%) as compared with continuously uninsured children.

WHY DISPARITIES REMAIN

Given that we expected to find a more substantial narrowing of financial burden across poverty groups following the Medicaid and SCHIP expansions, we examined whether the expansions had, in fact, resulted in a net increase in the proportion of poor and near-poor children with health insurance coverage between 1980 and 2000. There was a large increase in the proportion of children in low-income families covered by public insurance from 1980 to 2000. There was a large increase in the proportion of children in poor and near-poor families.

1980 revealed a substantial gradient across poverty categories, whereby the share of family income spent on children’s health care was inversely related to family income. We hypothesized that the gradient present in 1980 would be substantially reduced in 2000 given the large-scale expansions in public insurance targeted at children in poor and near-poor families.

The number of children enrolled in Medicaid has more than doubled between the early 1980s and 2000, and an additional 3 million children were newly enrolled in SCHIP by 2000.21 Both programs cover a broad range of health care services needed by children, including preventive care, acute care services, and many of the specialized services needed for the care of chronic conditions. Moreover, both programs limit deductibles, coinsurance, and copayments to nominal levels.

Our results suggest that out-of-pocket expenditures decreased for children overall between 1980 and 2000. This decrease in absolute financial burden may reflect the shift from traditional indemnity insurance to managed care plans that require less cost sharing for many services commonly used by children (eg, preventive care). However, the shape and slope of the gradient across poverty categories did not substantially change. This finding indicates that out-of-pocket expenditures for children in the poor and near-poor categories have not declined more rapidly than for children in higher-income categories, though a more rapid decline for children in the poor and near-poor categories had been expected given the large-scale expansions in public coverage. Additionally, the expected reduction in disparities in relative financial burden of out-of-pocket expenditures did not occur.

We undertook this study to examine whether socioeconomic disparities presently exist in the burden of out-of-pocket health care spending for children. The previous analysis by Newacheck and Halfon12 using data from 1980 revealed a substantial gradient across poverty categories, whereby the share of family income spent on children’s health care was inversely related to family income. We hypothesized that the gradient present in 1980 would be substantially reduced in 2000 given the large-scale expansions in public insurance targeted at children in poor and near-poor families.

Table 2. Estimated Percentage of Change of Absolute and Relative Financial Burden for Children Aged 0 to 18 Years Who Are Below 200% of the Federal Poverty Level*

<table>
<thead>
<tr>
<th>Insurance</th>
<th>Out-of-Pocket Expenditures, % (95% CI)</th>
<th>Out-of-Pocket Expenditures per $1000 of Family Income, % (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Uninsured</td>
<td>Reference</td>
<td>Reference</td>
</tr>
<tr>
<td>Public</td>
<td>−61.36 (−74.74 to −40.84)</td>
<td>−49.49 (−66.24 to −24.35)</td>
</tr>
<tr>
<td>Private</td>
<td>134.43 (41.91-286.90)</td>
<td>79.14 (9.31-193.59)</td>
</tr>
<tr>
<td>Mixed</td>
<td>−32.56 (−55.78 to 2.74)</td>
<td>−23.81 (−49.44 to 14.91)</td>
</tr>
</tbody>
</table>

Abbreviation: CI, confidence interval.
*Data from the 2000 Medical Expenditure Panel Survey.17

Table 3. Insurance Coverage in 1980 and 2000 for Children Aged 0 to 18 Years*

<table>
<thead>
<tr>
<th>Poverty Status, % of FPL</th>
<th>Continuous Private Coverage, %</th>
<th>Continuous Public Coverage, %</th>
<th>Continuously Uninsured, %</th>
<th>Mixed Insurance Coverage, %</th>
</tr>
</thead>
<tbody>
<tr>
<td>100−149</td>
<td>14.41</td>
<td>12.18</td>
<td>35.75</td>
<td>46.77</td>
</tr>
<tr>
<td>150−199</td>
<td>40.36</td>
<td>26.64</td>
<td>12.74</td>
<td>30.10</td>
</tr>
<tr>
<td>200−249</td>
<td>52.19</td>
<td>37.88</td>
<td>7.10</td>
<td>18.75</td>
</tr>
<tr>
<td>250−299</td>
<td>69.47</td>
<td>57.02</td>
<td>4.73</td>
<td>11.32</td>
</tr>
<tr>
<td>300−349</td>
<td>80.63</td>
<td>65.08</td>
<td>1.28</td>
<td>3.14</td>
</tr>
<tr>
<td>Total</td>
<td>62.31</td>
<td>59.50</td>
<td>9.04</td>
<td>14.46</td>
</tr>
</tbody>
</table>

Abbreviation: FPL, federal poverty level.
*Pooled data from the 1980 National Medical Care Utilization and Expenditure Survey and the 2000 Medical Expenditure Panel Survey.17
The expansions in public insurance did not reduce the number of uninsured children to the degree expected. We found little change in the proportion of children with health insurance, despite expansions of Medicaid and the implementation of SCHIP. This phenomenon is consistent with the “crowd-out” or substitution argument, whereby public insurance expansions crowd out private coverage with little net gain in coverage. However, the extent to which crowd out takes place remains unclear. A recent literature review revealed crowd-out estimates ranging from 11% to 40%, varying by data source and methodology. Even considering the higher end of this range, crowd out would only partially offset an increased enrollment in public programs.

Other changes in the broader economy and the health care system, such as the large-scale shift from a manufacturing economy to a service economy, may have left increased numbers of low- and moderate-income families without employer-sponsored private insurance. Further, the migration to managed care over the past 2 decades has likely led to disproportionate reductions in out-of-pocket expenses for middle- and higher-income families who had indemnity coverage in the past. Major benefits of managed care are the limited financial exposure for deductibles and coinsurance as well as more generous coverage of preventive services. Together, these system-level changes, along with crowd out, appear to have muted the effect of expanded public coverage.

Although the Medicaid expansions and implementation of SCHIP did not lead to an attenuation of disparities in financial burden, they have been effective in keeping low-income families with children from facing increasing financial burden. Our data show that for low-income children in 2000, continuous public coverage was protective against financial burden, more so than private insurance was. The noted disparities might have been reduced if fewer low-income children with public insurance experienced gaps in coverage. Many children who are eligible for Medicaid and SCHIP do not enroll, and many who enroll experience lapses in coverage. It is likely that without the expansions, even more children would be uninsured with higher out-of-pocket financial burdens. Additionally, while disparities in financial burden still exist across family income levels, evidence from other sources indicates that the expansions and enactment of SCHIP have improved access to care and use of preventive services, and they have reduced the mortality of infants and children.

Our study should be interpreted in light of important limitations. As the NMCUES did not collect data on insurance premiums, we were not able to compare financial burden associated with premium expenses. If coverage of low-income children has shifted from private insurance (with premiums) to public insurance (with minimal or no premiums), then a reduction in financial burden might have been demonstrated for low-income children over time had premium data been available. Whether this would be enough to reduce the disparities across income groups in a significant fashion is another question. Our recent study of financial burden in families using the 2001 MEPS data revealed a regressive pattern for poor families, even with the inclusion of premium data. Second, our measures of financial burden count only the direct out-of-pocket expenditures that families incur for health care. As with most studies of health care expenditures, we excluded the indirect costs of illness, such as lost school days and workdays owing to illness. Third, definitive conclusions cannot be made about the causes of differences in financial burden over time given our cross-sectional study design. Finally, although all of the states had operating programs by 2000, the 2000 MEPS data may not reflect the full impact of SCHIP.

Expansions in public coverage have helped children in low-income families maintain health insurance coverage in the face of declining rates of private insurance coverage. While the financial burden of children's out-of-pocket health care expenditures has decreased for all of the income groups over time, income-related disparities in relative financial burden continue to exist. However, public insurance coverage appears to protect against financial burden for low-income children, more so than private insurance does. The persistence of socioeconomic disparities in the financial burden of out-of-pocket expenditures is of great concern, particularly if increased cost sharing prevents families from obtaining needed health care or other important household goods and services. Further research is needed to develop effective strategies for reducing disparities in financial burden.

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REFERENCES

The thing that impresses me most about America is the way parents obey their children.
—Duke of Windsor