The Within-Year Concentration of Medical Care: Implications for Family Out-of-Pocket Expenditure Burdens

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Objective. To examine the within-year concentration of family health care and the resulting exposure of families to short periods of high expenditure burdens.

Data Source. Household data from the pooled 2003 and 2004 Medical Expenditure Panel Survey (MEPS) yielding nationally representative estimates for the nonelderly civilian noninstitutionalized population.

Study Design. The paper examines the within-year concentration of family medical care use and the frequency with which family out-of-pocket expenditures exceeded 20 percent of family income, computed at the annual, quarterly, and monthly levels.

Principal Findings. On average among families with medical care, 49 percent of all (charge-weighted) care occurred in a single month, and 63 percent occurred in a single quarter). Nationally, 27 percent of the study population experienced at least 1 month in which out-of-pocket expenditures exceeded 20 percent of income. Monthly 20 percent burden rates were highest among the poor, at 43 percent, and were close to or above 30 percent for all but the highest income group (families above four times the federal poverty line).

Conclusions. Within-year spikes in health care utilization can create financial pressures missed by conventional annual burden analyses. Within-year health-related financial pressures may be especially acute among lower-income families due to low asset holdings.

Key Words. Medical utilization, expenditures, burdens

A growing literature examines the out-of-pocket medical spending of U.S. families, showing the distribution of high or “catastrophic” burdens over time and across subgroups.¹ Evidence on burdens can help inform policies to reduce uninsurance and can aid in the design of public and private insurance benefits. The literature, however, has focused on annual burdens, potentially missing financial pressures that can arise from within-year spikes in medical spending. Although high-income families may have sufficient income and assets to view burdens from an annual or even multi-year perspective,

low-income families may to varying extents be living “month to month.” Many have few liquid assets to draw upon, and some face declining incomes just as their medical bills grow.

This paper is the first to examine the within-year concentration of health care utilization and its impact on the financial pressures facing families. Data on event timing in the Medical Expenditure Panel Survey (MEPS) reveal that utilization is *highly* concentrated within the year, with nearly half of all charge-weighted family utilization occurring on average in a single month. The combination of spikes in medical care and, to a lesser extent, dips in income led to high within-year burden prevalence—especially among low- and middle-income families.

DATA AND METHODS

Data are from the 2003 and 2004 Household Component of MEPS, sponsored by the Agency for Healthcare Research and Quality and the National Center for Health Statistics (Cohen et al. 1996; Cohen 1997). MEPS has a rotating panel design, following each household for 2 years. When combined with sample weights, each year of MEPS yields nationally representative estimates of insurance coverage and out-of-pocket premiums, medical expenditures, and a wide range of other health-related and socioeconomic characteristics for persons in the U.S. civilian, noninstitutionalized population. The analysis focuses on the nonelderly population, because Medicare Part D may have changed burdens among seniors. Standard errors and statistical tests are adjusted for the complex design of MEPS, but they do not account for errors in tax simulations or event month imputations. All differences discussed in the text are statistically significant at the 1 percent level unless otherwise noted.

Health Care Utilization, Charges, and Expenditures

MEPS provides data on type of service and expenditures by payment source for every household-reported event within the calendar year. MEPS also provides the full established charge,² which can differ from total expenditures due to discounts and uncompensated care. MEPS also records the month

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care was received,³ permitting the analysis of within-year utilization concentration.

MEPS provides the dates on which events occurred, but not when bills were paid. Prescription medicines (RX) were likely paid for as prescriptions were filled. For other events—especially hospital care—families may have paid well after the event occurred due to billing delays, billing disputes, negotiated installment plans, or simply late payments. For this reason, I examine a range of assumptions regarding payment timing.

Other Variables

Out-of-pocket spending is computed net of the following (burden-reducing) tax subsidies: federal and state income tax deductions for medical expenses, Section 125 income and payroll tax exclusions of employee premium contributions and flexible spending accounts, state and local sales tax exemptions, and the self-employment health insurance deduction.⁴ Out-of-pocket premiums for private and public insurance are allocated to months in which coverage was held.^{5,6}

Monthly earnings estimates are constructed from data on job start and stop dates, compensation, hours worked, unpaid leave without pay, and other health-related absences from work (for self or family) for workers lacking paid sick leave. Unemployment benefits, worker's compensation, and cash welfare benefits are allocated so as to fill earnings gaps. Other unearned income is allocated uniformly across months.

Other financial measures include the following: home ownership from the linked National Health Interview Survey (measured the year before families enter MEPS), receipt of asset income (measured each year in MEPS), and nonmortgage debt (measured after the end of the second year in MEPS).

Families are defined using health insurance eligibility units, typically consisting of an adult, his/her spouse, and their children through age 18 (or through age 23 if they are full-time students).⁷ All estimates are person-weighted using MEPS sampling weights, the goal being to measure the percentage of persons living in families with high health care expenditure burdens.

Measuring High Annual and Within-Year Burdens

High annual burdens are defined as out-of-pocket expenditures on premiums and care that exceeded 20 percent of after-tax, after-transfer income.⁸ Selected results are presented for higher and lower thresholds. Families with high

monthly burdens are those with at least 1 month in which out-of-pocket spending exceeded 20 percent of monthly income. Quarterly burdens are defined analogously, based on the 10 rolling quarters within the year.⁹ Additional results are presented in which burdens are defined inclusive of implicit reductions in cash wages associated with employer contributions to employer-sponsored insurance (ESI).

RESULTS

The Within-Year Concentration of Medical Care Utilization

The driving force behind within-year burdens is the within-year concentration of medical care utilization. Figure 1 graphs monthly family utilization as a percentage of total annual utilization among families with positive use. Months were ranked by utilization for each family, with shares of annual family utilization being averaged across the sample for each ranked month.¹⁰ To combine utilization across service types, events are weighted by charges, total expenditures, and out-of-pocket expenditures. Weighting utilization by charges has the advantage of accounting for uncompensated care. Weighting by total expenditures has the advantage of reflecting actual payment flows rather than potentially subjective charges (but misses uncompensated care). Weighting by out-of-pocket payments is most directly relevant to burdens,

Figure 1: Within-Year Concentration of Family Utilization: Monthly Shares of Annual Totals by Ranked Months, 2003–2004

showing the share of out-of-pocket bills for care that were incurred (if not always paid) in a given month.

Utilization was highly concentrated for all three measures. Weighting by charges, 48.6 percent of families' annual utilization occurred in a single month. Utilization was less concentrated when weighted by total expenditures, because hospital-related events were disproportionately represented in peak-month utilization (and had lower payment/charge ratios) and because prescription drugs were more evenly distributed than other events (and had payment/charge ratios of one by construction).¹¹ Utilization was least concentrated when weighted by out-of-pocket payments, yet even in this case the peak month accounted on average for 44.5 percent annual family utilization.

Table 1 presents average monthly and quarterly peak utilization percentages for selected subgroups. Peak quarters accounted for larger shares of annual utilization than did peak months. This is partially by construction, since a 40 percent peak month share would translate into a 50.9 percent peak quarter share even if utilization were uniformly distributed across all nonpeak months.¹² However, observed peak quarter shares tend to be larger than such calculations would suggest, because months surrounding the peak had higher utilization on average than other nonpeak months.

Within-year utilization concentrations were consistently high across population subgroups. Low-income families—those under 200 percent of the federal poverty line (FPL)—had more concentrated utilization than higher-income families. Utilization was slightly more concentrated among families with public coverage than among those with private coverage, and utilization was most highly concentrated among uninsured families. Note, however, that uninsured families were also the least likely to use care. Had zero utilization families been included with peak month shares of 1/12, uninsured families would have had the lowest average peak month shares.

Grouping by family size shows the expected pattern of lower concentrations among larger families. However, even among families with five or more members, the average peak month accounted for 46.2 percent of annual utilization weighting by charges or 43.6 percent of annual utilization weighting by out-of-pocket expenditures. This is largely because utilization was very unevenly distributed across family members. On average, the family member with highest utilization accounted for 71.1 percent (SE = 0.2) of annual family charge-weighted utilization among families with use (not shown in table). Even in families with five or more members, the highest user accounted on average for 59.8 percent (SE = 0.5) of the family total. In the peak utilization month,

Table 1: Within-Year Concentration of Family Medical Care Utilization, 2003–2004

	Sample Size*	Population (Millions)	Utilization Weighted by Charges [†]			Utilization Weighted by Total Expenditures [‡]			Utilization Weighted by Out-of-Pocket Expenditures [§]		
			Positive Use (%) [¶]	Peak Month Share (%)	Peak Quarter Share (%)	Positive Use (%) [¶]	Peak Month Share (%)	Peak Quarter Share (%)	Positive Use (%) [¶]	Peak Month Share (%)	Peak Quarter Share (%)
All nonelderly	57,960	255.2	93.1 (0.2)	48.6 (0.2)	62.8 (0.2)	92.8 (0.2)	45.8 (0.2)	60.8 (0.2)	89.7 (0.2)	44.5 (0.2)	60.5 (0.2)
Poverty level**											
< 100% FPL	11,953	30.7	90.0 (0.5)	53.4 (0.5)	66.9 (0.4)	89.3 (0.6)	50.0 (0.5)	64.5 (0.4)	80.2 (0.8)	51.0 (0.7)	67.1 (0.5)
100–199% FPL	13,779	43.7	91.2 (0.4)	52.8 (0.5)	66.3 (0.4)	90.6 (0.4)	50.0 (0.5)	64.2 (0.4)	85.2 (0.6)	49.9 (0.6)	65.3 (0.5)
200–399% FPL	16,409	81.2	92.7 (0.3)	48.9 (0.4)	63.1 (0.3)	92.4 (0.3)	46.2 (0.4)	61.1 (0.3)	90.6 (0.3)	44.3 (0.5)	60.2 (0.4)
≥ 400% FPL	15,819	99.6	95.1 (0.2)	45.2 (0.3)	60.0 (0.3)	95.0 (0.3)	42.6 (0.3)	58.1 (0.3)	93.9 (0.3)	40.8 (0.4)	57.2 (0.3)
Family coverage ^{††}											
All private	23,797	137.6	96.2 (0.2)	45.5 (0.3)	60.2 (0.2)	96.1 (0.2)	43.0 (0.3)	58.4 (0.2)	94.9 (0.3)	41.0 (0.3)	57.3 (0.2)
All public	5,463	14.9	95.8 (0.4)	47.7 (0.7)	61.9 (0.6)	95.6 (0.4)	42.6 (0.7)	58.2 (0.6)	83.7 (0.1)	45.7 (0.9)	63.6 (0.7)

Non-Medicare ^{††}	4,328	11.2	95.5 (0.5)	48.9 (0.8)	63.1 (0.7)	95.4 (0.5)	44.0 (0.8)	59.5 (0.7)	80.9 (1.3)	49.6 (1.1)	66.6 (0.8)
All uninsured	5,919	23.5	65.2 (0.9)	61.5 (0.8)	73.2 (0.6)	63.5 (0.9)	59.7 (0.8)	72.0 (0.7)	61.3 (0.1)	58.5 (0.9)	71.4 (0.7)
Mixed private and public	3,768	15.2	98.8 (0.3)	45.1 (0.7)	60.1 (0.6)	98.8 (0.3)	41.5 (0.8)	57.5 (0.6)	95.9 (0.6)	38.6 (0.9)	55.5 (0.8)
Mixed private and uninsured	5,768	29.0	92.0 (0.5)	53.3 (0.6)	66.8 (0.5)	91.7 (0.5)	50.7 (0.6)	65.0 (0.5)	90.3 (0.6)	47.4 (0.6)	63.0 (0.5)
Mixed public and uninsured	9,206	21.9	95.5 (0.5)	54.3 (0.6)	67.7 (0.5)	95.2 (0.5)	51.2 (0.6)	65.5 (0.5)	84.6 (0.8)	55.5 (0.8)	70.3 (0.6)
Private, public and uninsured	4,039	13.0	98.5 (0.4)	51.3 (0.9)	65.5 (0.7)	98.3 (0.4)	48.4 (0.9)	63.3 (0.7)	93.3 (0.8)	49.0 (0.9)	65.2 (0.7)
Family size											
1	11,863	60.3	77.1 (0.5)	57.3 (0.4)	69.8 (0.3)	76.2 (0.5)	55.2 (0.4)	68.3 (0.3)	71.5 (0.6)	54.1 (0.5)	68.3 (0.3)
2	11,381	56.7	96.7 (0.3)	46.1 (0.4)	60.7 (0.3)	96.5 (0.3)	43.0 (0.4)	58.4 (0.3)	94.2 (0.4)	40.5 (0.4)	57.3 (0.3)
3-4	22,792	97.7	98.4 (0.2)	46.9 (0.4)	61.5 (0.3)	98.3 (0.2)	44.0 (0.4)	59.4 (0.3)	95.9 (0.3)	42.8 (0.4)	59.1 (0.3)
5+	11,924	40.5	98.9 (0.2)	46.2 (0.5)	61.0 (0.4)	98.8 (0.2)	43.4 (0.5)	58.8 (0.4)	95.7 (0.4)	43.6 (0.7)	59.7 (0.5)
Family total expenditures on health care (2004 \$)											
Under \$1,000	18,830	74.2	76.1 (0.5)	61.6 (0.4)	73.2 (0.3)	75.1 (0.5)	60.5 (0.4)	72.5 (0.3)	67.4 (0.6)	64.6 (0.5)	76.3 (0.4)
\$1,000-\$4,999	20,786	93.4	100	41.6 (0.3)	57.7 (0.2)	100	38.7 (0.3)	55.7 (0.2)	98.5 (0.1)	41.7 (0.3)	58.6 (0.3)
\$5,000-\$9,999	9,782	46.3	100	44.6 (0.5)	59.3 (0.4)	100	41.0 (0.5)	56.6 (0.4)	99.1 (0.2)	36.1 (0.5)	53.8 (0.4)

continued

Table 1. *Continued*

	Utilization Weighted by Charges [†]			Utilization Weighted by Total Expenditures [‡]			Utilization Weighted by Out-of-Pocket Expenditures [§]				
	Sample Size*	Population (Millions)	Positive Use (%) [¶]	Peak Month Share (%)	Peak Quarter Share (%)	Positive Use (%) [¶]	Peak Month Share (%)	Peak Quarter Share (%)	Positive Use (%) [¶]	Peak Month Share (%)	Peak Quarter Share (%)
\$10,000+	8,562	41.2	100	51.3 (0.6)	64.3 (0.4)	100	47.6 (0.5)	61.3 (0.4)	99.5 (0.1)	35.8 (0.5)	53.3 (0.4)

Source: Author's calculations using pooled 2003 and 2004 MEPS data. All estimates are for the under age 65 civilian noninstitutionalized population and are person-weighted using MEPS sampling weights. Standard errors (in parentheses) are corrected for the complex design of the MEPS survey, but they do not account for error introduced by event date imputations.

*Sample size is for observations with positive sample weights.

[†]Utilization weighted by full established charge.

[‡]Utilization weighted by total expenditure (amounts actually paid by all sources of payment).

[§]Utilization weighted by out-of-pocket expenditure.

[¶]Percentage of persons in families with positive (weighted) utilization. Percentages depend on how utilization was weighted, because events with positive charges can have zero total expenditure and/or zero out-of-pocket payment.

^{||}Computed for families with positive (weighted) utilization.

**Family income gross of transfers as a percentage of federal poverty level (FPL).

^{††}Insurance categories reflect the coverage of all family members. The all private coverage group includes only families in which all members have private coverage (and no public coverage) for the entire year. The all public coverage group is defined symmetrically. Mixed coverage categories reflect dual public/private coverage, changes in coverage during the year, and differences in coverage across family members.

^{‡‡}The "non-Medicare" category is a subset of all public that excludes families with any Medicare coverage. It predominantly consists of families with full-year Medicaid or State Children's Health Insurance Program coverage.

MEPS, Medical Expenditure Panel Survey.

shares of family utilization due to a single member averaged 83.0 percent (SE = 0.2) overall and 80.0 percent (SE = 0.6) in families with five or members.

Table 1 also shows the extent to which high concentrations are driven by families with limited use. A family with a single low-cost office visit during the year would have a peak month share of 100 percent, yet can be viewed as having a “utilization spike” in only the narrowest sense. Peak month shares were indeed highest among families with annual expenditures <\$1,000 (2,004 dollars). However, peak month shares exceeded 40 percent in all expenditure groups when weighted by charges and were more than four times the annual average even when weighted by out-of-pocket payments.

Prevalence of High Within-Year Burdens

Table 2 presents the paper’s main results regarding the frequency of high out-of-pocket spending burdens. The table presents means for the four basic components of burdens—disposable income, out-of-pocket spending on care, out-of-pocket spending on premiums, and tax subsidies that defray out-of-pocket spending.¹³ Not surprisingly, there were substantial differences in income, spending, and tax subsidies across poverty level and family insurance coverage.

On average, over one quarter of the nonelderly population lived in a family experiencing a month in which (post-subsidy) out-of-pocket spending on premiums and care exceeded 20 percent of disposable income. This is nearly four times the prevalence of high annual burdens. The frequency of high quarterly burdens was approximately halfway between the monthly and annual frequencies.

The remainder of Table 2 shows annual and within-year burden rates by poverty level and coverage. High annual, quarterly, and monthly burden frequencies among the poor were 21.5, 34.5, and 43.7 percent, respectively. In families between 100 and 199 percent of FPL, these burden rates were 10.4, 23.7, and 34.9 percent. Even among families between two and four times FPL the frequency of high monthly burdens was 28.9 percent.

A large percentage of low-income families experienced high within-year burdens even if the burden threshold is doubled (not shown in table). Among the poor, 24.6 percent (SE = 0.9) and 32.7 percent (SE = 0.9) experienced 40 percent quarterly and monthly burdens, respectively. Among persons in families between 100 and 199 percent of FPL, the corresponding frequencies were 10.3 percent (SE = 0.5) and 19.3 percent (SE = 0.7). Lowering the burden

Table 2: 20% Annual, Quarterly, and Monthly Out-of-Pocket Medical Spending Burdens, 2003–2004

	Mean Family Out-of-Pocket Spending and Associated Tax Subsidies (2004 \$)			Frequency of Persons with Family Burdens Exceeding 20% of Income			
	Mean Disposable Family Income (\$) *	Out-of- Pocket Spending on Health Care	Out-of-Pocket Spending on Premiums	Tax Subsidies [‡]	Annual	Quarterly	Monthly
All nonelderly	44,398 (458)	1,206 (20)	1,503 (23)	416 (7)	6.9 (0.2)	16.7 (0.3)	27.0 (0.4)
Poverty level [‡]							
< 100% FPL	9,149 (187)	703 (42)	376 (24)	25 (3)	21.5 (0.8)	34.5 (0.9)	43.7 (0.9)
100-199% FPL	21,422 (232)	851 (33)	916 (38)	202 (11)	10.4 (0.6)	23.7 (0.8)	34.9 (0.9)
200-399% FPL	36,377 (305)	1,182 (34)	1,610 (38)	409 (10)	5.9 (0.4)	16.7 (0.6)	28.9 (0.7)
≥ 400% FPL	71,866 (683)	1,537 (31)	2,019 (39)	636 (12)	1.8 (0.2)	8.2 (0.3)	16.9 (0.5)
Family coverage [§]							
All private	57,540 (612)	1,382 (26)	2,117 (35)	616 (10)	5.2 (0.2)	13.5 (0.4)	23.3 (0.5)
All public	12,676 (527)	813 (36)	102 (11)	7 (3)	12.1 (0.9)	22.5 (1.3)	30.9 (1.4)
Non-Medicare [*]	12,824 (610)	384 (37)	14 (5)	6 (4)	6.5 (0.7)	15.4 (1.2)	23.7 (1.5)
All uninsured	21,473 (808)	786 (52)	0	17 (4)	7.9 (0.5)	17.9 (0.9)	26.1 (1.0)
Mixed private and public	39,129 (849)	1,590 (80)	2,254 (87)	446 (26)	14.1 (1.0)	25.8 (1.4)	38.2 (1.5)
Mixed private and uninsured	43,355 (1,077)	1,171 (49)	1,426 (58)	375 (17)	6.6 (0.5)	19.6 (1.0)	33.6 (1.2)
Mixed public and uninsured	20,042 (442)	737 (45)	48 (5)	9 (3)	8.1 (0.6)	19.0 (1.0)	29.6 (1.2)
Mixed private, public and uninsured	32,642 (1,164)	972 (66)	1,065 (57)	233 (16)	7.6 (1.0)	20.4 (1.6)	31.0 (1.9)

Source: Author's calculations using pooled 2003 and 2004 MEPS data. All estimates are for the under age 65 civilian noninstitutionalized population and are person-weighted using MEPS sampling weights. Standard errors (in parentheses) are corrected for the complex design of the MEPS survey, but they do not account for error introduced by tax simulations or event date imputations.

*Family income gross of transfers and net of income taxes (federal and state) and property taxes.

[‡]Tax subsidies are those applying to out-of-pocket spending on premiums and health care: federal and state income tax deductions for medical expenses, Section 125 income and payroll tax exclusions of employee premium contributions, the self-employment health insurance deduction, and simulated spending out of flexible spending accounts. Tax subsidy estimates do not include (implicit) state and local sales tax exemptions.

[§]Family income gross of transfers as a percentage of federal poverty level (FPL).

[§]Insurance categories reflect the coverage of all family members. The all private coverage group includes only families in which all members have private coverage (and no public coverage) for the entire year. The all public coverage group is defined symmetrically. Mixed coverage categories reflect dual public/private coverage, changes in coverage during the year, and differences in coverage across family members.

^{*}The "non-Medicare" category is a subset of all public that excludes families with any Medicare coverage. It predominantly consists of families with full-year Medicaid or State Children's Health Insurance Program coverage.

MEPS, Medical Expenditure Panel Survey.

threshold to 10 percent of disposable income increases high quarterly and month burden prevalence to 45.8 percent (SE = 0.9) and 54.7 percent (SE = 1.0) among the poor and 40.6 percent (SE = 0.9) and 53.9 percent (SE = 0.9) in families between 100 and 199 percent of FPL.

Persons in families with full public coverage experienced high quarterly burdens nearly twice as often as did persons in families with full private coverage. This is primarily due to families with Medicare beneficiaries. Excluding such families, so that public coverage is predominantly through Medicaid or the State Children's Health Insurance Program (SCHIP), the public-private difference in quarterly burden frequency was much smaller, and the difference in monthly burden rates was not statistically significant.

One important question is whether within-year burdens can be adequately captured simply by computing annual burdens with lower income thresholds. Among persons in poor families, 29.9 percent (SE = 0.9) had both 10 percent annual and 20 percent monthly burdens, whereas 1.1 percent (SE = 0.2) had only the former and 13.8 percent (SE = 0.7) had only the latter (not shown in table). Lowering the annual threshold to 5 percent identifies more persons with 20 percent monthly burdens, but it increases the percentage with high annual, but not monthly, burdens. Clearly, within-year burden calculations offer a perspective on financial pressures that is missed by relying solely on annual burden measures at any threshold.

Burdens Inclusive of Employer Premium Contributions

Table 2 follows much of the burden literature by focusing on *out-of-pocket* spending. In contrast, one can in principle expand the definition of burden to include the reduction in after-tax income that occurs if employers reduce cash wages to offset ESI contributions. Including wage offsets in burdens, however, poses measurement problems: Are wages reduced for all workers offered coverage or only those taking it up? Does family coverage lead to larger wage reductions than single coverage? Do wage offsets reflect the health risks of workers and covered dependents? The literature provides no conclusive answers, yet the incidence of employer ESI costs depends greatly on one's assumptions (Selden and Bernard 2004, Table 3). For simplicity, employer premium contributions were assumed to be borne by workers taking up coverage without regard to their characteristics (or those of covered dependents).¹⁴

Adding subsidy-adjusted ESI wage offsets to both the numerator and denominator of the burden ratio greatly increases the prevalence of 20 percent burdens (results presented in Supporting Information, Appendix SA2). The

Table 3: Average Shares of Medical Spending in Families with 20% Quarterly Burdens, 2003–2004

	Sample Size	Population (Million)	Average Shares of Family Out-of-Pocket Spending in Peak Burden Quarter (%) ^a					RX
			Out-of-Pocket Premiums	Inpatient Hospital	Outpatient Hospital	ER	Office Visits	Dental
All	9,972	42.6 (1.2)	28.8 (0.7)	4.3 (0.3)	2.9 (0.2)	3.9 (0.3)	14.5 (0.5)	17.0 (0.6)
Poverty level [†]								
< 100% FPL	3,424	10.6 (0.4)	19.7 (1.1)	3.0 (0.5)	2.1 (0.3)	6.5 (0.8)	14.3 (1.0)	10.8 (0.9)
100–199% FPL	2,709	10.3 (0.4)	31.3 (1.5)	4.5 (0.7)	2.5 (0.4)	4.1 (0.5)	12.1 (0.9)	13.1 (1.1)
200–399% FPL	2,521	13.6 (0.6)	34.7 (1.2)	4.3 (0.6)	3.1 (0.4)	3.0 (0.4)	14.7 (0.8)	19.1 (1.2)
≥ 400% FPL	1,318	8.1 (0.4)	27.7 (1.5)	5.7 (0.9)	3.9 (0.6)	1.6 (0.4)	17.6 (1.5)	26.3 (1.5)
Family coverage [‡]								
All private	3,308	18.6 (0.7)	38.6 (1.1)	4.0 (0.4)	3.3 (0.4)	1.7 (0.2)	14.0 (0.8)	22.1 (1.0)
All public	1,113	3.4 (0.2)	9.1 (1.0)	4.5 (1.7)	2.8 (0.8)	1.8 (0.8)	7.6 (1.6)	5.7 (0.9)
Non-Medicare [§]	619	1.7 (0.2)	2.3 (0.7)	2.7 (1.1)	5.0 (1.5)	2.5 (1.3)	10.3 (2.8)	6.6 (1.5)
All uninsured	1,044	4.2 (0.3)	0	4.9 (0.9)	3.6 (0.7)	10.1 (1.3)	21.6 (1.5)	21.1 (2.0)
Mixed private and public	915	3.9 (0.2)	43.2 (1.8)	2.1 (0.6)	2.4 (0.5)	1.5 (0.4)	8.7 (0.9)	13.1 (1.5)
Mixed private and uninsured	1,182	5.7 (0.3)	34.8 (1.9)	5.5 (1.1)	2.2 (0.5)	5.1 (1.0)	19.0 (1.6)	13.0 (1.4)
Mixed public and uninsured	1,658	4.2 (0.3)	3.0 (0.5)	4.3 (0.8)	2.4 (0.8)	9.6 (1.6)	15.3 (1.4)	13.5 (1.7)
Mixed private, public, and uninsured	752	2.7 (0.2)	37.3 (2.5)	5.8 (1.5)	1.5 (0.5)	4.1 (1.4)	14.1 (1.8)	8.5 (1.8)

Source: Author's calculations using pooled 2003 and 2004 MEPS data. Dollar amounts are inflated to 2004. All estimates are for the civilian noninstitutionalized population under age 65 and are person-weighted using MEPS sampling weights. Standard errors (in parentheses) are corrected for the complex design of the MEPS survey, but they do not account for error introduced by tax simulations or event date imputations.

^aEstimates omit several minor types of service for brevity: home health care, durable medical equipment, and miscellaneous other health care.

[†]Family income gross of transfers as a percentage of federal poverty level (FPL).

[‡]Insurance categories reflect the coverage of all family members. The all private coverage group includes only families in which all members have private coverage (and no public coverage) for the entire year. The all public coverage group is defined symmetrically. Mixed coverage categories reflect dual public/private coverage, changes in coverage during the year, and differences in coverage across family members.

[§]The “non-Medicare” category is a subset of all public that excludes families with any Medicare coverage. It predominantly consists of families with full-year Medicaid and SCHIP coverage.

MEPS, Medical Expenditure Panel Survey; SCHIP, State Children's Health Insurance Program.

frequency of high monthly burdens was nearly 50 percent, not just among the poor but also in families with incomes up to four times FPL—especially those with ESI coverage. Even in the highest-income families, the high monthly burden rate was 26.2 percent. These results should perhaps be taken with a grain of salt, however. Imputed employer premium contributions may be a poor proxy for (unobserved) reductions in cash wages. Moreover, as one moves up the income scale, families may care more about annual burdens than within-year burdens, because assets may help them smooth consumption without incurring high-cost debt. Nevertheless, these results raise the possibility that within-year spikes in out-of-pocket spending, when added to burdens from employer premium contributions, may cause financial pressures throughout the income distribution.

Financing Burdens: Overview

The prevalence of high within-year burdens among low-income families raises the question of how so many low-income families managed to finance medical spending that, for at least a portion of the year, was such a large share of income. Are within-year burdens overstated because families were able to delay payments? Might some families have saved in anticipation of utilization spikes? To what extent were high burdens the result of transitory income declines among families with higher “permanent” incomes? Did low-income families have assets to help finance medical spending, and did they incur potentially costly nonmortgage debt? The next three subsections address these issues.

Financing Burdens: Smoothing Payments

Families may pay for care well after the event date due to billing delays, billing disputes, installment payments, or late payments. To gauge the sensitivity of within-year burden estimates to the (unobserved) timing of payments, within-year burdens were recalculated assuming that families paid for hospital events (inpatient, outpatient, and emergency room) in 12 equal monthly installments starting in the month care was received. This causes payments for some current year events to spill over to the following year, whereas payments for some prior year events spill over to the current year.¹⁵

Smoothing hospital bills has little qualitative effect on the results, especially among low-income families and among the publicly insured and uninsured (results presented in Appendix SA3). Indeed, burden prevalence sometimes *rises* slightly, in essence because smoothing prolongs the duration of financial burdens from prior year hospital care. Among the poor, the

prevalence of 20 percent quarterly burdens rises from 31.7 to 32.7 percent, and the monthly burden rate is essentially unchanged. Among persons in families between 100 and 199 percent of the FPL, burden frequency declines by an insignificant 0.5 percentage points (quarterly) and by 1.6 percentage points (monthly). Indeed, even smoothing medical spending for *all events* other than RX and premiums had little effect on burden rates.

Families may also be able to smooth out-of-pocket burdens by saving in anticipation of utilization. With the exception of emergency room visits, care for accidents, injuries, and colds, and prescriptions deemed episodic in nature, families were assumed to smooth the burden of all other health care spending over the 12 months leading up to and including the event date.¹⁶ This reduces high monthly burden frequencies by 6.5 percentage points (SE = 1.2) in poor families and by 13.1 percentage points (SE = 1.3) in families between 100 and 199 percent of FPL (not shown in table). Corresponding reductions in quarterly burden rates were 2.7 percentage points (SE = 1.0) and 5.5 percentage points (SE = 1.0). Although some of these reductions are large, they assume an unrealistically high degree of foresight, and within-year burden frequencies nevertheless remain high, especially among the poor.

To provide insights into why within-year burden prevalence among low-income families is so insensitive to payment smoothing, Table 3 presents the composition of spending driving high quarterly burdens. Although inpatient hospital stays can be expensive, they are infrequent and averaged only 3.0 percent of spending in the peak-burden quarter among poor families. Emergency room visits accounted for a larger share for both the poor (6.5 percent) and the uninsured (10.1 percent). The two largest components of spending among low-income families were out-of-pocket premiums and RX. Spending on premiums averaged 19.7 percent of spending for the poor and 31.3 percent of spending for families between 100 and 199 percent of FPL. The RX spending shares were 38.2 percent for the poor and 28.0 percent for families between 100 and 199 percent of FPL. Among families with non-Medicare public coverage (predominantly Medicaid and SCHIP), RX spending accounted for 65.0 percent of spending in the peak burden quarter.¹⁷ Among families over four times FPL, the largest contributor to high monthly burdens was dental care—some of which might have been anticipated and/or paid in installments.

Financing Burdens: Transitory Income Shocks

Periods of high health care spending can be associated with reductions in earnings as workers spend time away from their jobs to receive care, recover

from illness or injury, and care for family members.¹⁸ For some workers, these periods may be at least partially covered by paid sick leave, but many low-wage workers lack this benefit (Davis et al. 2005). When a family's income declines as medical bills rise, the pressures of financing medical care coincide with the more basic financial implications of reduced income. Nonetheless, a family whose high monthly burden resulted in part from a large transitory income decline may have had greater capacity to accumulate assets before the income shock and greater subsequent ability to pay off debts than a family with the same peak month spending whose income was chronically low.

There is evidence that spikes in medical spending tend to coincide with dips in income among low-income families. For instance, consider poor working families with annual earnings over \$1,000 who experience "moderate" utilization shocks, defined as annual expenditures exceeding \$1,000 with at least one third of expenditure-weighted utilization in a single month. In the peak utilization month, 21.4 percent (SE = 1.8) experienced at least a one-third dip in income relative to their annual average (not shown in table). For families with incomes above 400 percent of FPL, the corresponding figure was only 4.3 percent (SE = 0.4). One should not infer causality from these descriptive results. Families over 400 percent of FPL may have high incomes in part because they did not experience major within-year declines in earnings, and a portion of the income declines among the poor simply reflects their greater overall income variability.¹⁹ The salient point is that dips in income likely compounded the problem of utilization spikes for a substantial share of low-income families.

To assess the impact of income fluctuations on the prevalence of within-year burdens, I recalculated within-year burdens holding income constant at its monthly average. For persons in poor families, the rate of high quarterly burdens declined modestly from 34.6 to 31.9 percent (SE = 0.9) (not shown in table). The impact on the prevalence of high monthly burdens was also small: from 43.6 to 41.2 percent (SE = 1.0). For persons in families between 100 and 199 percent of FPL, the quarterly measure fell from 23.7 to 20.0 percent (SE = 0.8) and the monthly measure fell from 34.9 to 30.2 percent (SE = 0.9). These differences are all highly statistically significant, but they are qualitatively modest. The effect of income variation was even smaller at higher income levels (and not always statistically significant). The explanation is that most within-year burdens arose from spikes in spending that were large enough to exceed 20 percent of monthly income regardless of whether it is smoothed.

A related question is whether low-income families with high burdens in the current year had higher incomes in the preceding year. Among persons in poor families with 20 percent annual burdens in their second year of MEPS, only 3.2 percent (SE = 1.3) were in families whose incomes had been more than 50 percent of FPL greater in the preceding year (not shown in table). The corresponding rate among poor families who did not experience 20 percent burdens was nearly the same: 3.1 percent (SE = 0.5). Thus, while year-to-year or within-year income declines might have exacerbated the financial pressures facing families, the prevalence of high burdens among low-income families was not primarily due to transitory dips in income among those who were usually much better off.

Financing Burdens: Assets and Debt

For many families, having assets or access to credit may be a necessary condition if they are to spend 20 percent or more of income on insurance and medical care while also paying for food, shelter, and other necessities. Table 4 shows that for low-income families home ownership and the receipt of asset income were both strongly correlated with having high burdens.²⁰ Receipt of asset income was nearly twice as high among poor families with high annual burdens as among the poor in general. The more salient result, however, is that most low-income families experiencing high within-year burdens did not have assets that produced income, and under half were homeowners.

Table 4 also shows that low-income families with high burdens were more likely to have nonmortgage debt at the end of MEPS than were low-income families without such burdens. Poor families with high quarterly burdens were nearly three times as likely to have ended MEPS in debt as to have held income-producing assets that could have helped finance care. Moreover, debt amounts were correlated with high burdens among poor families with debt, averaging \$32,768 (SE = 9,853) if the family had experienced a high quarterly burden, versus \$12,907 (SE = 2,903) if not.²¹

Gathering results, a case can be made that high within-year burdens pose the potential for substantial financial pressures for low-income families. Within-year burdens are widespread even if one allows for payment smoothing, and they resulted primarily from spikes in medical spending rather than transitory dips in income. A substantial share of low-income families with high within-year burdens owned neither their own home nor income-producing assets. In order to finance high annual, quarterly, and monthly burdens, families likely reduced other nonessential spending, and when this proved in-

Table 4: Home Ownership, Receipt of Asset Income, and Non-Mortgage Debt, by Poverty Level and Burden, 2003–2004

		Persons in Families with 20% Burden		
Poverty Groups	All Persons	Annual	Quarterly	Monthly
Person's Family Owned Home in Year Before Start of MEPS (%)				
<100% FPL	25.5 (1.1)	43.5*** (2.5)	37.5*** (1.9)	34.3*** (1.6)
100–199% FPL	38.9 (1.3)	59.7*** (2.6)	51.5*** (2.0)	46.2*** (1.8)
200–399% FPL	59.2 (1.0)	68.2*** (2.6)	66.7*** (1.8)	65.3*** (1.5)
≥ 400% FPL [†]	75.1 (0.7)	56.7*** (4.4)	70.3*** (1.9)	74.7 (1.3)
Person's Family Received Asset Income in Current Year (%)				
<100% FPL	7.3 (0.6)	15.4*** (1.7)	11.3*** (1.2)	10.1*** (1.0)
100–199% FPL	14.2 (0.7)	25.0*** (2.7)	22.1*** (1.7)	19.9*** (1.4)
200–399% FPL	33.0 (1.0)	37.8* (3.1)	38.0*** (2.1)	36.9* (1.7)
≥ 400% FPL [†]	60.9 (0.9)	45.1*** (4.3)	54.7*** (2.2)	60.2 (1.6)
Person's Family Held Non-Mortgage Debt as of End of MEPS (%) [‡]				
<100% FPL	24.3 (1.3)	33.7*** (3.3)	29.9*** (2.6)	29.1*** (2.2)
100–199% FPL	33.8 (1.3)	33.3 (4.0)	36.2 (3.0)	38.1 (2.4)
200–399% FPL	41.8 (1.1)	43.7 (4.7)	43.6 (3.0)	45.1 (2.1)
≥ 400% FPL [§]	38.2 (1.0)	35.0 (5.9)	37.3 (3.4)	37.6 (2.3)

Source: Author's calculations using pooled 2003 and 2004 MEPS data. Standard errors (in parentheses) are corrected for the complex design of the MEPS survey. Sample sizes vary across burden categories and outcomes.

[†]Estimates for persons in families above 400% of FPL with high annual burdens are based on a relatively small sample ($N = 313$) and are presented for completeness.

[‡]Estimates are for persons in second year of MEPS.

[§]Estimates for persons in families above 400% of FPL with high annual burdens are based on a relatively small sample ($N = 143$) and are presented for completeness.

***Significantly different at 1% level from those in the same poverty group without high burdens.

*Significantly different at 10% level from those in the same poverty group without high burdens.

MEPS, Medical Expenditure Panel Survey; FPL, federal poverty level.

sufficient relied on some combination of cash on hand or in bank accounts, other assets (if any), help from friends and relatives, and higher-cost borrowing with credit cards.

DISCUSSION

This paper presents evidence on the remarkable within-year concentration of medical utilization. On average, 48.6 percent of all charge-weighted family utilization occurred in a single month, and 62.8 percent occurred in a single quarter. Utilization was even more concentrated among low-income families.

These spikes in utilization caused many low-income families to experience within-year burdens exceeding 20 percent of income. When payments are assumed to have been made in the month (quarter) that care was received, 43.7 percent of the poor experienced a 20 percent burden month, and 34.5 percent experienced a 20 percent burden quarter. Indeed, high frequencies of within-year burdens are observed in families up to four times FPL. Within-year burden prevalence remains high even if families are assumed able to smooth payment for some services, either by delaying payments or through anticipatory saving. Only a small share of low-income families with high within-year burdens held income-producing assets that might have been liquidated to help finance medical spending. For many low-income families faced with high medical bills, neither smoothing payments nor drawing down assets would have provided a complete solution to the financing of care. It seems likely, therefore, that many faced the prospect of making large changes in nonmedical spending, obtaining assistance from relatives or friends, or incurring high-cost debt.

These results may help explain the seeming paradox that three or four times as many families report facing health care "bill problems" as are observed facing annual burdens exceeding 20 percent of income. Based on data collected by the 2005 Commonwealth Fund Biennial Health Insurance Survey, 28 percent of all adults aged 19–64 reported a bill problem, including an inability to pay all medical bills, being contacted by a collection agency, or a significant change in way of life (Collins et al. 2006).²² This estimate rises to 34 percent of adults if one includes medical debt, of which half was incurred in the current year. In contrast, the frequency of 20 percent annual burdens among adults was 6.9 percent (SE = 0.2). Of course, these disparate results might simply reflect respondents reporting bill problems in qualitative surveys despite health care spending being only a relatively low share of income. This

paper offers the alternative explanation that, especially for low-income families, the within-year concentration of utilization may create significant financial pressures that are missed by conventional annual burden measures.

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Disclaimer: None.

NOTES

1. Recent contributions include Banthin and Bernard (2006), as well as Hwang et al. (2001), Selden and Banthin (2003), Banthin and Selden (2003), Schoen et al. (2008), and Bernard, Banthin, and Encinosa (2006).
2. The exception is prescription drugs, for which charges are set equal to payments.
3. An important exception is that households were not asked to provide prescription "fill" dates. However, the fill month can usually be inferred from prescription start dates, dates of linked medical provider visits (if any), the round in which the fill occurred, medication type (episodic versus chronic), and comparison of payment sources and insurance coverage. In ambiguous cases, spending was spread uniformly across the possible months to avoid upwardly biasing estimates of within-year concentration. A second algorithm that loaded all such fills more aggressively onto months with high spending yielded similar results.
4. See Selden (2008) for details. Although some tax subsidies might not be received until after taxes are filed, the largest tax subsidies (the subsidy for employee premium contributions and the sales tax exemption) are implicitly received as payments are made. Moreover, the combined impact of all tax subsidies on out-

of-pocket spending burdens was small, especially among lower-income families (Selden 2008).

5. Private coverage premiums were imputed to fill in missing values (for coverage acquired after the first interview in each year).
6. Premiums were simulated for Medicare Parts A and B. Although MEPS likely undercounts premiums for Medicaid and SCHIP, these were not simulated to avoid a potential bias if premium waivers for hardship reflect medical expenses. As of 2003–2004 Medicaid and SCHIP premiums were mainly required of families with (gross) incomes above 200 percent of the Federal Poverty Line, and results were qualitatively unaffected by introducing simulated premiums.
7. See Agency for Healthcare Research and Quality (2005). The exception to this rule is that poverty levels are computed using the broader Census definition of families. All family-level measures were constructed before subsetting to the nonelderly sample. MEPS excludes persons in institutions, potentially biasing burdens downward, because institutionalized family members likely add proportionately more to health care spending than to income.
8. Income is computed net of federal income, federal payroll, state income, and local property taxes (on owner-occupied dwellings). Income and payroll taxes were simulated using the National Bureau of Economic Research TAXSIM model, version 7.0 (Feenberg and Coutts 1993; National Bureau of Economic Research 2007). Regarding the use of disposable income in burden calculations, see Banthin and Selden (2006). I follow standard practice of limiting the influence of extremely low disposable income by bounding it from below (at \$1,000 in 2004 dollars).
9. This approach modestly understates quarterly high burden frequencies by ignoring 3-month intervals that start before or end after the calendar year.
10. Figure 1 is person weighted (rather than family weighted) for consistency with the burden results. Family-weighted concentrations are slightly higher (because smaller families, with higher concentrations, receive greater weight). Families with zero utilization are excluded from the figure. Months were ranked separately for each utilization measure.
11. Uncompensated care also played a small role in this difference. Defining uncompensated care as the gap between monthly charges and payments when monthly charges exceed \$200 and payments cover less than 10 percent of charges, 50.1 percent of all uncompensated care occurs in the month of peak charge-weighted utilization.
12. This is calculated by spreading the remaining 60 percent of annual utilization over the remaining 11 months ($40 + 2 \times 60/11$). Similarly, a 60 percent peak month share would translate into a 67.3 percent peak quarter share.
13. These are person-weighted estimates of family-level measures for consistency with the high-burden frequencies. Tax subsidy estimates do not include state and local sales tax exemptions. These exemptions, however, are (implicitly) accounted for in the burden estimates.
14. Cash wage offsets hold total compensation fixed (gross of payroll taxes). Employer contributions were predicted using regressions estimated with the MEPS-IC employer survey.

15. To capture payments from prior-year care, estimates are for persons in their second year of MEPS.
16. To capture all prepayments, estimates use only persons in their first year of MEPS.
17. This mirrors findings in Banthin and Bernard (2006) and Bernard, Banthin, and Encinosa (2006). Although Medicaid and SCHIP impose only low (or zero) copays for prescription drugs, the data reveal some enrollees have out-of-plan purchases, perhaps reflecting restrictions regarding quantities, prior authorization, and off-label use.
18. Medical expenditures and income could be positively correlated if, for instance, extra income from a new job (and perhaps newly acquired ESI) triggers increased spending on health care.
19. In the peak month, the likelihood of a one-third dip in income exceeded the likelihood of a one-third income spike by 9.8 percentage points. The corresponding difference in the lowest-spending month was 2.7 percent, yielding a "difference-in-differences" of 6.9 percent (SE = 3.5). This difference-in-differences increases when I subset further to families with more severe utilization shocks, and it falls with the percentage of FPL.
20. Asset income primarily consists of interest and dividends but also includes small amounts of income from trusts, rental properties, royalties, and other business interests not elsewhere reported.
21. Difference is significant at the 5 percent level. The debt distribution is highly skewed. Among poor families with debt, the median amount was \$5,000 if the family experienced a high-burden quarter versus \$2,800 if not. No significant differences in debt levels were observed among the remaining poverty groups. For evidence on medical debt see Collins et al. (2006) and Schoen et al. (2008).
22. A similar estimate for 2007 is even higher at 41 percent (Doty et al. 2008).

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SUPPORTING INFORMATION

Additional supporting information may be found in the online version of this article:

Appendix SA1: Author Matrix.

Appendix SA2: Twenty Percent Burdens Calculated Inclusive of Employer Premium Contributions, 2003–2004.

Appendix SA3: Sensitivity of 20 Percent Out-of-Pocket Burden Frequencies to Payment Smoothing, Panel 7 2003 and Panel 8 2004.

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