

# Out-Of-Pocket Medical Spending For Care Of Chronic Conditions

Chronically ill persons who are uninsured have higher out-of-pocket medical spending and are five times less likely to see a physician than their insured counterparts.

*by Wenke Hwang, Wendy Weller, Henry Ireys, and Gerard Anderson*

**ABSTRACT:** We examined out-of-pocket medical spending by persons with and without chronic conditions using data from the 1996 Medical Expenditure Panel Survey (MEPS). Our results show that mean out-of-pocket spending increased with the number of chronic conditions. The level of this spending also varied by age and insurance coverage, among other characteristics. Out-of-pocket spending for prescription drugs was substantial for both elderly and nonelderly persons with chronic conditions. As policymakers continue to use cost sharing and design of benefit packages to contain health spending, it is important to consider the impact of these policies on persons with chronic conditions and their families.

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**L**ARGE OUT-OF-POCKET EXPENDITURES for medical services have been shown to impede access to care, affect health status and quality of life, and leave insufficient income for other necessities.<sup>1</sup> It is important to identify the characteristics of persons who are likely to spend large amounts out of pocket, to assess the impact of policy changes related to health insurance coverage. It is also important to know which services are most likely to generate large out-of-pocket expenditures. A review of the literature, however, reveals a dearth of recent comprehensive national estimates of out-of-pocket spending by the general population and for persons with chronic conditions.

The few studies that are available have not identified the characteristics of persons with high out-of-pocket spending and have not examined the wide range of services used by persons with chronic

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conditions. For example, Catherine Hoffman and colleagues, using data from 1987, estimated that out-of-pocket spending made up about 22 percent of total direct medical spending for all persons with a chronic condition.<sup>2</sup> However, they did not explore variations in out-of-pocket spending by individual or family characteristics. Most studies limit their analysis of out-of-pocket spending to specific chronic conditions or to specific services.<sup>3</sup> The disease- and service-specific nature of these studies, combined with methodological and data limitations (for example, no comparison group, reliance on convenience samples), makes it difficult to generalize the results to a larger population, thus diminishing their policy relevance. In addition, approximately half of those with a chronic condition have multiple such conditions, making disease-specific studies more difficult to interpret.<sup>4</sup>

In this study we examine data from the 1996 Medical Expenditure Panel Survey (MEPS) to assess the impact of chronic conditions on out-of-pocket spending for individuals and families. At the individual level, we used descriptive and multiple regression analyses to examine the variation in out-of-pocket spending by number of chronic conditions and by socioeconomic factors. We also determine how out-of-pocket expenditures were distributed across different spending categories (for example, hospital, office-based visits, prescription medications). At the family level, we explore the variation in mean out-of-pocket spending and the characteristics of families with high levels of such spending.

### Study Methods

■ **Data source.** Data for this study were drawn from the 1996 MEPS, a nationally representative survey sponsored by the Agency for Healthcare Research and Quality (AHRQ). The MEPS household component collected detailed information on health status, health care use and expenses, and health insurance coverage; it represents the most comprehensive, nationally representative utilization and expenditure data available.<sup>5</sup> Responses from 22,326 individuals and 8,605 families were used in this analysis.

■ **Definition of chronic condition.** We defined a person as having a chronic condition if that person's condition had lasted or was expected to last twelve or more months and resulted in functional limitations and/or the need for ongoing medical care.<sup>6</sup> We selected a broad definition of *chronic condition* for several reasons. First, we know that almost half of persons with chronic conditions have more than one.<sup>7</sup> For example, our own analysis of the MEPS data found that 77 percent of adults with diabetes, 70 percent of adults with hypertension, and 68 percent of adults with asthma had another

chronic condition. Second, the consequences of health problems (such as functional limitations) are often independent of specific diseases. Although specific diagnoses are important for medical interventions, condition labels alone often provide incomplete information on morbidity, because of the wide variation in severity that exist within specific chronic conditions.<sup>8</sup>

To operationalize our definition of *chronic condition* in the context of the MEPS data set, we convened two physician panels to review all medical conditions reported by the survey sample.<sup>9</sup> The panelists included five general pediatricians to review conditions of persons age nineteen and younger and five internists to review those of adults. Each physician was asked to judge whether each *International Classification of Diseases*, Ninth Revision (ICD-9) code as listed in the data set met the definition presented above.<sup>10</sup> A total of 578 codes were classified; 111 were classified as chronic conditions in children and 177 as chronic conditions in adults.<sup>11</sup>

To determine the number of distinct chronic conditions per person, we used a clinical classification system (CCS) already developed by AHRQ. The CCS aggregates all diagnosis codes into 259 mutually exclusive, clinically homogeneous categories.<sup>12</sup> These groups have been used to construct comorbidity measures to predict the use and costs of hospital services and mortality.<sup>13</sup> In our analysis persons were considered to have more than one chronic condition if (1) they had more than one condition classified as chronic by our physician panels; and (2) these conditions were in separate CCS categories.<sup>14</sup> For example, diabetes and asthma were classified as two separate chronic conditions, while spina bifida (ICD-9 code 741) and "other congenital anomalies of the nervous system" (ICD-9 code 742) were aggregated into one chronic condition (nervous system congenital anomalies). Using this approach, persons were assigned to one of four categories based on their total number of chronic conditions (0, 1, 2, 3 or more).

■ **Out-of-pocket spending.** Out-of-pocket expenditures reported in MEPS represent self-reported payments for coinsurance and deductibles, as well as cash outlays for services, supplies, and other items not covered by health insurance. Health insurance premiums, whether directly paid or withheld by employers, were not included in our analysis.<sup>15</sup> When examined by type of service, mean out-of-pocket expenditures were calculated across persons using medical services during the year (that is, persons without any medical services use were not included in denominators).

■ **Other variables.** Persons under age sixty-five were classified into one of four mutually exclusive health insurance categories: private, Medicaid, other public insurance, and uninsured. Three insur-

ance categories were used to classify the status of persons age sixty-five and older: Medicare only, Medicare plus private insurance, and Medicare plus Medicaid.<sup>16</sup> Income information was translated into percentage above or below the federal poverty level.<sup>17</sup>

## Study Results

■ **Populations with chronic conditions.** Based on our definition of a chronic condition, an estimated 41 percent of the noninstitutionalized U.S. population, or 108 million persons, had one or more chronic conditions in 1996. Among them, 58 percent had only one chronic condition, approximately 24 percent had two, and 18 percent had three or more. The most prevalent conditions for adults were upper respiratory infections, hypertension, nontraumatic joint disorders, diabetes, disorders of lipid metabolism, and asthma. For children, upper respiratory disease, asthma, blindness/vision defects, lower respiratory disease, and mental conditions were most frequently reported.

As expected, the prevalence of chronic conditions increased with age (Exhibit 1). Among subgroups, women were slightly more likely than men to have had a chronic condition. The gender difference persisted when the results were adjusted for age (data not shown). Among the population under age sixty-five, prevalence was lowest for those with no insurance (27.1 percent) and highest for those whose coverage was classified as “other public” (41.5 percent). Prevalence was similar for the privately insured (36.8 percent) and those covered by Medicaid (36.9 percent). Among the population age sixty-five and older, the prevalence of chronic conditions was slightly lower among persons insured by Medicare only (74.8 percent) compared with those with Medicare and private insurance (81.4 percent) or Medicare and Medicaid (79.3 percent).

■ **Out-of-pocket spending by individual characteristics.** According to the MEPS data, 86 percent of noninstitutionalized Americans used medical services in 1996. These Americans spent an average of \$427 per person out of pocket on personal health care services, accounting for 19.2 percent of their total direct medical spending (data not shown). Mean out of pocket spending among users of health services increased for each additional chronic condition present (but at a decreasing rate), with mean out-of-pocket spending increasing from \$249 for persons without a chronic condition to \$1,134 for persons with three or more chronic conditions (Exhibit 2).<sup>18</sup>

The finding of a positive, nearly linear relationship between out-of-pocket medical spending and number of chronic conditions mostly persisted when the population was grouped by socioeco-

**EXHIBIT 1****Socioeconomic Characteristics Of MEPS Respondents, By Number Of Chronic Conditions, 1996**

<b>Characteristic</b>	<b>Number (millions)</b>	<b>Number of chronic conditions</b>			
		<b>None</b>	<b>1</b>	<b>2</b>	<b>≥3</b>
Total population	266	59.3%	23.7%	9.6%	7.4%
Age					
0–19	79	76.4	19.0	3.9	0.7 <sup>a</sup>
20–44	101	67.6	23.3	6.4	2.7
45–64	54	41.7	29.7	15.9	12.7
65–79	25	22.3	26.2	23.8	27.7
80 or older	7	14.7 <sup>a</sup>	26.8	20.9	37.6
Sex					
Male	130	62.9	23.5	8.2	5.4
Female	136	56.0	23.9	10.9	9.3
Race					
White	218	57.8	24.2	10.2	7.8
Black	35	65.7	21.4	7.1	5.9
Other	13	67.1	21.7	6.0 <sup>a</sup>	5.2 <sup>a</sup>
Hispanic ethnicity					
Hispanic	30	70.6	20.6	5.3	3.6
Non-Hispanic	236	57.9	24.1	10.2	7.9
Insurance status					
Age 65 and older					
Medicare only	9	25.2	24.9	25.4	24.5
Medicare/private	20	18.7	27.0	23.0	31.4
Medicare/Medicaid	3	20.8	26.0	18.6	34.7
Under age 65 <sup>b</sup>					
Private	160	63.2	24.2	8.4	4.3
Medicaid	27	63.1	22.7	7.7	6.5
Other public	6	58.5	23.1	10.3	8.1
Uninsured	32	72.9	19.9	4.7	2.6 <sup>a</sup>
Poverty status					
Poor	37	62.3	21.8	8.4	7.5
Near-poor	13	59.0	21.8	10.5	8.7
Low income	40	59.7	22.2	8.9	9.1
Middle income	88	61.3	22.3	9.2	7.1
High income	88	55.9	26.7	10.7	6.7

**SOURCE:** Authors' tabulations of 1996 Medical Expenditure Panel Survey (MEPS) Household Component survey data.

<sup>a</sup> Insufficient sample size to generate reliable national estimates.

<sup>b</sup> Excludes persons with unknown type of insurance.

nomic and demographic characteristics. Out-of-pocket spending increased with age and income and varied by insurance status. Persons in the oldest age category (age eighty or older) spent more than five times out of pocket than did persons in the youngest age category (birth to nineteen years) and twice as much as persons in the middle age category (ages forty-five to sixty-five) (Exhibit 2).

The level of out-of-pocket spending also varied by type of health insurance. Among the population under age sixty-five, out-of-pocket spending was lowest for those covered by Medicaid. This is

**EXHIBIT 2****Socioeconomic Characteristics And Mean Annual Out-Of-Pocket Spending Per Person, By Number Of Chronic Conditions, 1996**

<b>Characteristic</b>	<b>All</b>	<b>Number of chronic conditions</b>			
		<b>None</b>	<b>1</b>	<b>2</b>	<b>≥3</b>
Total population	\$ 427	\$249	\$433	\$ 733	\$1,134
<b>Age</b>					
0–19	219	179	288	502	441 <sup>a</sup>
20–44	337	258	380	616	814
45–64	593	356	553	786	1,055
65–79	777	421	610	815	1,130
80 or older	1,162	617 <sup>a</sup>	540	1,074	1,828
<b>Sex</b>					
Male	373	237	374	723	1,016
Female	473	260	486	740	1,200
<b>Race</b>					
White	462	270	461	780	1,206
Black	225	129	259	383	647
Other	317	175	330	634 <sup>a</sup>	878 <sup>a</sup>
<b>Hispanic ethnicity</b>					
Hispanic	263	182	286	591	716
Non-Hispanic	445	257	448	742	1,157
<b>Insurance status</b>					
<b>Over age 65</b>					
Medicare only	924	455	643	966	1,492
Medicare/private	910	485	636	875	1,394
Medicare/Medicaid	434	262 <sup>a</sup>	247	447 <sup>a</sup>	649
<b>Under age 65</b>					
Private	386	259	449	731	943
Medicaid	140	81	129	292	455
Other public	424	157	468	663 <sup>a</sup>	1,422 <sup>a</sup>
Uninsured	423	304	419	908	1,845 <sup>a</sup>
<b>Poverty status</b>					
Poor	282	129	269	599	878
Near-poor	397	223	321	646	1,104
Low income	400	226	357	680	1,035
Middle income	428	251	440	760	1,181
High income	494	306	520	784	1,269

**SOURCE:** Authors' tabulations of 1996 Medical Expenditure Panel Survey (MEPS) Household Component survey data.

<sup>a</sup> Insufficient sample size to generate reliable national estimates.

not surprising given the comprehensive nature of the Medicaid benefit package and the limits on cost sharing. Nevertheless, there was a positive association between out-of-pocket spending and chronic conditions for Medicaid beneficiaries.

Mean out-of-pocket spending was higher for the uninsured than for persons with health insurance. Further analysis revealed that despite higher out-of-pocket spending, uninsured persons were less likely to see a health care provider than were persons with insurance. Approximately 45 percent of uninsured persons without a chronic condition used no medical services during the year, com-

pared with 16 percent of persons with private insurance. Fifteen percent of uninsured persons with at least one chronic condition and 6 percent of uninsured persons with multiple chronic conditions did not see a medical care provider, compared with fewer than 3 percent and 1 percent, respectively, of privately insured persons.

Among persons age sixty-five and older, mean out-of-pocket spending was lowest for those insured by both Medicare and Medicaid (dual eligibles). Dual eligibles spent about half as much out of pocket as other Medicare beneficiaries did. This was true for persons with or without chronic conditions. Surprisingly, mean out-of-pocket spending was only slightly lower for seniors with Medicare and private coverage than for those with Medicare only. The results were consistent regardless of number of chronic conditions.

Two separate multiple linear regression models (one for those under age sixty-five and the other for those age sixty-five and older) were constructed to confirm the relationship between out-of-pocket spending and the presence of chronic conditions while controlling for demographic characteristics and insurance status. Multivariate results confirmed the directions of the bivariate analyses and suggest that the number of chronic conditions is an important predictor of out-of-pocket spending.<sup>19</sup>

■ **Out-of-pocket spending by type of service.** For persons age sixty-five and older, mean out-of-pocket spending was highest for prescription drugs (\$397), followed by dental services (\$145) (Exhibit 3). For persons under age sixty-five, mean out-of-pocket spending was highest for physician office visits (\$104). With the exceptions of dental services and vision aids, spending generally increased with the number of chronic conditions. Increases in mean out-of-pocket spending for prescription drugs were particularly noticeable for persons both under and over age sixty-five. Home health care was the second-highest out-of-pocket spending category when seniors had three or more chronic conditions.

■ **Out-of-pocket spending by family characteristics.** Families' total out-of-pocket expenditures averaged \$842 in 1996 (Exhibit 4). Twenty-eight million families (26 percent of all families) spent more than \$1,000 out of pocket on medical care, and 5.4 million families (5 percent of all families) spent more than \$3,000. Families headed by someone age sixty-five or older spent considerably more than did other families (Exhibit 4). For example, two-person families with an elderly head of household spent nearly twice as much out of pocket (\$812) as their nonelderly counterparts did (\$429) and were 2.5 times as likely to exceed the \$3,000 threshold.

On average, families spent nearly 5.1 percent of their total income on out-of-pocket medical spending in 1996 (data not shown), and

**EXHIBIT 3**

**Percentage Using Services And Mean Out-Of-Pocket Spending Amounts Per Person, By Type Of Medical Service, 1996**

Number of chronic conditions	Percent using services						
	Prescription drugs	Home health	Dental services	Office visits	Hospital <sup>a</sup>	Medical equipment	Vision aids
Age 65 or older	92%	12%	43%	92%	46%	16%	24%
0	69	5	44	79	32	6	21
1	93	7	38	92	39	11	20
2	97	11	44	96	46	14	26
3 or more	99	21	45	98	61	26	28
Under age 65	74	1	50	81	27	4	18
0	63	1	49	75	22	3	14
1	85	1	51	86	30	5	21
2	84	2	54	94	40	8	27
3 or more	99	6	53	97	54	12	30
<b>Mean out-of-pocket spending</b>							
Age 65 or older	\$397	\$ 88	\$145	\$108	\$ 53	\$37	\$34
0	113	1	167	88	37	13	34
1	235	22	137	98	47	28	28
2	438	57	120	110	64	39	37
3 or more	667	218	159	125	58	58	37
Under age 65	97	1	90	104	38	5	25
0	41	0	81	69	27	3	19
1	110	1	104	117	42	4	30
2	229	1	105	217	65	18	43
3 or more	443	4	94	253	105	15	43

**SOURCE:** Authors' tabulations of 1996 Medical Expenditure Panel Survey (MEPS) Household Component survey data.

**NOTE:** Data are for the 86 percent of the population who used any type of service.

<sup>a</sup> Includes inpatient and outpatient services.

about 9 percent (or ten million) of families spent more than 10 percent of their family income to purchase medical services (Exhibit 4).<sup>20</sup> Further analysis revealed that families with certain characteristics were more likely to devote 10 percent or more of their income on out-of-pocket medical expenditures. Nearly one-quarter of single, noninstitutionalized seniors and 16 percent of senior couples spent more than 10 percent of their income in this way.

■ **Study limitations.** Several possible study limitations should be mentioned. First, response and recall errors are a potential concern with survey data. Inability to recall a condition, unwillingness to reveal a condition, or errors in coding conditions also could introduce errors.<sup>21</sup> Second, while MEPS separately collected information on nursing home residents, these data were not publicly available at the time of our analysis. Future research should consider out-of-pocket spending by persons residing in nursing homes and other residential facilities, since these persons are likely to be disproportionately affected by chronic conditions. Third, information was not available on direct “nonmedical” out-of-pocket costs that individuals and families with chronic conditions often encounter, such as



EXHIBIT 4  
Out-Of-Pocket Spending, By Family Characteristics, 1996

Family characteristic	Number of families (millions)	Mean out-of-pocket spending	Percent of families spending		
			More than \$1,000 out of pocket	More than \$3,000 out of pocket	More than 10% of income out of pocket
All families	109	\$ 842	25.7%	5.3%	9.3%
Size of family					
Nonelderly families <sup>b</sup>					
One person	29	429	11.6	1.8	9.1
Two persons	21	837	25.9	4.9	6.1
Three persons	14	836	26.2	4.1	5.3
Four or more persons	22	1,081	32.3	8.1	5.1
Elderly families <sup>c</sup>					
One person	11	812	27.3	3.6	22.8
Two persons	9	1,522	47.3	12.5	17.5
Three persons <sup>d</sup>	1	1,570	51.0	15.1	9.5
Four or more persons <sup>d</sup>	1	1,428	45.6	21.1	11.0
Number of members with at least one chronic illness					
None	38	407	10.0	1.9	4.3
One	46	842	26.2	4.8	12.1
Two	20	1,448	46.2	10.6	12.7
Number of members with two or more chronic illnesses					
One	27	1,196	39.7	7.6	15.8
Two or more	6	2,177	70.6	21.2	20.1

**SOURCE:** Authors' tabulations of 1996 Medical Expenditure Panel Survey (MEPS) Household Component survey data.

**NOTE:** Families include single-person households.

<sup>a</sup> Includes families with zero income.

<sup>b</sup> Head of household is under age sixty-five.

<sup>c</sup> Head of household is age sixty-five or older.

<sup>d</sup> Insufficient sample size to generate reliable national estimates.

travel expenses, clothing, home modifications, and phone bills.

Finally, in this study it is not possible to make any statements about the appropriateness of the level of out-of-pocket spending. For example, some persons may make a rational decision to pay for medical care out of pocket rather than to purchase health insurance. Therefore, they may have higher out-of-pocket spending than persons with health insurance have but lower overall spending because they have no outlays for health insurance.

### Summary And Policy Implications

Findings from this study show that, on average, out-of-pocket spending on personal medical care increases as the number of chronic conditions rises. This nearly linear relationship persists even after insurance status and other demographic factors are controlled for. This suggests that the number of chronic conditions is an important predictor of out-of-pocket medical spending.

Families with chronically ill members are 2.6 times more likely than other families are to spend \$1,000 out of pocket annually for

medical care. Higher out-of-pocket expenditures for these persons and families are likely to persist over multiple years, given that most chronic conditions, by definition, persist over time. As a result, these individuals and families are particularly likely to be affected by changes in benefit design and coverage.

The high out-of-pocket expenses among uninsured chronically ill persons poses another potential challenge to policymakers in their efforts to improve access to health care. This study shows that among chronically ill persons the uninsured had the highest out-of-pocket spending and were five times less likely to see a medical care provider in a given year. Further research is necessary to clarify the relationship between insurance status, out-of-pocket spending, and access to care among persons with chronic conditions.

**A**S PUBLIC AND PRIVATE INSURERS continue to use cost sharing and benefit packages to reduce health care spending, it is important to consider the impact of these policies on vulnerable populations. Persons with multiple chronic conditions are particularly vulnerable to cost sharing and coverage restrictions because of their higher overall utilization and their use of specific services for which benefits are limited.

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## NOTES

1. B. Altman, P.F. Cooper, and P.J. Cunningham, "The Case of Disability in the Family: Impact on Health Care Utilization and Expenditures for Nondisabled Members," *Milbank Quarterly* 77, no. 1 (1999): 39-75; and E. Rasell, J. Bernstein, and K. Tang, "The Impact of Health Care Financing on Family Budgets," *International Journal of Health Services* 24, no. 4 (1994): 691-714.
2. C. Hoffman, D. Rice, and H-Y. Sung, "Persons with Chronic Conditions: Their Prevalence and Costs," *Journal of the American Medical Association* 276, no. 18 (1996): 1473-1479.
3. See, for example, A.M. Epstein et al., "Costs of Medical Care and Out-of-Pocket Expenditures for Persons with AIDS in the Boston Health Study," *Inquiry* (Summer 1995): 211-221; K. Whetten-Goldstein et al., "The Burden of Parkinson's Disease on Society, Family, and the Individual," *Journal of the American Geriatrics Society* 45, no. 7 (1997): 844-849; M. Stommel, C.W. Given, and B.A. Given, "The Cost of Cancer Home Care to Families," *Cancer* 71, no. 5 (1993): 1867-1874; E.P. Steinberg et al., "Beyond Survey Data: A Claims-Based Analysis of Drug Use and Spending by the Elderly," *Health Affairs* (Mar/Apr 2000): 198-211; C. Mueller, C. Schur, and J. O'Connell, "Prescription Drug Spending: The Impact of Age and Chronic Disease Status," *American Journal of Public Health* 87, no. 10 (1997): 1626-1629; and J. Rogowski, L. Lillard, and R. Kington, "The Financial Burden of Prescription Drug Use among Elderly Persons," *Gerontologist* 37, no. 4 (1997): 475-482.

4. Hoffman et al., "Persons with Chronic Conditions."
5. See S.B. Cohen, *Sample Design of the 1996 Medical Expenditure Panel Survey Household Component*, Methodology Report no. 2, Pub. no. 97-0027 (Rockville, Md.: Agency for Healthcare Research and Quality, July 1997). Although the 1996 MEPS provides the most recent, comprehensive national spending data available, it is now nearly five years old. However, we do not believe that the level or distribution of out-of-pocket spending changed dramatically between 1996 and 2001. According to the National Health Accounts, out-of-pocket spending increased 4.4 percent in 1996, 6.2 percent in 1997, and 5.5 percent in 1998, while personal health care spending increased 5.2 percent, 4.8 percent, and 5.2 percent, respectively, during the same time period. K. Levit et al., "Health Spending in 1998: Signals of Change," *Health Affairs* (Jan/Feb 2000): 124-132.

Because managed care plans generally have lower out-of-pocket spending than fee-for-service plans have, an increase in the number of managed care enrollees could change the distribution of out-of-pocket spending. Studies suggest that persons with more health concerns are less likely to enroll in managed care than healthier persons are. The amount of out-of-pocket spending for persons with chronic conditions should remain relatively stable. Finally, more recent data sets, such as the Current Population Survey, do not contain the detailed information on out-of-pocket spending needed to conduct this type of analysis.

6. E.C. Perrin et al., "Issues Involved in the Definition and Classification of Chronic Health Conditions," *Pediatrics* 91, no. 4 (1993): 787-793; R.E.K. Stein et al., "Framework for Identifying Children Who Have Chronic Conditions: The Case for a New Definition," *Journal of Pediatrics* 122, no. 3 (1993): 342-347; and R.E.K. Stein, L.E. Westbrook, and L.J. Bauman, "The Questionnaire for Identifying Children with Chronic Conditions: A Measure Based on a Noncategorical Approach," *Pediatrics* 99, no. 4 (1997): 513-521. A more detailed description of our conceptual framework is available from Wenke Hwang, <whwang@hsph.edu>.
7. Hoffman et al., "Persons with Chronic Conditions."
8. Stein et al., "The Questionnaire for Identifying Children."
9. In MEPS, medical conditions and procedures were described by respondents, recorded as verbatim text by interviewers, and then assigned a diagnosis code by professional coders. See S.R. Machlin and A.K. Taylor, *Design, Methods, and Field Results of the 1996 Medical Expenditure Panel Survey Medical Provider Component*, MEPS Methodology Report no. 9, Pub. no. 00-0028 (Rockville, Md.: AHRQ, May 2000).
10. Because MEPS data on an individual's medical condition were self-reported, three-digit ICD-9 codes were used instead of the more specific five-digit codes. As a result, some diagnosis codes were broad enough to include both chronic and acute forms of a condition. In these cases, the physicians made a decision based on their clinical experience and available published literature regarding whether the majority of the cases associated with the code were chronic or acute.
11. The list of chronic conditions is available from the authors upon request.
12. See *MEPS Data Documentation HC-006: 1996 Medical Conditions*, Pub. no. 99-DP06 (Rockville, Md.: AHRQ, 1999).
13. A. Elixhauser et al., "Comorbidity Measures for Use with Administrative Data," *Medical Care* 36, no. 1 (1998): 8-27.
14. After we classified conditions as acute or chronic, eighty-two CCS categories were identified as chronic for adults and seventy-seven for children.
15. This approach produces a measure of the financial burden on individuals and families that is directly related to their own medical care use. See G. Shearer,

*Hidden from View—The Growing Burden of Health Care Cost* (Washington: Consumers Union, January 1998). For a detailed description of MEPS expenditure data, see *MEPS HC-01: 1996 Full Year Use and Expenditure Data* (Rockville, Md.: AHRQ, December 1999).

16. Persons could have been covered by more than one type of insurance in separate periods during the year or by more than one type of insurance during the same time period. Therefore, several steps were taken and decision rules were applied to assign persons to mutually exclusive insurance categories. First, we divided the population into those under age sixty-five and those age sixty-five or older. Second, we required persons to have more than six months of one type of insurance to be assigned to that insurance group. Third, when persons age sixty-five and older were covered by multiple types of insurance for more than six months during the year, they were categorized as having both types of coverage. Finally, persons under age sixty-five were classified as uninsured only if they reported having no insurance during the entire year, the approach used by the U.S. Census Bureau for identifying uninsured persons. We were unable to determine the type of insurance for approximately 2.8 percent of the population under age sixty-five (most often because they were covered by multiple types of insurance for short periods during the year); these persons were excluded from the analysis.
17. In MEPS, income of each family member was aggregated to estimate family income. Family income then was used to determine the family's poverty status (based on family size and age of the head of family). All families were classified into one of the following five groups: poor, near-poor, low income, middle income, and high income. See *MEPS HC-08: 1996 Full Year Population Characteristics* (Rockville, Md.: AHRQ, December 1999).
18. Out-of-pocket expenditures presented throughout this study reflect mean expenditures among persons who used medical services in 1996.
19. Because the distribution of the dependent variable was skewed, we modeled the natural logarithm of out-of-pocket expenditures. The following independent variables were included in the models: number of chronic conditions, age, sex, race, Hispanic ethnicity, insurance, and poverty status. For persons under age sixty-five, presence of chronic conditions, age, sex, race, and insurance type were all statistically significant at  $p < .01$ . The overall adjusted R-square was 0.22. For persons age sixty-five and older, sex and age were not significant, but the presence of chronic conditions and insurance type were statistically significant at  $p < .01$ , with an adjusted R-square of 0.14. Various stratified regression analyses were conducted to test possible interactions between variables. Specific results from the regression analyses (for example, parameter estimates and  $p$ -values) are available from the authors.
20. Families who have health insurance but spend more than 10 percent of their family income on out-of-pocket medical spending are considered to be underinsured. See P.F. Short and J.S. Banthin, "New Estimates of the Underinsured Younger than 65 Years," *Journal of the American Medical Association* 274, no. 16 (1995): 1302-1306.
21. Hoffman et al., "Persons with Chronic Conditions."