

Associations Between Maternal and Child Health Status and Patterns of Medical Care Use

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Objective.—To determine associations in health status and health care utilization between mothers and their children.

Methods.—Cross-sectional analysis of the 1996–97 Community Tracking Study Household Survey. Separate logistic regression models describing each type of service use were conducted and adjusted for child age, health status, mother age, race, education, and respondent type. Models incorporated maternal health care use, employment, poverty, child's insurance status, and family type as independent variables.

Results.—Sample included 9803 mother-child pairs, for a weighted sample of 35 651 048 pairs. Compared to mothers reporting excellent health, mothers reporting very good to good health status and fair or poor health were more likely to have children in good, fair, or poor health (odds ratio 2.00, 95% confidence interval 1.63–2.45; and odds ratio 4.16, 3.36–5.15, respectively). For each of 5 types of service use, mothers' and children's use were strongly associated: 1+ physician visits (2.42, 2.07–2.84); 6+ physician visits (2.07, 1.80–2.37); emergency department use (2.01, 1.75–2.31); hospitalizations (1.56, 1.10–2.22); and mental health visits (7.07, 5.67–8.82).

Conclusions.—Associations in health service use were noted across a broad array of services for women and their children. These associations may reflect similar tendencies to seek care and suggest the need to consider patterns of maternal use in trying to understand and improve patterns of health care utilization for children.

KEY WORDS: child health services; utilization

Ambulatory Pediatrics 2002;2:85–92

Parents are widely recognized as decision makers for their children's health,^{1–4} and mothers have been shown to be the predominant caregivers of children.^{5–7} As such, mothers influence the timing and frequency of interactions with providers. In fact, it has been suggested that mothers' and children's health behaviors are closely related. Associations between women and their children regarding health care seeking are well documented during the perinatal period. Specifically, maternal receipt of prenatal care has been associated with timeliness of receipt of both early childhood vaccinations^{8–13} and well child care.^{14–18}

Despite these recognized associations between women and their children regarding health service use, little is known about the extent to which such relationships persist for mothers and their children beyond the perinatal period. These associations may differ, since the expected number of health maintenance visits for children decreases beyond infancy, and other factors, such as sociodemographic characteristics and the child's level of need for care, may over-

shadow maternal health care seeking influences on children's receipt of health care services.

Much of the health services research focused on children's use of health care services is based on the Behavioral Model of Health Services Use developed and adapted by Andersen and Aday.¹⁹ This conceptual framework accounts for predisposing, enabling, and need variables as individual determinants of health service use. Predisposing factors include sociodemographic characteristics and health beliefs that influence an individual's health care seeking for him/herself, whereas enabling characteristics include family resources such as health insurance and income. Need refers to an individual's perceived and actual health status. Recent efforts have incorporated environmental and provider-related factors, though without explicit consideration of maternal use of services as predisposing women to seek care for their children.²⁰

A number of studies conducted in the past 2 decades have highlighted the role of individual determinants of health service use among children. Among the predisposing factors, young age, white race and non-Hispanic ethnicity, higher level of maternal education, higher socioeconomic status, and the presence of 2-parent rather than single-parent households, have been associated with greater use of services by children.^{1,21–24} Two additional enabling factors, the presence of insurance and having a usual source of care, have also been associated with increased utilization of health services.^{21,25} Children's need for care has been shown to be the most influential factor influencing both entry into the medical system and the volume of services received.^{16,21,22}

The behavioral model has not been fully explored with regard to associations in health care seeking for behaviors

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Presented at the Pediatric Academic Societies meeting, Baltimore, Md, April 30, 2001, and the Academy for Health Services Research and Health Policy meeting, Atlanta, Ga, June 11, 2001.

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Received for publication May 21, 2001; accepted November 20, 2001.

of adults for themselves and as caregivers for their children. Newacheck et al²⁶ and Hanson²⁷ independently examined associations between maternal and child health service using the nationally representative National Health Interview Survey (in 1978 and 1990, respectively). They documented associations between parents and their children for both physician visits and the volume of visits. In addition, Hanson found a greater association between parents' and children's use of any physician services among privately insured children rather than among uninsured children. However, in both investigations, as in several prior studies,^{1,16,21} analyses were limited to physician visits and did not assess a broader array of health care services. Beyond the significance of maternal health care seeking as it relates to the impact on individual families, associations in health status and health care use between mothers and their children are likely to have profound implications for programs and policies aimed at enhancing appropriate health service use for children.

The main objective of this study is to examine associations in health status and health care utilization between mothers and their children across a broad array of health services. We expect that mothers in good health will be more likely to report having children in good health. Furthermore, we hypothesize that mothers' and children's service use will be strongly associated with regard to physician visits and emergency department use, reflecting similar tendencies to seek care for themselves and their children from ambulatory providers. However, we do not expect to find similar relationships in service use between mothers and their children with regard to hospitalizations or mental health visits, since we imagine that need for care will more strongly influence children's receipt of care for these services.

METHODS

Data Source

The study data come from the Community Tracking Study Household Survey (CTSHS), 1996–97: (United States), which is a component of the Community Tracking Study (CTS) sponsored by the Robert Wood Johnson Foundation. The CTS is a national study designed to track the changes of the health care system and its consequent effects on access, cost, service delivery, and quality. The CTSHS was fielded from July 1996 to July 1997 and includes detailed information on insurance coverage, access to care, service use across a broad array of services, and sociodemographic characteristics of families.

Sampling

The sample for the CTSHS was drawn from civilian and noninstitutionalized residential population within the contiguous 48 states of the United States. We used the core sample and a supplemental sample drawn to increase the precision of national estimates.²⁸ A maximum of 8 persons per household were recruited in the survey. Where there were children in the family, one child aged 0–17 years was randomly selected to be included in the

sample. The resulting population combining the core and supplemental samples is 60 446 individuals.

The sample for these analyses included one randomly selected child aged 0–17 years per family insurance unit as well as his/her adult mother present in the same family. Our study sample included 9803 mother-child pairs or a weighted population of 35 651 048 pairs.

Data Collection

A family informant provided most of the information for each family member, except for the Self-Response Module (SRM) questions. In the SRM, mostly subjective questions (ie, health status) were asked since proxy respondents may not be able to answer them reliably. Each adult answered the SRM questions for him/herself. For children, either the family informant or the adult in the family who took the selected child to his/her last doctor visit answered the SRM questions.

The survey was administered to 32 097 families primarily by telephone with the use of the computer-assisted telephone interviewing technology. Additional in-person interviews were conducted with 635 families to represent those without telephone service. Interviews were conducted in English and Spanish, and participating families received \$25. The household level response rate was 68.5%.²⁹

Definition of Variables

Independent Variables

Poverty Level: The percentage of poverty was calculated by the family income provided in the survey interview over the standard poverty guidelines based on the 1996 Department of Health and Human Service of the United States Poverty Guidelines.³⁰ The percentages of poverty were categorized into 4 groups, which were below 100%, 100%–200%, 200%–500%, and above 500%, in order to confirm associations of income with health status and to explore whether there were gradients in utilization based on income.

Family Type: Family type was based on a constructed variable that utilizes relationships among adults and children to define the family structure. Responses were grouped to create a dichotomous variable indicating single versus married (including married and non-nuclear families) to account for the possibility that the presence of multiple adults rather than one maternal parent per household may differentially influence children's use of health services. At least one prior study has noted increased numbers of visits for children in 2-parent families.¹

Health Insurance: Three current health insurance types, including private insurance, Medicaid, Medicare, and uninsured, as well as being uninsured, at the time of interviews were measured in this study. Mothers were defined to be covered by private insurance if the health insurance is currently 1) provided through current or past employers, 2) purchased directly, or 3) obtained by someone who does not live in the household. Children were similarly defined to be covered by private insurance if the health insurance was either 1) purchased directly or 2) obtained

Table 1. Characteristics of the Sample (n = 9803)

Characteristics	%	Counts	Characteristics	%	Counts
Child's age (y)			Child's insurance		
0-1	10.3	1006	Private/military	76.4	7490
2-4	17.6	1727	Medicaid/other public	12.7	1241
5-9	26.4	2584	Uninsured	10.3	1011
10-17	45.8	4486	Medicare	0.6	61
Mother's age (y)			Mother's Insurance		
18-21	2.6	250	Private/military	73.7	7507
22-29	17.7	1739	Uninsured	15.5	1369
30-39	45.9	4495	Medicaid/other public	9.7	828
40-49	30.0	2937	Medicare	1.2	99
50-55	3.9	382	Child's health status		
Mother's race			Excellent	54.6	5352
White	70.1	6868	Very good	29.8	2924
African-American	13.3	1303	Good	11.4	1119
Native/Asian/Pacific/Other	5.3	524	Fair	3.6	350
Hispanic	11.3	1108	Poor	0.6	58
Mother's education			Child's ED visit*		
<High school	9.6	939	Never	76.9	7543
High school	36.4	3566	≥1	23.1	2260
Some college	26.5	2599	Child's Dr/Nur/PA visits*		
College	18.4	1808	Never	16.6	1626
>College	9.1	891	≥1	83.4	8177
Family type			Child's doctor visits*		
Single	24.4	2393	≤5	82.5	8088
Married/non-nuclear	75.6	7410	6+	17.5	1715
Poverty level (%)			Child's mental health visits*		
≤100	16.8	1649	Never	93.7	9186
100-200	21.2	2077	>1	6.3	617
200-500	43.3	4262	Child's hospitalization*		
≥500	18.7	1815	Never	95.7	9379
			>1	4.3	424

*Utilization in the last 12 months. ED indicates Emergency Department; Dr, doctor; Nur, nurse; and PA, physician assistant.

by someone who does not live in the household. For the other 3 types, categorization was based on respondents' answers on the questions about their current coverage of Medicaid, Medicare, or non-coverage. A hierarchical variable was constructed, with the following order: Medicare, Private, Medicaid and other public coverage, and uninsured. For persons with more than one type of coverage, insurance type was assigned to the first applicable category mentioned above.

Employment Status: Maternal employment was determined through a question on whether any work for either pay or profit was performed in the week prior to the survey. Number of hours worked was used to create 3 categories: full time (ie, work ≥40 h/wk total), part time (work 1-39 h/wk total), and unemployed (ie, work 0 h/wk total). Prior studies suggested decreased use of discretionary services for children of employed mothers, with some variation in the impact of employment among children with chronic illness.¹

Health Status: Women were asked to report their current health as poor, fair, good, very good, or excellent at the time of the interview. A child's general health question was responded to either by the family informant or by an adult in the family who took the child to the most recent doctor's visit. The health status independent variables for mothers and for children were grouped into 3 categories—excellent, very good to good, and fair to poor—in order

to explore gradients in health status and their associations with child's health and child's health services utilization.

Maternal Health Service Utilization: Dichotomous variables (ie, never vs at least once) were adopted to describe health service utilization with regard to hospitalizations, emergency department (ED) visits, doctor/nurse/physician assistant (PA) visits, and mental health visits during the 12 months preceding the interview. In the administration of the interview, separate questions were posed regarding the number of hospital stays (we excluded those involving the delivery/birth of a child), ED visits, doctor visits, nurse and PA visits, and mental health professional visits during the 12 months preceding the interview. Doctor and nurse/PA visits were combined to construct a single variable representing doctor/nurse/PA visits to represent entry into the health care system for ambulatory care. In addition, doctor visits alone were recoded to be less than or equal to 5 times versus 6 or more times to represent high volume use for outpatient physician services.

Dependent Variables

Child's Health Status: As described above, children's general health questions were answered by a proxy. A dichotomous variable was defined to identify "good, fair, or poor" versus "very good or excellent" health status for the logistic regression model in Table 2. Given the relatively small proportion of children in less than good

Table 2. Family Characteristics, Mother's General Health Status, and Child's Health Status,† Odds Ratios, and 95% Confidence Intervals (n = 36 651 048)

Variables	Child's Good, Fair, & Poor Health (odds ratio & 95% confidence interval)
Child's insurance status	
Private/military (ref.)	1.00
Medicare	3.28 (1.60–6.74)**
Medicaid/other public	1.22 (0.98–1.53)
Uninsured	0.99 (0.80–1.22)
Mother's race	
White (ref.)	1.00
African-American	1.98 (1.67–2.34)**
Native/Asian/Pacific/Other	1.75 (1.39–2.19)**
Hispanic	1.79 (1.46–2.20)**
Mother's education	
<High school	2.46 (1.74–3.49)**
High school	1.76 (1.30–2.37)**
Some college	1.54 (1.16–2.05)**
College	1.37 (1.01–1.85)*
>College (ref.)	1.00
Poverty level (%)	
≥500 (ref.)	1.00
200–500	1.06 (0.87–1.28)
100–200	1.35 (1.08–1.68)*
≤100	1.56 (1.22–1.99)**
Mother's general health status	
Excellent (ref.)	1.00
Very good to good	2.00 (1.63–2.45)**
Fair to poor	4.16 (3.36–5.15)**
Respondent	
Mother (ref.)	1.00
Other	1.02 (0.83–1.26)

†“Good, fair, and poor health” rather than “excellent or very good health” is modeled for child's general health status. The model estimates are adjusted for child's age, mother's age, mother's job status, and family type, none of which were significant.

**P* value < .05.

***P* value < .01.

health, we chose to combine good, fair, and poor ratings to model health for the least healthy children.

Child's Health Service Utilization: The family informant provided all information on children's health service visits in the past 12 months. Dichotomous variables (ie, never vs at least once) were adopted to describe a child's health service utilization including ED visits, doctor/nurse/PA visits, and mental health visits during the 12 months preceding the interview. In the administration of the interview, separate questions were posed regarding the number of hospital stays (we excluded those involving the delivery/birth of a child), ED visits, doctor visits, nurse and PA visits, and mental health professional visits during the 12 months preceding the interview. Doctor and nurse/PA visits were combined to construct a single variable representing doctor/nurse/PA visits or entry into ambulatory health care services. In addition, doctor visits alone were recoded to be less than or equal to 5 times versus 6 or more times to represent high-volume use.

Statistical Analyses

A cross-sectional survey approach was employed to examine associations among women and their children with

regard to health status and also with regard to their health care utilization. Because of the complex sampling design of the CTSHS, we used weights to obtain precise estimates for the nation as a whole.³¹

Analyses

The unweighted distributions in this national sample were examined with respect to each characteristic of interest. Using weighted observations, logistic regression models were applied to estimate the strength of associations between children's health status and mothers' health status and also between children's health service utilization and that of their mothers. A child's “good, fair, or poor” (rather than “excellent or very good”) health was modeled for health status as a dependent variable. For a child's health service visits, utilization for emergency room visits, doctor/nurse/PA visits, and mental health visits for one or more times was modeled. “More than 6 times” was modeled for child's doctor visits alone. For each set of logistic regressions modeling children's utilization, the mother's corresponding health service utilization was inserted to investigate the associations between mother's service utilization and a child's health service visits. These models incorporated predisposing, enabling, and need characteristics previously shown to influence children's receipt of health care. In addition, all models were adjusted for whether mothers answered the child's health status and health service visits questions for the child. The strength of association was estimated by odds ratios (OR), with associated 95% confidence intervals (CI) and *P* values used as an aid to infer prediction.

SUDAAN Software

The CTSHS sample design includes stratification, clustering, and oversampling. Thus, use of standard statistical packages is likely to underestimate the variances when regression is employed on such a data set. The SUDAAN software is appropriate for use on data from complex sample surveys such as the CTHS and was used for the estimation of regression parameters.³²

Human Subjects

Given the use of publicly available data lacking identifiers, this study was granted an exempt status from the Johns Hopkins Committee on Human Research.

RESULTS

The weighted study sample represented 35 651 048 pairs of children, aged 0–17 years, and their mothers (Table 1). Mothers were the respondent for 84% of children regarding the children's health status and use of health services. Most mothers were 30 years of age or older (79.8%), white (70.1%), and had a high school education or higher (90.4%). Mothers' race was similar to 2000 Census data, which indicates: 71.3% white, 12.2% black, 4.5% Native/Asian/Pacific/Other, and 11.9% Hispanic.³³

One quarter of the children resided in single-parent households, and 38.0% of children lived in households

Table 3. Family Health and Demographic Characteristics and Child’s Health Service Utilization (n = 35 651 048), Odds Ratios, and 95% Confidence Intervals†

Independent Variables	Child’s Health Services Utilization (odds ratio & 95% confidence interval)				
	Doctor/Nurse/PA Visits (0 vs ≥1 time)	Doctor Visits (≤5 vs 6+ times)	ED Visits (0 vs ≥1 time)	Hospitalizations (0 vs ≥1 time)	Mental Health Visits (0 vs ≥1 time)
Child’s insurance status					
Private/military (ref.)	1.00	1.00	1.00	1.00	1.00
Medicare	2.53 (1.11–5.78)*	1.92 (0.89–4.17)	1.07 (0.57–1.99)	3.14 (1.38–7.14)*	2.36 (1.04–5.34)*
Medicaid/other public	1.33 (0.99–1.79)	0.95 (0.75–1.21)	1.04 (0.86–1.26)	1.26 (0.89–1.79)	1.51 (1.02–2.24)*
Uninsured	0.48 (0.39–0.59)**	0.44 (0.33–0.58)**	0.69 (0.56–0.85)**	0.53 (0.36–0.79)**	0.87 (0.44–1.72)
Mother’s race					
White (ref.)	1.00	1.00	1.00	1.00	1.00
African-American	0.79 (0.63–0.99)*	0.48 (0.39–0.60)**	1.07 (0.90–1.26)	0.82 (0.60–1.12)	0.54 (0.37–0.79)**
Native/Asian/Pacific/Other	0.89 (0.69–1.15)	0.88 (0.66–1.18)	0.85 (0.69–1.06)	0.56 (0.33–0.94)*	0.91 (0.52–1.60)
Hispanic	0.78 (0.64–0.96)*	0.83 (0.67–1.03)	0.80 (0.63–1.00)*	1.07 (0.74–1.54)	0.77 (0.40–1.47)
Poverty level (%)					
≥500 (ref.)	1.00	1.00	1.00	1.00	1.00
200–500	0.76 (0.61–0.96)*	0.87 (0.73–1.03)	0.95 (0.82–1.10)	1.24 (0.83–1.86)	0.81 (0.64–1.04)
100–200	0.58 (0.45–0.75)**	0.73 (0.60–0.89)**	0.99 (0.82–1.19)	1.45 (0.99–2.13)	0.88 (0.63–1.22)
≤100	0.54 (0.41–0.72)**	0.85 (0.67–1.08)	1.06 (0.85–1.34)	1.40 (0.88–2.23)	1.12 (0.66–1.91)
Mother’s health status					
Excellent (ref.)	1.00	1.00	1.00	1.00	1.00
Very good to good	1.09 (0.92–1.29)	1.10 (0.90–1.35)	1.29 (1.13–1.47)**	1.58 (1.18–2.11)**	0.88 (0.70–1.09)
Fair to poor	1.07 (0.82–1.39)	0.96 (0.68–1.35)	1.35 (1.03–1.77)*	1.00 (0.62–1.61)	0.96 (0.58–1.58)
Child’s health status					
Excellent (ref.)	1.00	1.00	1.00	1.00	1.00
Very good to good	1.30 (1.09–1.55)**	2.47 (2.12–2.88)**	1.17 (1.04–1.31)*	1.39 (1.05–1.84)*	1.53 (1.22–1.92)**
Fair to poor	1.46 (0.93–2.29)	6.72 (5.20–8.69)**	1.85 (1.43–2.39)**	3.74 (2.62–5.33)**	2.28 (1.40–3.71)**
Mother’s Dr/Nur/PA Visits					
Never (ref.)	1.00	—	—	—	—
1+ time	2.42 (2.07–2.84)**	—	—	—	—
Mother’s doctor visits					
≤5 times (ref.)	—	1.00	—	—	—
6+ times	—	2.07 (1.80–2.37)**	—	—	—
Mother’s ED visits					
Never (ref.)	—	—	1.00	—	—
≥1 time	—	—	2.01 (1.75–2.31)**	—	—
Mother’s hospitalizations					
Never (ref.)	—	—	—	1.00	—
≥1 time	—	—	—	1.56 (1.10–2.22)*	—
Mother’s mental health visits					
Never (ref.)	—	—	—	—	1.00
≥1 time	—	—	—	—	7.07 (5.67–8.82)**
Respondent					
Mother	1.00	1.00	1.00	1.00	1.00
Other	0.27 (0.23–0.32)**	0.70 (0.59–0.83)**	0.94 (0.81–1.09)	0.92 (0.62–1.36)	0.74 (0.51–1.05)

†In this table, “6+ times” is modeled for children’s “doctor visits” (ie, ≤5 vs 6+ times), whereas “≥1 time” is modeled for children’s “doctor/nurse/PA visits,” “ED visits,” “hospitalization,” and “mental health visits” utilization (ie, 0 vs ≥1 time). The model estimates are adjusted for child’s age, mother’s age, job status, education, and family type.

*P value < .05.

**P value < .01.

with incomes of less than 200% poverty level. Relative to 2000 Census data, this sample had comparable percentages of children living in married households (75.6% CTSHS vs 74.5% Census),³⁴ below poverty (16.8% CTSHS vs 16.2% Census),³⁵ and without insurance (10.3% CTSHS vs 11.6% Census).³⁶ The lower proportion of CTSHS children covered by Medicaid (12.7% CTSHS vs 20.4% Census)³⁶ has been previously reported and attributed primarily to CTSHS’s designation of individuals with overlapping or dual coverage (eg, Medicaid and private) as individuals with private insurance rather than both.³⁷

Although less than 10% of children were reported to use mental health services or to be hospitalized in the preceding 12 months, 23.1% had 1 or more ED visits, and 83.4% had 1 or more physician/nurse practitioner/PA visits. Children’s reported health care use is consistent with national data published from the 1996 Medical Expenditure Panel Survey (4.3% hospitalized and 74.2% with at least one ambulatory visit).³⁸ Less than one fifth of children were reported to be in good, fair, or poor health (as opposed to excellent or very good health), as was found reported by Weinick et al³⁹ in analyses of the 1996 Medical Expenditure Panel Survey.

Table 2 presents results on the influence of mother's general health status and other child and maternal factors on the child's health status and models good to poor child health as the dependent variable. Being insured through Medicare, being of non-white maternal race, living in households with incomes at or below 200% poverty, and having a mother with less than excellent health each increased the odds that a child would be reported as having good to poor rather than very good or excellent health. The association of Medicare with suboptimal health is consistent with childhood eligibility for Medicare being limited to those with select, severe chronic conditions. Child's age, maternal age and employment, family type, and whether or not the mother was the respondent for the child's health questions were variables that were not independently associated with the child's health status.

In order to examine associations between maternal health service use and that of their children, we created logistic regression models to model 5 types of children's health service use (Table 3). For any doctor visits, 6+ doctor visits, any ED visits, any hospitalizations, and any mental health visits, maternal use was significantly associated with that of related children. In addition, being uninsured relative to those with private or military insurance decreased the odds of children's use of all services except mental health services. Two indicators of need for health care, both health status and, to a lesser degree, being insured by Medicare, were associated with receipt of a broad array of health services. Being poor was associated with greater likelihood of not having any physician visits, although family income was not associated with ED visits, hospitalizations, or mental health visits. Young maternal age was associated with increased reports of the child's ED use but was not associated with other types of service use.

Recognizing that infants rarely receive mental health services and regularly may have 6+ physician visits in the first year of life, we constructed models for receipt of services excluding children 0–1 years but found no difference in associations between mothers' and children's health service use. Whether or not the mother was the respondent for the child's reported use was associated with decreased odds of reporting any doctor/nurse/PA visits and 6+ physician visits.

DISCUSSION

This study demonstrates relationships between maternal and child use of health care services across a broader array of health care services than previously has been examined. This is the first study to examine associations between a broad array of mother and child's service utilizations using a national sample. Not only did we verify similarities in the presence and volume of physician visits as reported in previous research, but we also found associations in ED visits, hospitalizations, and mental health visits. Associations in mental health service use were particularly notable given recent interest in understanding barriers to children's receipt of mental health services.

Our findings suggest that further exploration of familial

patterns of service use may be warranted to understand how family characteristics contribute to unmet health needs for mental and physical health problems as well as unnecessary use of EDs and preventable hospitalizations. Moreover, such an understanding of the familial context of child health services use is needed for designing appropriate interventions to improve care for children. The particularly strong association between mothers' and their children's receipt of mental health services, even while controlling for child's health status, suggests that interventions to promote access to children's mental health services may need to simultaneously offer services for their mothers. One prior study reported that the presence of parental mental health problems reduced the threshold for recognizing a child's behavior problems but did not lead to changes in children's receipt of mental health care.⁴⁰ Although our health care utilization analyses controlled for mother's general health status, we did not include specific measures of mental health conditions. It is possible that inclusion of indicators of maternal mental health conditions might alter the association in service use between mothers and their children for mental health care.

Poverty has long been associated with reduced access to care for children. In the multivariate analyses, being poor was associated with reduced odds of reporting physician visits but was not associated with ED use, hospitalizations, or mental health visits. Differences in the relationships between poverty and these services might be attributed to differences in provider billing practices, patient acuity, and systems characteristics. EDs and hospitals may be less likely than physician practices to require payment at the time of service. Moreover, it is possible that health need disproportionately drives utilization for services other than physician visits. As for differences in system characteristics, limited availability of mental health services across socioeconomic groups may influence this finding. Alternatively, screening and diagnostic services available through schools and other non-health settings may override the influence of poverty on reducing access to care. Finally, the more extensive scope of mental health benefits available through Medicaid, relative to some private insurance plans, may affect relationships between income and receipt of care.

Several limitations of this study should be noted. First, as in prior studies, we use maternal utilization of services and do not also assess parental attitudes regarding health care utilization, such as perceptions of vulnerability and beliefs in the value of preventive care or mental health services. Second, we are unable to comment on whether the reported levels of service use are appropriate or on the content of care. However, levels of hospitalizations and ambulatory care are consistent with those published using the 1996 Medical Expenditure Panel Survey.³⁹ Third, this nationally representative sample does not include measures of family dynamics, nor does it enable us to assess patterns of use among siblings within families; both of these factors also are likely to influence children's receipt of health care services. Fourth, the CTSHS relies on parent report of health status and health care utilization

rather than self-assessment for health status or medical record abstraction for utilization. Maternal reports of children's health status may not be consistent with those of other observers, including the children themselves. One prior investigation indicates a high degree of agreement between parent report of child health events and true occurrences.⁴¹ The overwhelming majority (84%) of respondents in this study were mothers, and respondent type was not associated with the child's reported health status or use of ED visits, hospitalizations, or mental health visits. The finding that respondents other than mothers had a reduced odds of reporting that the child had physician visits may suggest less familiarity with the child's receipt of nonacute services. Maternal stress also has been associated with increased use of children's health services²²; however, measures of stress were not available in the current study to determine whether nonmaternal respondents had reduced levels of stress. In addition, attributing differences in children's utilization to differences in respondent stress would not account for variability by type of service.

There has been growing public interest in family insurance coverage as a means to reduce the number of uninsured children in the United States. Mechanisms to promote family coverage have included Medicaid expansions allowed under an option for family coverage created by the 1996 Federal welfare law, Medicaid waivers, and state-funded adult expansions that included parents.⁴² And more recently, as of January 2001, 3 states (New Jersey, Rhode Island, and Wisconsin) had newly received federal waivers to offer health insurance coverage to parents of children eligible under either SCHIP or Medicaid.⁴³

It is expected that family coverage will stimulate children's enrollment in publicly funded programs though increased program attractiveness and simplified eligibility⁴⁴ while improving family health through enhanced access to medical care for parents and their children. Family insurance coverage has been recognized as the means to provide health insurance for low-income working parents. In 1998, the 5.2 million uninsured parents accounted for nearly 20% of the 27 million uninsured adults in the United States.⁴⁵ Whether or not expanding insurance coverage to parents of children enrolled in Medicaid and SCHIP increases appropriate use of health care services for children as well as parents is an empirical question worthy of further investigation.

ACKNOWLEDGMENT

We gratefully acknowledge the thoughtful review of this manuscript by Dr Bernard Guyer. Funded under a cooperative agreement with the Maternal and Child Health Bureau, HRSA (U93-MC-001). The views expressed here are those of the authors and do not necessarily reflect those of the Maternal and Child Health Bureau, HRSA, or the Department of Health and Human Services.

REFERENCES

- Cafferata GL, Kasper JD. Family structure and children's use of ambulatory physician services. *Med Care*. 1985;23:350-360.
- Hickson GB, Clayton EW. Parents and their children's doctors. In: Bornstein M, ed. *Handbook of Parenting*. Mahwah, New Jersey: Lawrence, Erlbaum Assoc; 1995:163-185.
- Tinsley BJ, Lees NB. Health promotion for parents. In: Bornstein M, ed. *Handbook of Parenting*. New Jersey: Lawrence, Erlbaum Assoc; 1995:187-204.
- Parke RD, Buriel R. Socialization in the family: ethnic and ecological perspectives. In: Damon W, ed. *Handbook of Child Psychology*. 5th ed. New York, NY: Wiley; 1998:490-491.
- Carpenter ES. Children's health care and the changing role of women. *Med Care*. 1980;18:1208-1218.
- Buller S. Women's roles and health: the mediating effect of perceived control. *Women Health*. 1994;22:11-30.
- Alexander CS, Markowitz R. Maternal employment and use of pediatric clinic services. *Med Care*. 1986;24:134-137.
- Swigonski NL, Skinner CS, Wolinsky FD. Prenatal health behaviors as predictors of breast-feeding, injury, and vaccination. *Arch Pediatr Adolesc Med*. 1995;149:380-385.
- Kogan MD, Alexander GR, Jack BW, Allen MC. The association between adequacy of prenatal care utilization and subsequent pediatric care utilization in the United States. *Pediatrics*. 1998;102:25-30.
- Wiecha JM, Gann P. Does maternal prenatal care use predict infant immunization delay? *Family Med*. 1994;26:172-178.
- Stevens-Simon C, Kelly LS, Singer D. Pattern of prenatal care and infant immunization status in a comprehensive adolescent-oriented maternity program. *Arch Pediatr Adolesc Med*. 1996;150:829-833.
- Butz AM, Funkhouser A, Caleb L, Rosenstein BJ. Infant health care utilization predicted by pattern of prenatal care. *Pediatrics*. 1993;92:50-54.
- Wood D, Donald-Sherbourne C, Halfon N, et al. Factors related to immunization status among inner-city Latino and African-American preschoolers. *Pediatrics*. 1995;96:295-301.
- Gemperline P, Brockert J, Osborn LM. Preventive health care utilization. Prenatal and the first 3 years in a Utah population. *Clin Pediatr*. 1989;28:24-37.
- Schor E, Starfield B, Stidely C, Hankin J. Family health: utilization and effects of family membership. *Med Care*. 1987;25:616-626.
- Starfield B, Jankin J, Steinwachs D, et al. Utilization and morbidity: random or tandem? *Pediatrics*. 1985;75:241-247.
- Bates AS, Fitzgerald JF, Dittus RS, Wolinsky F. Risk factors for underimmunization in poor urban infants. *JAMA*. 1997;272:1105-1110.
- Freed GL, Clark SJ, Pathman DE, Schectman R. Influences on the receipt of well-child visits in the first two years of life. *Pediatric (Journal of the Ambulatory Pediatric Association)*. 1999;103:864-869.
- Andersen RM. Revisiting the behavioral model and access to medical care: does it matter? *J Health Soc Behav*. 1995;36:1-10.
- Phillips KA, Morrison KR, Andersen R, Aday LA. Understanding the context of healthcare utilization: assessing environmental and provider-related variables in the behavioral model of utilization. *Health Serv Res*. 1998;33:571-596.
- Riley AW, Finney JW, Mellits ED, et al. Determinants of children's health care use: an investigation of psychosocial factors. *Med Care*. 1993;31:767-783.
- Woodward CA, Boyle MH, Offord DR, et al. Ontario Child Health Study: patterns of ambulatory medical care utilization and their correlates. *Pediatrics*. 1988;82:425-434.
- Weinick RM, Weigers ME, Cohen JW. Children's health insurance, access to care, and health status: new findings. *Health Affairs*. 1998;17:127-136.
- Newacheck PW, Hughes DC, Stoddard JJ. Children's access to primary care: differences by race, income, and insurance status. *Pediatrics*. 1996;97:26-32.
- Newacheck PW, Stoddard JJ, Hughes DC, Pearl M. Health insurance and access to primary care for children. *N Engl J Med*. 1998;19:513-519.
- Newacheck PW, Halfon N. The association between mother's

- and children's use of physician services. *Med Care*. 1986;24:30-38.
27. Hanson KL. Is insurance for children enough? The link between parents' and children's health care use revisited. *Inquiry*. 1998;35:294-302.
 28. Kemper PD, Blumenthal JM, Corrigan PJ, et al. The design of the Community Tracking Study: a longitudinal study of health system change and its effects on people. *Inquiry*. 1996;33:195-206.
 29. Center for Studying Health System Change. *Community Tracking Study Household Survey: Survey Methodology Report, Round One*. Technical Publication 15. Center for Studying Health System Change; November 1998. <http://www.hschange.org/CONTENT/171/>. Accessed February 28, 2001.
 30. Federal Register. Vol 60. No 27. February 9, 1995:7772-7774.
 31. Center for Studying Health System Change. *User Guide*. Community Tracking Study Household Survey, 1996-1997: 2nd ICPSR version. Washington, DC: Inter-University Consortium for Political and Social Research; 1999.
 32. SUDAAN Version 7.5.3. Research Triangle Park, NC: Research Triangle Institute.
 33. *Resident Population Estimates of the United States by Sex, Race, and Hispanic Origin: April 1, 1990 to July 1, 1999, With Short-Term Projection to November 1, 2000*. Release date December 20, 2000. <http://www.census.gov/population/estimates/nation/intfile3-1.txt>. Accessed July 13, 2001.
 34. Day JC. *Projections of the Number of Households and Families in the United States: 1995 to 2010*. US Bureau of the Census. Current Population Reports, P25-1129. Washington, DC: US Bureau of the Census; 1996. Accessed October 9, 2001.
 35. Dalaker J. *Poverty in the United States 2000*. US Census Bureau Current Population Reports, P60-214. Washington, DC: US Bureau of the Census; September 2001. Accessed October 9, 2001.
 36. Mills RJ. *Health Insurance Coverage 2000*. US Census Bureau Current Population Reports, P60-215. Washington, DC: US Bureau of the Census; September 2001. Accessed October 9, 2001.
 37. Rosenbach M, Lewis K. *Estimates of Health Insurance Coverage in the Community Tracking Study and the Current Population Survey*. Washington, DC: Center for Studying Health System Change; 1998:16. <http://www.hschange.org/CONTENT/172/8525page3.html>. Accessed February 16, 2001.
 38. Krauss NA, Machlin S, Kass BL. *Use of Health Care Services, 1996*. MEPS Research Findings No 7. AHCPR 99-0018. Rockville, MD: Agency for Health Care Policy and Research; 1999.
 39. Weinick RM, Weigers ME, Cohen JW. Children's health insurance, access to care, and health status: new findings. *Health Affairs*. 1998;17:127-136.
 40. Verhulst FC, Van Der Ende J. Factors associated with child mental health service use in the community. *Am Acad Child Adolesc Psychiatr*. 1997;36:901-909.
 41. Pless CE, Pless B. How well they remember; the accuracy of parent reports. *Arch Pediatr Adolesc Med*. 1995;149:553-558.
 42. Ku L, Broaddus M. *The Importance of Family-Based Insurance Expansions: New Research Findings about State Health Reforms*. Center on Budget and Policy Priorities; 2000.
 43. US Department of Health and Human Services. *HHS News*. January 18, 2001. <http://www.hhs.gov/news/press/2001press/20010118d.html>. Accessed January 25, 2001.
 44. Thorpe KE, Florence CS. Covering uninsured children and their parents; estimated costs and the number of newly insured. *Med Care Res Rev*. 1999;56:197-214.
 45. Dubay L, Kenney G, Zuckerman S. Extending Medicaid to parents: an incremental strategy for reducing the number of uninsured. 2000. The Urban Institute. *Assessing New Federalism*. Series B:B-20.