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Annual Report on Access to and Utilization of Health Care for Children and Youth in the United States–1999

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ABBREVIATIONS. MEPS, Medical Expenditure Panel Survey; HCUP, Healthcare Cost and Utilization Project; AHCPR, Agency for Health Care Policy and Research; HC, Household Component; MPC, Medical Provider Component; IC, Insurance Component; ICD-9-CM, *International Classification of Diseases, 9th Revision, Clinical Modification*; SID, State Inpatient Databases; NIS, Nationwide Inpatient Sample; AHA, American Hospital Association; MSA, Metropolitan Statistical Area.

The dynamics of health care delivery for children and adolescents have greatly evolved over the last 5 years. The growth of managed care has been especially rapid, and has coincided with other fundamental changes—declines in private coverage, growth of Medicaid, welfare reform, and the creation of the state Child Health Insurance Program (CHIP).[1] Over the past 10 years, the number of children covered through employer-sponsored plans and other private plans has dropped.[2] During this same period, changes to Medicaid have begun to de-couple eligibility from welfare eligibility, theoretically enabling states to expand coverage. For children, this movement from private to public coverage has accelerated the movement to managed care systems. Between 1991 and 1997, Medicaid enrollment in managed care plans increased from 9.5% to 47.8% of total Medicaid enrollment.[3] Recent estimates suggest that over half of these Medicaid managed care enrollees are children.[4] However, little is known about the impact of these trends on children's access to and use of services, let alone the quality and outcomes of that care.

This report is the first in what is anticipated to be an annual series of reports on access to and use of health care services by America's children and youth. The report capitalizes on the existence of 2 national datasets, the Medical Expenditure Panel Survey (MEPS) and the Healthcare Cost and Utilization Project (HCUP), which have not been widely used by the child health services research community. As background to these new sources of data, we have provided a detailed description of the datasets, and review some of the fundamental tabulations. In future years, as more data are accumulated, these reports will focus on delineation of key trends and analyses addressing policy issues.

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METHODS

MEPS

The MEPS is conducted to provide nationally representative estimates of health care use, expenditures, sources of payment, and insurance coverage for the US civilian noninstitutionalized population, cosponsored by the Agency for Health Care Policy and Research (AHCPR) and the National Center of Health Statistics. This survey contains a level of detail and breadth that is far greater than other surveys of health insurance in the United States. Through the surveys detailed below, MEPS provides the linked information that is needed to examine important relationships between insurance, access, use of health care services, and costs of care for children and adolescents.

MEPS comprises 4 component surveys: the Household Component (HC), the Medical Provider Component (MPC), the Insurance Component (IC), and the Nursing Home Component. The latter is not further discussed in this report. The HC is the core survey, and it forms the basis for the MPC sample and part of the IC sample. The sampling frame for the MEPS HC is drawn from respondents to the National Health Interview Survey and includes an oversampling of Hispanics and blacks.

HC

The HC collects detailed data on demographic characteristics, health conditions, health status, use of medical care services, charges and payments, access to care, satisfaction with care, health insurance coverage, income, and employment. Data are collected using an overlapping panel design over a 2.5-year period in a series of 5 rounds of interviews (Fig 1). Using computer-assisted personal interviewing technology, data on medical expenditures and health care services use for 2 calendar years are collected from each household. The overlapping panel design allows data from 2 panels to be combined to provide continuous and current estimates of based on a larger sample size. The base sample size in any given year is approximately 23 000 individuals, increasing every 5 years to a peak of 33 000. In 1996, there were 10 500 families and 6286 children <18 years. The HC is designed to provide national estimates and does not have a large enough sample to provide reliable state-based estimates.

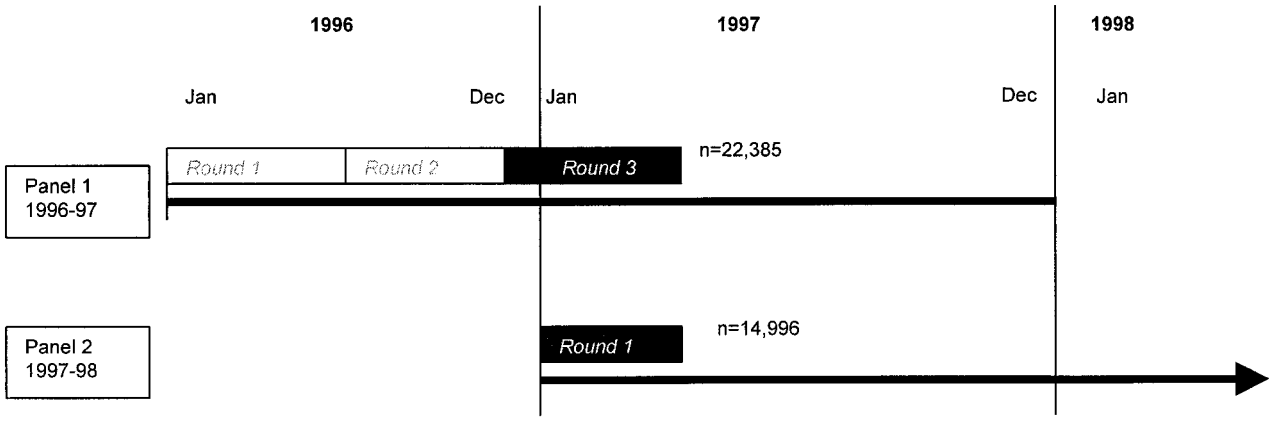

Fig 1. Overlapping panel design of the Medical Expenditure Panel Survey (MEPS).

MPC

The MPC supplements and validates information on medical care events that were reported by respondents in the HC. All hospitals and pharmacies, and a sample of medical providers identified by household respondents are contacted through telephone interviews and mailed survey materials. The information provided during the HC is then verified and missing information is supplemented. Data collected in the MPC includes the following: diagnoses coded according to the *International Classification of Diseases, 9th Revision, Clinical Modification* (ICD-9-CM) and the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition ;* physician procedure codes classified by *Current Procedural Terminology, Version 4*; inpatient stay codes classified by diagnosis-related group; prescription codes by national drug code, medication names, strength, and quantity dispensed; and charges, payments, and the reasons for any difference between charges and payments.

IC

While insurance information is collected from household respondents, MEPS also includes a separately constructed sample of establishments, which offer health insurance. The MEPS IC collects data on health insurance plans obtained through employers, unions, and other sources of private health insurance. Data obtained in the IC include the number and types of private insurance plans offered, benefits associated with these plans, premiums, contributions by employers and employees, and employer characteristics. Establishments participating in the MEPS IC are selected through employers and insurance providers identified by MEPS HC respondents, the Bureau of the Census, and an Internal Revenue Service list of the self-employed. Data are collected from the selected organizations through a prescreening telephone interview, a mailed questionnaire, and a telephone follow-up for nonrespondents. The IC is large enough to provide state-based estimates of health insurance for 40 states, a listing of which is available from AHCPR.

MEPS is the third in a series of national probability surveys conducted by AHCPR on the financing and use of medical care in the United States. The National Medical Care Expenditure Survey was conducted in 1977 and the National Medical Expenditure Survey was conducted in 1987. These three surveys allow for analysis of trends over time in medical care, and public use files are available at the AHCPR web site (www.ahcpr.gov).

HCUP

Data Source

This study uses data from the HCUP. HCUP is a federal-state-private sector collaboration, sponsored by AHCPR, to collect hospital discharge abstract data for purposes of research. (Information on obtaining HCUP datasets from 1988 to 1996 is also available on the AHCPR website.) For the 1996 data year, 19 states[a] contributed their hospital data to HCUP, encompassing over half of all hospital discharge abstracts in the United States. The state data are translated into a uniform format to facilitate multistate comparisons and research, and together comprise the HCUP State Inpatient Databases (SID). The SID contain the universe of all inpatient discharge abstracts in participating states and contain a core set of clinical and nonclinical information found in a typical discharge abstract.

The Nationwide Inpatient Sample (NIS) is drawn from the SID and approximates a 20% sample of US community hospitals, as defined by the American Hospital Association (AHA) annual survey.[5] The AHA defines community hospitals as all non-federal short-term (average length of stay <30 days) general and specialty hospitals whose facilities are open to the general public. Specialty hospitals include obstetrics-gynecology, pediatric, short-term rehabilitation, orthopedic, and oncology hospitals, among others. Excluded are long-term hospitals, psychiatric hospitals, and alcohol/chemical dependency treatment facilities. The NIS collects all inpatient stays from sampled institutions and includes >900 hospitals and 6.5 million discharges for 1996, of which 1.2 million are for children <18 years old.

The NIS sample is a stratified probability sample of hospitals in the frame, with sampling probabilities proportional to the number of US community hospitals in each stratum. The hospital universe is defined using the AHA annual survey of hospitals.[5] This universe of hospitals is divided into strata using 5 hospital characteristics: ownership/control, bed size, teaching status, rural/urban location, and geographic region. Hospitals from HCUP participating states (the sampling frame) are selected to represent these strata, and all discharges from sampled hospitals are included in the database. Weights indicate the number of discharges that the sample discharge represents in the universe of discharges from US hospitals for that year in that stratum. The total number of discharges in the universe from that stratum is also taken from the AHA annual survey of hospitals.[5]

Study Sample

The entire sample of NIS discharges for 1996 was used for this study (N = 6 542 000) from 906 hospitals. These discharges were weighted to obtain estimates that are representative of hospital inpatient discharges in the United States. The estimated total number of discharges represented in these analyses is 34 874 000. This estimate is comparable to the estimate of 34.4 million discharges (30.5 million non-newborn discharges plus 3.9 million newborns) based on the National Hospital Discharge Survey.[6] The unit of analysis is the discharge, or hospital stay, rather than the patient. Because the NIS is limited to inpatient hospital data, conditions treated on an ambulatory basis are not represented here.

[a]Arizona, California, Colorado, Connecticut, Florida, Illinois, Iowa, Kansas, Maryland, Massachusetts, Missouri, New Jersey, New York, Oregon, Pennsylvania, South Carolina, Tennessee, Washington, and Wisconsin.

Diagnosis Categories

The diagnoses recorded on hospital discharge abstracts are coded using the ICD-9-CM.[7] The ICD-9-CM consists of >12 000 diagnosis codes. Although it is possible to present descriptive statistics for individual ICD-9-CM codes, it is often helpful to aggregate codes into clinically meaningful categories that group similar conditions.

For this study, diagnoses and procedures were initially categorized using the Clinical Classification Software, which was developed to provide a convenient way to report hospital statistics by diagnosis or procedure.[8] The Clinical Classification Software aggregates illnesses and conditions into 259 mutually exclusive categories, most of which are clinically homogeneous. Some heterogeneous categories combine several less common individual conditions. For this report, these categories were further aggregated for ease of presentation.

Calculation of Statistics

The number of cases in the NIS was multiplied by hospital-specific discharge weights to derive national estimates of the number of discharges. Results are not presented when the unweighted number of discharges is <70. Using a generalized variance technique for proportions, it was determined that a sample of at least 70 discharges is required to ensure, with 95% confidence, that the reported proportions had a relative error of <30% (ie, if the reported value is P, the error is $<.3P$). All results reported are significant at $P < .05$; most results are significant at $P < .001$.

All charge data are charges for the hospitalization, excluding professional (primarily physician) fees. Charges do not necessarily reflect costs nor are they synonymous with reimbursements. In the NIS, charge data are present for 98% of all discharges.

These 2 databases provide critical insight into the factors driving health care for children and youth. Results are reported for each sequentially. MEPS is used as the source of information for all data on insurance coverage and utilization of ambulatory care services. HCUP is the source of all data on patterns of hospitalization.

RESULTS

Access to Health Care: Health Insurance Coverage

In general, children are more likely than adults to have health insurance.[9] Nearly 90% of children had either private or public health insurance for some period of time during 1996 (Table 1). However, a comparison of full year MEPS data with insurance estimates from the first round of data collection reveals that there is substantial movement of children on and off insurance. When measured at a single point in time, the proportion of children who are uninsured grows to 15.4%.[9] Children <1 year of age were more likely than children in other age groups to lack private health insurance or to have public insurance. Public insurance continues to grow in its importance to children and adolescents. Overall, 20.8% of children <18 years had public insurance, compared with 12.1% of individuals between 0 and 65 years old. What these data do not reveal, however, is that a substantial number of children eligible for public insurance programs are not enrolled. Selden and Banthin[10] estimated that in 1996, fully 4.7 million children were eligible but not enrolled in Medicaid.

Factors Associated With Health Insurance Coverage

Race/Ethnicity

White children were more likely than children from other racial/ethnic groups to have private health insurance and were the least likely to have public insurance (Table 2). Hispanic children were the racial/ethnic group most likely to be uninsured (21.2%). When compared with whites, a greater proportion of Hispanic and black children were covered under public health insurance. Indeed, nearly 4 times as many black children were covered by public health insurance (41.3%) as white children (11.5%).

Family Employment Status

Employers are the source of health insurance for the majority of children covered by the private sector (60.2%, data not shown). Children in families with single parents who were not employed were the least likely to have private health insurance (8.3%). Children in 2-parent families where both parents were employed were the group most likely to be privately insured (85.9%) when compared with children of single-parent employed families or 2-parent families where only 1 parent was employed. Private coverage was far less common when only 1 of the parents in a 2-parent family was employed (66.8%). Children in families with single parents who were not employed were the most likely to be publicly insured (83.7%). In 2-parent families, a child was most likely to be publicly insured when neither parent was employed (69.1%).

Using 1996 MEPS data and earlier surveys in 1987 and 1977, Weinick and Monheit[11] analyzed the relationship between family structure, parental employment, family income, and children's health insurance and found that the rise in the proportion

TABLE 1. Health Insurance Coverage for Children by Age Group, 1996

Age	N (in Thousands)	Percent With Private Insurance	Percent With Public Insurance	Percent Uninsured
Total*	71 421	63.9	20.8	15.4
Total†	71 479	68.6	20.8	10.6
Less than 1 y	3740	53.7	34.0	12.4
1 to 4 y	16 072	66.2	25.6	8.2
5 to 9 y	19 864	68.7	21.0	10.3
10 to 14 y	19 478	69.4	18.9	11.8
15 to 17 y	12 325	74.7	13.3	12.0

* Estimate based on the first half of 1996.
† Estimate based on full year data for 1996.
Population includes children whose parents' education and/or employment status is unknown as well as children with no parents.
Note: Restricted to civilian noninstitutionalized population. Percents may not add up to 100 because of rounding.

TABLE 2. Factors Associated With Insurance Coverage of Children Ages 17 and Under

Factor	(N) (in Thousands)	Percent With Private Insurance	Percent With Public Insurance	Percent Uninsured
Total*	71 479	68.6	20.8	10.6
Race/ethnicity*				
White	46 485	80.4	11.5	8.1
Black	11 182	47.9	41.3	10.9
Hispanic	10 625	40.2	38.6	21.2
Other	3187	63.0	25.4	11.6
Sex*				
Male	36 928	69.1	20.4	10.6
Female	34 551	68.0	21.5	10.7
Family employment status†	70 512	68.9	20.4	10.7
Single-parent employed	12 341	55.6	29.9	14.6
Single-parent not employed	3998	8.3	83.7	8.0
Two-parent both employed	34 655	85.9	6.0	8.1
Two-parent one employed	16 470	66.8	20.5	12.7
Two-parents neither employed	1101	13.8†	69.1	17.1‖
No parents	1946	24.9	59.4	15.8
Highest parent education‡	71 424	68.6	20.8	10.6
Less than high school	10 650	25.3	55.0	19.7
High school	22 510	63.6	24.3	12.2
More than high school	36 317	86.8	6.5	6.7
No parents	1946	24.9	59.4	15.8
Perceived health status§	70 507	69.0	20.6	10.4
Excellent/good	68 481	69.9	19.8	10.3
Fair/poor	2026	40.0	46.8	13.3
Census region*				
Northeast	13 132	72.2	21.1	6.8
Midwest	16 871	75.4	16.9	7.7
South	24 500	64.6	21.9	13.5
West	16 976	64.7	22.9	12.4
MSA*				
MSA	57 087	69.9	20.1	10.1
Non-MSA	14 392	63.3	23.8	12.9

* Population includes children whose parents' education and/or employment status is unknown as well as children with no parents.
† Excludes children whose parents' employment status is unknown.
‡ Excludes children whose parents' education level is unknown.
§ Excludes children who had missing health status information.
‖ Relative standard error is ≥30 percent.
Note: Restricted to civilian noninstitutionalized population. Percents may not add up to 100 because of rounding.

of children who were uninsured during this period was largely a single-parent family phenomenon and that the percentage of children in single-parent families grew from 16.9% to 24.3%. In addition, Cooper and Schone[12] found that while the availability of employment-related coverage increased over the last decade, the proportion of working families who declined offers of coverage increased, perhaps as a response to the increase in out-of-pocket premium costs.

Highest Parent Education

Children in households where the highest parent education level was more than high school were the most likely to be privately insured (86.8%). Children with at least 1 parent with a high school education were more likely to have private health insurance (63.6%) than children whose parent(s) had less than a high school education (25.3%). Having no parents or parents with less than a high school education was associated with having public health insurance (59.4% and 55.0%, respectively). Children whose parent(s) had less than a high school education were the most likely group to be uninsured (19.7%).

Health Status

Overall, only 2.8% of children were reported in fair or poor health. Children in excellent or good health (69.9%) were more likely than children in fair or poor health (40.0%) to have private health insurance. Those children with fair or poor health were more likely to have public insurance (46.8%) when compared with children in excellent or good health (19.8%).

Census Region

Children in the Northeast and Midwest census regions were more likely than children in the South or West to have private health insurance. Children in the West (22.9%) were more likely than children in the Midwest (16.9%) to have public health insurance. A higher proportion of children living in the South and West were uninsured when compared with children living in the Northeast and Midwest.

Metropolitan Statistical Area (MSA)

Children who lived in MSAs were more likely to have private health insurance than children who did not live in MSAs.

Usual Source of Care

Having a usual source of care is associated with a greater likelihood of seeing a physician.[13] Overall, 91.4% of children had a usual source of care in 1996 (Table 3). Regardless of health insurance status, adolescents were more likely to lack a usual source of care. Uninsured adolescents 15 to 17 years old were the ones most likely to lack a usual source of care (27.8%) and privately insured children <5 years were the ones least likely to lack a usual source of care (3.2%). Among publicly insured children, those 15 to 17 years old were more than twice as likely (20.8%) as those <5 years (8.2%) to lack a usual source of care. Zuvekas and Weinick[14] analyzed trends in usual source of care over the last 20 years and found that rates had decreased significantly for all age groups. In addition, they found important difference by race/ethnicity with Hispanics (all ages together) having the most marked increase in lacking a usual source of care (29.6% in 1996, compared with 19.7% in 1977). Perhaps most interestingly, their analysis showed that only 20% of this increase could be attributed to increasing rates of uninsurance.

The nature of a child's usual source of care has also been associated with the costs and quality of that care.[13] Privately insured children <5 years old were the most likely to have an office-based usual source of care (89%). Adolescents 15 to 17 years old with either public or no insurance were the least likely to rely on office-based practitioners (63.9% and 63.4%, respectively).

Utilization of Ambulatory Health Care Services

Provisional estimates based on 1996 data reveal that overall, 74.2% of children <18 years received at least 1 ambulatory medical care visit in 1996 with a mean number of 4.2 visits for children with at least 1 visit (data not shown)[15] Having a usual source of care was associated with a nearly twofold increase in the receipt of some ambulatory medical care services by children (80.8% compared with 49.3%, data not shown). The patterns of ambulatory health care services varied by site of care and sociodemographic characteristics.

Office-based Visits

Office-based visits include visits to physician and nonphysician providers as well as office-based providers of unknown type. Overall, 71.5% of children had an office based visit in 1996 (Table 4). Younger children were more likely than adolescents to have had an office-based provider visit, with the highest rate among children 1 to 4 years old (84.1%). White children were more likely than children in other racial/ethnic groups to have had an office-based provider visit. A larger proportion of children living in a MSA were also more likely to have had an office-based provider visit when compared with those who did not live in a MSA. Children with private insurance were most likely (76.2%) to have had at least 1 office-based provider visit and children who were uninsured were the least likely (50.7%).

Hospital-based Visits

Hospital-based visits include ambulatory visits to physician and nonphysician providers as well as providers of unknown type in hospital outpatient departments and specifically exclude emergency department visits. Overall, 18.2% of children <18 years old used ambulatory services in a hospital setting in 1996. Similar to office-based utilization, children 1 to 4 years old (24.1%) were more likely than children in other age groups to have had at least 1 hospital-based visit. The same holds true for white children when compared with children of other racial/ethnic groups. Also more likely to have had a hospital-based visit were children who were in fair or poor health (32.7%) compared with children in excellent or good health (17.9%). Uninsured children were the least likely when compared with children with private or public health insurance to have a hospital-based visit.

TABLE 3. Usual Source of Care by Age and Insurance Coverage for Children Ages 17 and Under

	(N) (in Thousands)	No Usual Source of Care	Office-based	Hospital Outpatient Department or Clinic	Emergency Department
Total*	70 131	8.6	81.6	9.4	0.4†
Private insurance					
Less than 5 y	12 258	3.2	89.0	7.4	0.3†
5 to 9 y	13 588	4.8	87.0	7.9	0.4†
10 to 14 y	13 414	6.5	84.8	8.6	0.1†
15 to 17 y	9186	9.8	81.7	8.4	0.1†
Public insurance					
Less than 5 y	4988	8.2	74.2	16.4	1.25†
5 to 9 y	4163	12.8	76.4	10.4	0.3†
10 to 14 y	3664	12.0	73.3	14.3	0.3†
15 to 17 y	1628	20.8	63.9	15.3	0
Uninsured					
Less than 5 y	1516	17.5	73.3	8.8	0.4†
5 to 9 y	2012	17.3	72.6	7.6	2.4†
10 to 14 y	2275	20.4	67.3	11.5	0.7†
15 to 17 y	1438	27.8	63.4	7.7	1.1†

* Excludes children whose information on access to care were missing.
† Relative standard error is ≥30 percent.
Note: Restricted to civilian noninstitutionalized population. Percents may not add up to 100 because of rounding.

TABLE 4. Utilization of Ambulatory Health Care by Setting and Selected Characteristics for Children Ages 17 and Under

Characteristic	(N) in Thousands	Percent With at Least One:				
		Office-based Visit	Hospital-based Visit	Emergency Department Visit	Dental Care Visit	Prescription Medicine
Total*	71 479	71.5	18.2	12.9	42.5	54.7
Age						
Less than 1 y	3740	78.0	17.5	6.7	0	42.0
1 to 4 y	16 072	84.1	24.1	18.0	19.2	69.6
5 to 9 y	19 864	72.2	16.0	11.2	53.2	57.8
10 to 14 y	19 478	64.2	16.1	11.7	54.3	45.6
15 to 17 y	12 325	63.7	17.4	13.1	50.0	48.4
Sex						
Male	36 928	71.8	19.3	13.8	41.6	55.0
Female	34 551	71.2	17.0	12.1	43.5	54.3
Race/ethnicity						
White	46 483	77.3	20.1	14.4	49.2	59.4
Black	11 182	59.0	14.6	10.3	27.2	43.1
Hispanic	10 625	62.6	14.9	11.1	29.2	49.1
Other	3187	61.5	13.0	7.2	42.2	44.6
MSA						
MSA	57 087	72.4	17.6	12.4	42.7	54.6
Non-MSA	14 392	68.1	20.2	15.3	41.7	54.7
Perceived health status†						
Excellent/good	68 481	71.8	17.9	12.8	43.3	54.6
Fair/poor	2026	77.0	32.7	22.7	36.3	76.6
Health insurance status						
Private	49 002	76.2	18.1	12.5	n/a	58.1
Public only	14 877	66.8	20.6	15.5	n/a	52.7
Uninsured	7601	50.7	13.6	10.8	n/a	36.1

* Population includes children whose parents' education and/or employment status is unknown as well as children with no parents.
† Excludes children whose information on health status was missing.
n/a Estimates omitted because health insurance status refers only to medical care and insurance for medical care.
Note: Restricted to civilian noninstitutionalized population.

Emergency Department Visits

Emergency department visits include all visits to the emergency department and include both physician and nonphysician providers. Overall, nearly 13% of children had an emergency department visit in 1996. Children <1 year old were the least likely (6.7%) and children 1 to 4 years old were the most likely (18.0%) to have had an emergency department visit when compared with children of other age groups. A higher proportion of white children had an emergency department visit when compared with Hispanic or black children and children of other racial/ethnic groups. Living in a MSA (12.4%) was associated with a smaller proportion of children with at least 1 emergency department visit compared with those children who did not live in a MSA (15.3%). Children in fair or poor health (22.7%) were nearly twice as likely as those in excellent or good health (12.8%) to have had at least 1 emergency department visit. Finally, publicly insured children were 50% more likely than uninsured children, and 20% more likely than privately insured children, to have had at least 1 emergency department visit in 1996.

Dental Care Visits

Dental care visits included visits to general dentists, dental hygienists, dental technicians, orthodontists, endodontists, and periodontists. Surprisingly, fewer than half of all children and adolescents had a dental care visit in 1996 and no subgroup of children even reached 60% with at least 1 visit. Children 5 years old and over were more likely than children <5 years old to have had at least 1 dental care visit. Black (27.2%) and Hispanic (29.2%) children were less likely than white children (49.2%) or children of other racial/ethnic groups (42.2%) to have a dental care visit.

Prescribed Medicine

Prescription medicines include receiving or purchasing any prescribed medicine. Overall, 54.7% of children <18 years old received at least 1 prescription medicine during 1996. Children 1 to 4 years old were more likely than any other age group to have had at least 1 prescription medicine. White children were also more likely than Hispanic or black children or children of other racial/ethnic group to have obtained a prescription medicine. Being in fair or poor health (76.6%) or having private health insurance (58.1%) were associated with a larger proportion of children receiving a prescription medicine. Children who were uninsured were the least likely to have received a prescription medicine (36.1%).

Utilization of Hospital Inpatient Services

In 1996, children and youth <18 years old accounted for 17.7% of hospitalizations in the United States, the majority of which were among infants <1 year old (Table 5). Until adolescence, females were as likely or slightly less likely to be admitted, unlike adults where female admissions predominate. The average charge for each hospital episode for children and youth was about half that for adults ($5284 vs $11 787), but with substantial

TABLE 5. Characteristics of Children and Adolescent Hospital Discharges Compared With Adults, 1996 (Number of Discharges in Thousands)

	Adults (Age 18+)	Children* and Adolescents (Age 0–17)	Children and Adolescents				
			Less Than 1 Year	1–4 Years	5–9 Years	10–14 Years	15–17 Years
Number of discharges (%)	28 703	6161	4422	539	321	345	534
	(82.3)	(17.7)	(71.8)	(8.7)	(5.2)	(5.6)	(8.7)
Female, *N* (%)	17 443	3034	2121	233	138	166	376
	(60.8)	(49.3)	(48.0)	(43.3)	(42.9)	(48.1)	(70.5)
Length of stay, mean (SD)	5.3	3.3	3.1	3.2	3.8	4.5	3.7
	(16.7)	(16.0)	(16.7)	(11.6)	(14.3)	(15.9)	(14.6)
Charges, mean (SD)	$11 787	$5284	$4319	$6693	$8131	$9172	$7533
	(47 282)	(48 826)	(49 778)	(41 885)	(51 242)	(47 067)	(45 473)
Admitted through emergency department, *N* (%)	11 830	930	215	238	143	152	182
	(41.2)	(15.1)	(4.9)	(44.1)	(44.4)	(44.0)	(34.1)
Expected payer							
Private, *N* (%)	13 560	3150	2324	241	158	187	240
	(47.2)	(51.1)	(52.5)	(44.9)	(49.2)	(54.2)	(44.9)
Medicaid, *N* (%)	4909	2462	1721	249	134	124	234
	(17.1)	(40.0)	(38.9)	(46.3)	(41.7)	(35.8)	(43.8)
Uninsured, *N* (%)	1386	329	226	29	17	20	36
	(4.9)	(5.3)	(5.1)	(5.4)	(5.4)	(5.8)	(6.8)
Bedsize of hospital							
Small, *N* (%)	4352	946	657	91	57	59	82
	(15.2)	(15.4)	(14.9)	(16.9)	(17.6)	(17.2)	(15.3)
Medium, *N* (%)	9169	1859	1355	151	87	98	168
	(31.9)	(30.2)	(30.6)	(28.0)	(27.2)	(28.3)	(31.4)
Large, *N* (%)	15 111	3340	2397	296	177	187	282
	(52.7)	(54.2)	(54.2)	(55.0)	(55.0)	(54.3)	(52.9)
Ownership of hospital							
Private, not for profit, *N* (%)	21 412	4655	3400	381	231	253	390
	(74.6)	(75.6)	(76.9)	(70.8)	(71.8)	(73.4)	(73.0)
Private, for profit, *N* (%)	3356	571	429	49	24	23	46
	(11.7)	(9.3)	(9.7)	(9.0)	(7.4)	(6.7)	(8.6)
Public, *N* (%)	3864	918	580	108	67	68	96
	(13.5)	(14.9)	(13.1)	(20.0)	(20.7)	(19.7)	(17.9)
Urban hospital, *N* (%)	23 979	5271	3824	444	271	291	441
	(83.5)	(85.6)	(86.5)	(82.4)	(84.3)	(84.2)	(82.7)
Teaching hospital, *N* (%)	9514	2381	1641	224	146	156	215
	(33.2)	(38.7)	(37.1)	(41.5)	(45.4)	(45.2)	(40.3)
Region							
Northeast, *N* (%)	6241	1141	795	103	68	75	101
	(21.7)	(18.5)	(18.0)	(19.0)	(21.2)	(21.7)	(18.9)
South, *N* (%)	10 636	2141	1455	226	133	136	191
	(37.1)	(34.7)	(32.9)	(41.9)	(41.5)	(39.3)	(35.7)
Midwest, *N* (%)	6793	1479	1073	120	68	81	136
	(23.7)	(24.0)	(24.3)	(22.3)	(21.1)	(23.6)	(25.6)
West, *N* (%)	5033	1400	1099	90	52	53	105
	(17.5)	(22.7)	(24.8)	(16.8)	(16.2)	(15.5)	(19.8)

variation. Despite the potential contribution of neonatal intensive care to charges for infants, their admissions were, on average, less costly than those for older children. With the exception of infants, about 40% of children and youth were admitted through the emergency department. The occurrence of coded complications (diagnoses that are explicitly attributed to a complication of medical care, eg, iatrogenic pneumothorax, hemorrhage complicating a procedure) was substantially lower in children and youth (.8%) than adults (5.1%) and also exhibited significant variation by age (data not shown). As expected, mortality among children was substantially lower than for adults (.4% compared with 3.0%). Most children and youth had a routine discharge (93.8%) and few were discharged to another facility (2.3%; data not shown). Medicaid was the expected payer for significantly more hospitalizations for children and youth (40%) than for adults (17.1%). The highest rate of uninsured hospitalizations was for adolescents 15 to 17 years old (6.8%). Most hospitalizations occurred in medium to large facilities, and in private not-for-profit institutions located in urban areas. Children and youth were slightly more likely than adults to be admitted to a teaching hospital, and this was most notable among children 5 to 9 years old (45.4% compared with 33.2% for adults). The distribution of hospitalizations by region of the country paralleled the population distribution.[16]

Inpatient Hospital Utilization by Region

When the characteristics of hospital admissions were compared by region of the country interesting differences emerged (Table 6). The average length of stay was highest in the Northeast (3.7 days) and lowest in the West (2.7 days). However, average charges were highest in the West and lowest in the Midwest. The proportion of admissions from the emergency department was lowest in the West

TABLE 6. Characteristics of Children and Adolescent Hospital Discharges by Region, 1996 (Number of Discharges in Thousands)

	Region			
	Northeast	Midwest	South	West
Number of discharges (%)	1142	1479	2141	1400
	(18.5)	(24.0)	(34.7)	(22.7)
Discharge rate (per 1000)	90.6	91.1	88.8	86.7
Length of stay, mean (SD)	3.7	3.3	3.4	2.7
	(17.4)	(16.0)	(16.6)	(13.7)
Charges, mean (SD)	$5263	$4583	$5374	$5925
	(40 560)	(40 149)	(49 136)	(61 565)
Admitted through emergency department, *N* (%)	203	201	379	147
	(17.8)	(13.6)	(17.7)	(10.5)
Expected payer				
Private, *N* (%)	678	831	1026	615
	(59.4)	(56.2)	(47.9)	(44.0)
Medicaid, *N* (%)	375	492	907	688
	(32.9)	(33.3)	(42.4)	(49.1)
Uninsured, *N* (%)	54	73	141	61
	(4.7)	(5.0)	(6.6)	(4.3)
Bedsize of hospital				
Small, *N* (%)	161	254	195	336
	(14.1)	(17.2)	(9.1)	(24.0)
Medium, *N* (%)	377	470	534	477
	(33.0)	(31.8)	(25.0)	(34.1)
Large, *N* (%)	604	755	1394	587
	(52.9)	(51.1)	(65.1)	(41.9)
Ownership of hospital				
Private, not-for-profit, *N* (%)	1104	1302	1277	973
	(96.8)	(88.0)	(59.6)	(69.5)
Private, for-profit, *N* (%)	—	31	357	183
	(.4)	(2.1)	(16.7)	(13.1)
Public, *N* (%)	37	146	491	244
	(3.2)	(9.9)	(22.9)	(17.4)
Urban hospital, *N* (%)	1052	1214	1742	1263
	(92.2)	(82.1)	(81.4)	(90.2)
Teaching hospital, *N* (%)	732	583	589	476
	(64.2)	(39.4)	(27.5)	(34.0)

* Includes newborns.
— indicates less than 1000 discharges.

(10.5%) compared with other regions (13.6% to 17.8%). Hospitalized children and youth were more likely to have private insurance in the Northeast and Midwest than in the South and West, where close to half the admissions were covered by Medicaid. In the West, a higher proportion of admissions were to small hospitals, and, in the South and West, higher proportions of admissions were to for-profit and public hospitals. Admissions to teaching hospitals accounted for almost two-thirds of admissions in the Northeast, but little more than a quarter in the South. No regional differences were observed in terms of gender distribution or discharge status (data not shown).

Inpatient Hospital Utilization by Payer Type

The characteristics of hospital discharges for children and youth were also examined by expected payer (Table 7). Not surprisingly, length of stay and charges were lowest for the uninsured, and highest for those on Medicaid. The uninsured were also more likely to be admitted through the emergency department (19.9%). Both those on Medicaid and those uninsured were more likely to be admitted to public hospitals.

Diagnoses Among Hospitalized Children and Youth

The principal diagnoses at discharge varied by age, and differed sharply from adult diagnoses (Table 8). Infections and perinatal problems predominated in infancy, and infection continued to play a major role in the preschool period. Over age 5, asthma, injuries and mental health problems appeared in the top 10 most frequent conditions in the hospital. In the 15- to 17-year-old age group, hospital use also reflected adolescent sexual activity and childbearing. In contrast, the most frequent hospitalizations among adults resulted from cardiovascular disease, chronic lung disease, and childbearing. Another difference between children and adults is that the top 10 diagnoses account for a far greater percentage of overall hospitalizations for children, up to 60% for the 1- to 4-year-old age group, than for adults where the top 10 diagnoses account for only 26.8% of all hospitalizations. This reflects the differential epidemiology of children and youth. Although children do not have the high prevalence of common chronic conditions that adults do, they do have many rare conditions. However, a smaller number of conditions account for a larger proportion of hospitalizations among children and adolescents. For example, among the top 10 conditions, infections and asthma contribute to over half of all hospitalizations in the 1- to 4-year-old age group and nearly a third of all hospitalizations in the 5- to 9-year-old age group. Similarly, pregnancy and childbirth dominate hospitalizations for 15- to 17-year-olds. No group of conditions

TABLE 7. Characteristics of Children and Adolescent Hospital Discharges by Expected Payer, 1996 (Number of Discharges in Thousands)

	Expected Payer		
	Medicaid	Private	Uninsured
Number of discharges (% of total)	2462	3150	329
	(40.0)	(51.1)	(5.3)
Length of stay, mean (SD)	3.7	3.0	2.8
	(18.8)	(13.6)	(10.8)
Charges, mean (SD)	$6201	$4576	$4252
	($57 682)	($41 143)	($32 714)
Admitted through emergency department, *N* (%)	431	404	65
	(17.5)	(12.8)	(19.9)
Bedsize of hospital			
Small, *N* (%)	410	440	55
	(16.7)	(14.0)	(16.7)
Medium, *N* (%)	737	983	87
	(30.0)	(31.2)	(26.3)
Large, *N* (%)	1304	1722	187
	(53.0)	(54.6)	(56.8)
Ownership of hospital			
Private, not-for-profit, *N* (%)	1713	2573	213
	(69.6)	(81.7)	(64.9)
Private, for-profit, *N* (%)	262	263	28
	(10.6)	(8.3)	(8.5)
Public, *N* (%)	477	309	87
	(19.4)	(9.8)	(26.4)
Urban hospital, *N* (%)	2036	2769	273
	(82.7)	(87.9)	(83.3)
Teaching hospital, *N* (%)	993	1168	124
	(40.3)	(37.1)	(37.7)

has comparable dominance for adult hospitalizations.

When the distribution of the top 10 diagnoses were examined by expected payer (Table 9), few differences were seen for the top 6 conditions, however, admissions for childbearing were more likely to be covered by Medicaid, and admissions for mental health problems were more likely to be covered by private insurance. Few mental health admissions were observed among those without insurance or covered by Medicaid.

DISCUSSION

These results provide few surprises for those fluent in the literature on health care access and use in children and youth.[2,17] What is important is that they provide a baseline for assessing changes in this era of rapidly changing health care arrangements. To date the literature has been dominated by information on the elderly that is attributable to the power of Medicare datasets. Child health advocates and researchers have had a much more restricted range of data and much of it is fairly dated. The results reported here begin to suggest the questions that will be explored in more detail in future reports. Moreover, they provide encouragement to researchers to explore these new datasets to address important issues in child health care.

In future years, additional data collected in the MEPS, including expenditures and type of coverage, will be reported. The survey has also been modified in 1999 to accommodate reporting on the state Child Health Insurance Program as a source of coverage and will enable national evaluations of the implementation of this new program beginning in 2001. Another change in future years will be improved timeliness: in January 2001, insurance coverage estimates from 1999 will be presented. Currently a new HCUP dataset is being developed and will undergo testing in the coming year. This dataset will be constructed specifically to examine children's use of hospital services and is being designed to enable in-depth and robust studies of children's conditions, even relatively uncommon conditions such as congenital anomalies.

Quality of care is a critical dimension of health care for children that currently is not included in this report. Recent studies have reviewed the literature in children's health quality and confirmed that wide variations in care persist, as they do in adults, with significant opportunities for improvement.[18] Yet we currently lack any national ability to measure health care quality, be it for children or adults. This is attributable to both a dearth of valid, reliable, and well accepted measures of quality of care for children and the absence of a national infrastructure for the collection of such data. A number of efforts are currently underway that will support future reporting on quality for children and youth. First, the Consumer Assessment of Health Plans Survey[19] assesses families' reports of their experiences and satisfaction with the care their children receive. In 1999, information from Consumer Assessment of Health Plans Survey will be available to >90 million Americans and early analyses of these data are showing significant variations in the interpersonal dimensions of care quality for children.

Other important efforts to improve information on quality include HCUP-related activities. The HCUP Quality Indicators were developed to help identify potential problems in quality of care using

TABLE 8. Ten Most Frequent Principal Diagnoses* Among Children and Adolescent Discharges Compared With Adults, 1996

Diagnoses	Children and Adolescents Number of Discharges in Thousands (% of Discharges in This Age Category)					Adults (Age 18+)
	Less than 1 Year	1–4 Years	5–9 Years	10–14 Years	15–17 Years	
Liveborn infant (218)*	3827 (86.6)					
Perinatal conditions (includes 222, 224, 219)	113 (2.6)					
Infections, excluding perinatal infections and including fluid and electrolyte disorders (includes CCS codes 7, 55, 122, 125, 126, 135, 159, 197)	224 (5.0)	223 (41.5)	60 (18.6)	13 (3.7)		1047 (3.7)
128 Asthma	17 (.4)	64 (11.9)	40 (12.6)	26 (7.5)		
Other conditions (includes CCS codes 45, 50, 83, 154)		40 (7.4)	23 (7.2)	16 (4.7)		
142 Appendicitis			16 (5.0)	29 (8.4)	19 (3.5)	
Injury (includes CCS codes 229, 230, 233)			11 (3.4)	28 (8.0)		
Mental health (includes CCS codes 68 and 74)				32 (9.4)	43 (8.1)	523 (1.8)
Pregnancy and delivery (includes CCS codes 181, 184, 190, 192, 193, 195, 196)					160 (30.1)	1200 (4.2)
Cardiovascular disease (includes CCS codes 100, 101, 106, 108, 109						4371 (15.2)
127 Chronic obstructive pulmonary disease and bronchiectasis						542 (1.9)
Percent of discharges with diagnoses in the top 10	94.6	60.8	46.8	41.7	41.7	26.8

* Diagnoses are first-listed diagnoses (ICD-9-CM codes) categorized using Clinical Classification Software (CCS): 7 Viral infections, 45 Chemotherapy, 50 Diabetes mellitus with complications, 55 Fluid and electrolyte disorders, 68 Affective disorders (primarily depression), 74 Other mental conditions (adjustment reactions and depressive disorder not elsewhere classified), 83 Epilepsy, convulsions, 100 Acute myocardial infarction, 101 Coronary atherosclerosis, 106 Cardiac dysrhythmias, 108 Congestive heart failure, 109 Acute cerebrovascular disease, 122 Pneumonia, 125 Acute bronchitis, 126 Other upper respiratory infections (includes croup), 127 Chronic obstructive pulmonary disease and bronchiectasis, 128 Asthma, 135 Intestinal infections, 142 Appendicitis, 154 Noninfectious gastroenteritis, 159 Urinary tract infections, 181 Other complications of pregnancy (includes genitourinary infections, anemia, hyperemesis), 184 Early or threatened labor, 190 Fetal distress and abnormal forces of labor, 192 Umbilical cord complications, 193 Trauma to perineum and vulva (due to childbirth), 195 Other complications of birth affecting the management of the mother, 196 Normal pregnancy and/or delivery, 197 Skin and subcutaneous infections, 218 Liveborn infant, 219 Short gestation, low birth weight, and fetal growth retardation, 222 Hemolytic and perinatal jaundice, 224 Other perinatal conditions (primarily perinatal infections and respiratory conditions, other than respiratory distress), 229 Fracture of upper limb, 230 Fracture of lower limb, 233 Intracranial injury.

administrative data. Currently, only 2 of these 33 Quality Indicators address children's health (asthma and low birth weight); however, additional indicators of quality for children are under development. Finally, measures of ambulatory care quality are being developed by the Child and Adolescent Health Measurement Initiative[20] among others.

The MEPS and HCUP datasets have significant strengths, but their use requires some information on their limitations. Discharge abstract data on pediatric hospitalizations, presented this year for the first time, are data collected as a routine step in the discharge of patients from hospitals, generally for billing purposes. The real strengths of discharge abstract data lie in the relatively detailed information provided on diagnoses and procedures and the potentially large number of observations. Such administratively-collected data can be used to delve into patterns of hospitalization, disease burden, economic impacts of conditions, and use of hospital procedures. However, because administrative data on inpatient stays were not created for research purposes, there may be problems with the reliability and validity of certain data elements. Although error rates have been declining since the 1970s and 1980s,[21] underreporting of socially stigmatized conditions such as alcoholism and drug abuse may occur, and to what extent this affects estimates for children is unknown. Further, analyses that are limited to principal diagnoses and procedures, the ones generally reported to avoid double-counting of stays, will produce an underestimate of diagnoses that tend to appear in secondary positions. Finally, the epidemiology of rare conditions, such as congenital anomalies, in children limit the utility of samples of discharge records for examining some issues of child health. The development of an HCUP dataset specifically designed to enable analyses of children's hospitalizations should help to address this challenge.

The MEPS data reported here rely on parental report of health problems and use of care. Clearly, a research agenda is needed to compare parental reports in the HC with other components to understand the validity of the information. Another important limitation of this report is the lack of information on patterns of care at the state level. MEPS does not permit state-based estimates. As a

TABLE 9. Ten Most Frequent Principal Diagnoses* Among Children and Adolescent Hospital Discharges by Expected Payer, 1996

Diagnoses	Expected Payer Number of Discharges (in Thousands) (% of Discharges With This Diagnosis Covered by This Payer)		
	Medicaid	Private	Uninsured
Liveborn infant* (218)	1409	2086	199
	(57.2)	(66.2)	(60.5)
Perinatal conditions (includes CCS codes 222, 224)	25	23	3
	(1.0)	(.7)	(.9)
Infections, excluding perinatal (includes CCS codes 7, 55, 122, 125, 159)	229	208	28
	(9.3)	(6.6)	(8.5)
128 Asthma	78	68	8
	(3.2)	(2.1)	(2.6)
142 Appendicitis		43	5
		(1.4)	(1.6)
Injury (includes CCS codes 233)			3
			(.9)
Mental health (includes CCS codes 68 and 74)		27	
		(.9)	
Other (include CCS codes 83, 50, 154, 45)	24	23	
	(1.0)	(.7)	
Pregnancy and childbirth (includes CCS codes 193, 196)	50		
	(2.0)		
Percent of discharges with diagnoses in the top 10	73.7	78.6	75.0

* Diagnoses are first-listed diagnoses (ICD-9-CM codes) categorized using Clinical Classification Software (CCS): 7 Viral infections, 45 Chemotherapy, 50 Diabetes mellitus with complications, 55 Fluid and electrolyte disorders, 68 Affective disorders (primarily depression), 74 Other mental conditions (adjustment reactions and depressive disorder not elsewhere classified), 83 Epilepsy, convulsions, 100 Acute myocardial infarction, 101 Coronary atherosclerosis, 106 Cardiac dysrhythmias, 108 Congestive heart failure, 109 Acute cerebrovascular disease, 122 Pneumonia, 125 Acute bronchitis, 127 Chronic obstructive pulmonary disease and bronchiectasis, 128 Asthma, 142 Appendicitis, 154 Noninfectious gastroenteritis, 159 Urinary tract infections, 193 Trauma to perineum and vulva (due to childbirth), 196 Normal pregnancy and/or delivery, 218 Liveborn infant, 222 Hemolytic and perinatal jaundice, 224 Other perinatal conditions (primarily perinatal infections and respiratory conditions, other than respiratory distress), 233 Intracranial injury.

consequence of the large sample size in the most populous states, there may be a capacity to derive direct estimates subject to meeting all confidentiality provisions afforded by the survey. In this context, MEPS also allows for studies that include state characteristics in models to estimate the influence of these characteristics on various care patterns. In contrast, HCUP is a rich dataset for state level analyses, at least for those states that are current partners in the program. Plans are underway to significantly expand the number of states included in HCUP and future reports in this series will include state-level analyses. Limits on state-based estimates have important implications for studies of children's health. Given states' growth in financing children's health care, expansion of existing national data collection efforts to enable accurate reporting at the state level is crucial.

A final issue in the preparation of reports such as this one is the standardization of age categories. Numerous annual reports exist that track various aspects of children's lives, the most recent of which is *America's Children: Key National Indicators of Well-Being*.[22] Unfortunately, no standardization exists across, or within, these reports on the appropriate age categories. Even within the health sector, wide variation exists. This diminishes the ability to easily use and compare these reports.

As we plan future reports from these important datasets, we welcome suggestions from the readers of the Journal. We recognize that the utility of analyses and datasets will be enhanced if they are responsive to the questions raised by those caring for children and youth.

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