Out-of-Pocket Healthcare Expenditure Burdens Among Nonelderly Adults With Hypertension

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Objectives

To examine the prevalence of high out-of-pocket burdens and self-perceived financial barriers to care among patients receiving hypertension treatment.

Study Population

Persons 18 to 64 years receiving treatment for hypertension from a nationally representative sample of the US population from the 2007 to 2009 Medical Expenditure Panel Survey.

Main Outcome Measures

The proportion of persons living in families with high a out-of-pocket burden associated with medical spending relative to income, defining high healthcare burden as spending on healthcare greater than 20% of income and high total burden as spending on healthcare and insurance premiums greater than 20% of income.

Results

The prevalence of high total burdens was significantly greater for persons receiving treatment for hypertension (13.1%) compared with other chronically ill (10.5%) and well patients (5.3%). Among hypertension patients with high total burdens, 15.7% said they were unable to get care and 13.6% said they delayed care due to financial reasons. Self-perceived financial barriers were highest among the uninsured and those with public coverage: 35.2% among the uninsured and 23.9% among those with public coverage said they were unable to get care due to financial reasons.

Conclusions

High burdens may deter patients from getting needed care. Our findings have 2 distinct policy implications. First, raising awareness among providers regarding the prevalence of high out-of-pocket burdens and financial barriers to care may encourage physicians to discuss healthcare coverage and associated costs with their patients. To the extent that patients' perceptions about their ability to pay are incorrect, physicians can help patients overcome barriers to treatment. Second, health plans could reduce patient cost sharing on drugs for which there is a strong body of evidence documenting cost-saving treatment such as antihypertensive medication. Addressing financial barriers to care may improve treatment adherence among patients with hypertension.

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Affecting more than 65 million Americans and a leading modifiable risk factor for heart disease and stroke, hypertension represents a costly public health challenge in terms of mortality and healthcare expenditures.[1] According to the World Health Organization, hypertension contributes to approximately two-thirds of cerebrovascular burdens and half of the coronary heart disease burdens in the world.[2] In 2010, heart disease and stroke represented the first and third-leading causes of death in the United States.[3] Total direct costs of cardiovascular disease care were $273 billion and indirect costs were $172 billion in 2010 (calculated in 2008 US dollars).[4]

Furthermore, disparities in hypertension prevalence exist between US racial and ethnic groups. While the 2009 to 2010 US prevalence of hypertension (adult, all races) equaled 28.6%, the non-Hispanic black population experienced a significantly higher prevalence of hypertension than the non-Hispanic white and Mexican American populations (age-adjusted rates of 40.4% vs 27.4% and 26.1%, respectively).[5] For these reasons, addressing the effective prevention, detection, treatment, and control of hypertension all remain essential goals of public health policy and initiatives such as Healthy People 2020, the nation's list of 10-year objectives for improving the health of all Americans; the National High Blood Pressure Education Program of the National Institutes of Health; and the National Quality Strategy.[6-8]

A recent study estimated that benefit-to-cost ratio of antihypertensive therapy is 10:1 for men and 6:1 for women.[9] Given the high societal return on investment for antihypertensive therapy, the question is why we do not do better at controlling hypertension. Medications that control hypertension have proven to reduce significantly the incidence of associated poor health outcomes such as renal failure, congestive heart failure, stroke, and ischemic heart disease, regardless of gender, age, ethnicity, or race[10]; however, in spite of improved control rates over recent years, the total number of patients with uncontrolled hypertension has increased.[11,12]

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The importance of antihypertensive control through medical management is noted in Healthy People 2020's Heart Disease and Stroke Objective 11.[6] This objective seeks to increase the proportion of adults with hypertension who are taking a prescribed medicine to lower their blood pressure by 10%—from 63.2% during the period of 2005 through 2008 to 69.5% in 2020 (age-adjusted to the year 2000 standard population). National Center for Health Statistics data indicate that the proportion of people with hypertension who are treated has increased from 63.2% during the period of 2005 through 2008 to 76.4% during the period of 2009 through 2010.[13,14] This trend is consistent with Healthy People 2020's Heart Disease and Stroke Objective 11. But despite the increase in the proportion of people with hypertension who are being treated, studies indicate that approximately 50% of people who started on antihypertensive therapies discontinue their use within 6 to 12 months of initiation.[14]

Take-Away Points

- Among nonelderly adults with hypertension treatment, 13.1% had high total burdens (ie, healthcare expenditures-healthcare and insurance premiums), accounted for more than 20% of their income. Those with private non-group insurance were the most likely to have high total burdens (49.9%), followed by the uninsured (21.0%), those with public insurance (18.6%), and those with private group insurance (9.3%).
- Among hypertension patients with high total burdens, 15.7% said they were unable to get care and 13.6% said they delayed care due to financial reasons.
- Raising awareness among providers regarding the prevalence of high out-of-pocket burdens and self-perceived financial barriers to care may encourage providers to discuss health care coverage and associated costs with their patients. To the extent that patients' perceptions about their ability to pay are incorrect, physicians can change these perceptions.
- Furthermore, health plans could reduce patient cost-sharing on drugs for which there is a strong body of evidence documenting cost-saving treatment such as antihypertensive medication. Addressing financial barriers to care may improve treatment adherence among patients with hypertension.

Patient treatment adherence is influenced by a number of patient-related, provider-related, and healthcare delivery–related factors.[15] Nonadherence can lead to higher long-term costs due to complications and avoidable hospitalizations.[11,16] Thus, it is important to identify factors that are associated with nonadherence.

One potential reason patients delay or go without needed care is a high out-of-pocket burden. Thus, it is important to examine health-related financial burdens among patients receiving treatment for chronic conditions such as hypertension. Many studies focus on expenditures for the treatment of hypertension only.[17-21] Our study also considers the impact of total health-related expense, including the cost of hypertension treatment, for the individual and the family. We do this because delaying treatment or going without treatment altogether may be a result not only of hypertension-specific costs but of total health-related expenses both for the individual and the family. We examine healthcare burden *relative to income*, including expenditures on health insurance premiums in the total burden measure to provide a more accurate picture of health-related financial strain. The burden measure is the ratio of healthcare cost to income. In this measure, both healthcare cost and income can play a primary role. We do this because a given level of health-related expenditure is likely to be more burdensome for families with lower incomes. First, we examine the variation in burdens among patients with hypertension treatment by insurance status and other sociodemographic characteristics. Second, we examine person-level spending on hypertension treatment versus other conditions. Third, we examine self-perceived financial barriers to care among patients receiving hypertension treatment.

METHODS

The data are from the Medical Expenditure Panel Survey-Household Component (MEPS-HC), sponsored by the Agency for Healthcare Research & Quality (AHRQ). Every year, the MEPS-HC panel is selected from a sample of households among those that participated in the prior year's National Health Interview Survey (NHIS). MEPS-HC is a 2-year rotating panel of households designed to yield nationally representative estimates of healthcare expenditures for the civilian, noninstitutionalized population. Data are collected through 5 rounds of interviews and include medical expenditures, insurance coverage, premiums, and other socioeconomic characteristics.[22]

MEPS-HC is a rich data source for analyzing out-of-pocket burdens because it includes all payers and all components of expenditures, unlike claims data, which only include covered services. Because MEPS-HC is a household survey, the data collected are self-reported. However, MEPS also includes a Medical Provider Component (MPC) that requests data from hospitals, physicians, home healthcare providers, and pharmacies identified by MEPS-HC respondents. The MEPS-MPC is designed to obtain information on both the medical and financial characteristics of medical events. Its purpose is to supplement and/or replace information received from the MEPS-HC respondents about the healthcare that was provided to sampled household members in the course of the survey year.

For the burden analysis among patients receiving treatment for hypertension, we pooled MEPS-HC data for the period of 2007 to 2009 to obtain a large enough sample to make reliable estimates for population subgroups. The unit of observation is a person aged 18 to 64 years. The burden measure includes out-of-pocket expenditures for all healthcare services, because burdens may be greater than the cost of hypertension treatment. Healthcare burdens are constructed as the share of family-level after-tax income spent on health-related expenditures, because family members share financial resources. Family-level burdens are then assigned to individuals within the family and the results are presented at the person level, enabling us to quantify the number of persons who live in families with high burdens.

Following previous literature, high burden is defined as health-related spending in excess of 20% of income.[23-28] Although there is no consensus on what constitutes affordable costs, similar patterns across subgroups result from using alternative thresholds such as 10% and 30%. *Healthcare burden* includes expenditures on all healthcare services such as deductibles, copays, cost sharing, and payments for services not covered by insurance plans. *Total burden* includes out-of-pocket expenditures on health insurance premiums in addition to out-of-pocket expenditures on healthcare services.

We also examined the impact of perceived financial barriers. The MEPS questionnaire asked respondents if they delayed care or were unable to get care, as well as the reason for delaying or going without care. If the respondent reported that (1) they could not afford care; or (2) insurance would not approve, cover, or pay; or (3) a doctor refused the family insurance plan, we coded that person as having reported financial barriers to care. The MEPS questionnaire also asked whether delaying or going without care was a big problem.

Medical conditions were collected verbatim from households and coded by professional coders using the *International Classification of Diseases, Ninth Revision (ICD-9)*. Condition categories were created using AHRQ's Clinical Classification Software (CCS), which compiles *ICD-9* codes into clinically meaningful categories.[29] Our analysis was based on "treated prevalence" (ie, persons who reported medical treatment for hypertension any time during a year).

We classified persons into 3 mutually exclusive categories: (1) hypertension (persons with 1 or more medical events associated with CCS codes 98 and 99); (2) other chronic condition (persons with no medical events associated with hypertension, but who have 1 or more medical event associated with other chronic conditions); and (3) no chronic condition (persons with no medical events associated with any chronic conditions). Chronic conditions were defined based on the fully specified *ICD-9-CM (Clinical Modification)* diagnosis codes using the Healthcare Cost and Utilization Project's (HCUP) Chronic Condition Indicator (CCI).[30]

The pooled MEPS-HC sample includes 9383 persons who received hypertension treatment, 17,404 persons with other chronic conditions, and 47,650 persons with no chronic conditions. We also examined burdens among persons who reported that they have hypertension in the current year but were not actively in treatment (ie, those who chose not to get treatment for hypertension).

Each person is classified as having private group (employment-related) insurance, private non-group (individual) insurance, public insurance, or no coverage. Persons with no private or public coverage anytime during the year were classified as having no coverage. We distinguished between 2 types of private insurance because non-group insurance is generally more expensive and provides less generous benefits.[31]

Out-of-pocket premiums were collected from household respondents for private group coverage and private non-group coverage. All premium amounts were prorated to account for the duration of coverage during the year.

Expenditures were classified into 4 service categories: hospital stays, ambulatory visits (office-based provider and outpatient), prescription medications, and "all other" services (emergency department, home health visits, dental visits, and other). All expenditure amounts were converted using the Consumer Price Index for all urban consumers and reported in 2009 US dollars.

All estimates were weighted to represent the US civilian noninstitutionalized population. Standard errors were corrected to account for the complex design of MEPS, with Taylor series linearization of the variance. Only differences statistically significant at the 5% level were discussed in the text. For further details of the methodology, see **eAppendix**.

RESULTS

Burdens by Medical Condition

The first 3 rows in **Table 1** show that risk of high total burdens was significantly greater for persons receiving treatment for hypertension compared with other chronically ill patients and well patients. Among patients who received hypertension treatment, 13.1% had high *total burdens* in contrast to 10.5% among those with other chronic

Table 1. Prevalence of Out-of-Pocket Burdens Among Nonelderly Adults by Medical Conditions and Insurance Status, 2007-2009 (in 2009 US$)

Medical Condition/ Insurance Status	Sample Size	Population (×1000)	Family Income, $	Out-of-Pocket Expenditures for Healthcare Services, $	Out-of-Pocket Expenditures on Healthcare Services & Premiums, $	Persons With Healthcare Burden[a] >20% of Family Income, %	Persons With Total Burden[b] >20% of Family Income, %
Hypertension	9383	30,344	50,810	1854	3839	7.1	13.1
			(795)	(45)	(72)	(0.3)	(0.5)
Other chronic conditions	17,404	65,224	54,641[c]	1641[c]	3625[c]	5.6[c]	10.5[c]
			(709)	(34)	(62)	(0.2)	(0.3)
No chronic conditions	30,246	94,611	46,799[c]	790[c]	2309[c]	2.4[c]	5.3[c]
			(600)	(19)	(43)	(0.1)	(0.2)
Hypertension							
Private group insurance	5949	21,585	61,239	1952	4366	2.9	9.3
			(903)	(55)	(82)	(0.3)	(0.5)
Private non-group insurance	205	792	50,251[c]	2700[c]	9866[c]	12.7[c]	49.9[c]
			(3911)	(253)	(778)	(3.2)	(5.3)
Public insurance	1955	4701	17,939[c]	1141[c]	1497[c]	16.8[c]	18.6[c]
			(736)	(90)	(108)	(1.0)	(1.0)
No coverage	1274	3265	29,336[c]	2028[c]	2263[c]	20.0[c]	21.0[c]
			(1433)	(129)	(135)	(1.4)	(1.5)

Source: Authors' calculations using the Medical Expenditure Panel Survey-Household Component, 2007-2009.
All monetary amounts are converted to 2009 US dollars using the Consumer Price Index for all urban consumers.
[a]Healthcare burden includes out-of-pocket expenditures on healthcare services.
[b]Total burden includes out-of-pocket expenditures on health care services and health insurance premiums.
[c,d]The difference from the reference category (hypertension) is significant at the 1 (5)% level.
Standard errors are in parentheses.

conditions and 5.3% among those without chronic conditions. Cancer, diabetes, and heart disease are other chronic conditions that lead to similarly high burdens.[21,22,24]

Burdens by Insurance Status Among Patients With Hypertension Treatment

The average annual population of persons receiving treatment for hypertension was 30.3 million between the years 2007 and 2009. Among nonelderly adults who received hypertension treatment, 71.1% had private group coverage (21.6 million), 2.6% had private non-group coverage (0.8 million), 15.5% had public coverage (4.7 million), and 10.8% were uninsured (3.3 million).

Focusing on healthcare burdens, Table 1 shows that the uninsured and those with public coverage were the most likely to have high burdens (20.0% and 16.8%, respectively). However, in terms of total burdens, those with private non-group insurance were the most likely to have high burdens (49.9%), followed by the uninsured (21.0%), those with public insurance (18.6%), and those with private group insurance (9.3%).

Among nonelderly adults who received hypertension treatment, older age, being female, never married or widowed, having no children, not working, working part-time, not having high income (being poor, near poor/low income, or middle income), lower education (high school or less), living in non-metropolitan statistical areas (MSAs), living anywhere except the Northeast, and having other chronic conditions were associated with high total burdens (eAppendix, Table 1).

Out-of-Pocket Expenditures by Service Type

Table 2 presents person-level spending on hypertension treatment versus other conditions among nonelderly adults who were receiving treatment for hypertension. Among all nonelderly adults who received hypertension treatment, the mean of total out-of-pocket expenditure on healthcare was $1163. Mean out-of-pocket expenditure on healthcare was highest among those with private non-group insurance ($1796), followed by the uninsured ($1555), those with private group insurance ($1139), and those with public insurance ($897). Out-of-pocket expenditures for

Table 2. Mean Out-of-Pocket Expenditures by Service Type Among Nonelderly Adults With Treatment for Hypertension by Insurance Status, 2007-2009 (in 2009 US$)

Service Type	Total	Private Group	Private Non-Group	Public	Uninsured
All services					
All healthcare	1163	1139	1796[a]	897[a]	1555[a]
	(32)	(35)	(199)	(81)	(101)
Hypertension treatment	174	165	236[a]	112[a]	310[a]
	(4)	(4)	(22)	(10)	(20)
% Hypertension treatment	15%	14%	13%	12%	20%
Prescription drugs					
All healthcare	535	487	642	511	864[a]
	(15)	(11)	(81)	(53)	(69)
Hypertension treatment	134	130	168	78[a]	231[a]
	(3)	(3)	(19)	(6)	(17)
% Hypertension treatment	25%	27%	26%	15%	27%
Ambulatory					
All healthcare	305	325	663[b]	153[a]	310
	(14)	(17)	(141)	(19)	(36)
Hypertension treatment	34	31	68[a]	23	62[a]
	(2)	(2)	(13)	(6)	(6)
% Hypertension treatment	11%	10%	10%	15%	20%
Hospital					
All healthcare	76	69	128	55	138
	(15)	(20)	(69)	(17)	(41)
Hypertension treatment	3	2	0	3	9
	(1)	(1)	(0)	(1)	(4)
% Hypertension treatment	4%	3%	0%	5%	7%
Other services					
All healthcare	247	258	363	179[c]	243
	(11)	(12)	(63)	(24)	(38)
Hypertension treatment	3	1	0[a]	8	8
	(1)	(0)	(0)	(3)	(4)
% Hypertension treatment	1%	0.004%	0%	4%	3%

Authors' calculations using the Medical Expenditure Panel Survey-Household Component, 2007-2009.
All monetary amounts are converted to 2009 dollars using the Consumer Price Index for all urban consumers.
[a,b] The difference from the reference category (private group) is significant at the 1 (5)% level.
Other services include emergency department, home health visits, dental visits, and other medical expenditures.
Standard errors are in parentheses.

hypertension treatment (including all types of services for hypertension treatment) accounted for 15% of total out-of-pocket expenditures on healthcare among those with treated hypertension.

Mean out-of-pocket expenditures on all prescription drugs (for the treatment of hypertension and other conditions) was $535. Prescription drugs for hypertension treatment accounted for 25% of total out-of-pocket expenditure on prescription drugs for those who received hypertension treatment.

Self-Perceived Financial Barriers to Care Among Adults Receiving Treatment for Hypertension

Table 3 shows that among those with high total burdens, 15.7% were unable to get care and 13.6% had to delay care during the past year due to financial reasons. Among those without high total burdens, 8.4% were unable to get care and 7.6% had to delay care during the past year due to financial reasons.

Focusing on those with high total burdens, 23.9% among those with public coverage and 35.2% among the

Table 3. Percent With Financial Barriers to Care Among Nonelderly Adults with Treatment for Hypertension by Insurance Status, 2007-2009 (in 2009 US$)

	Total	Private Group	Private Non-Group	Public	Uninsured
Total burden <20%[a]					
Was unable to get care due to financial reasons	8.4	4.4	6.7	19.1	22.9
	(0.5)	(0.4)	(3.7)	(1.5)	(2.0)
Delayed care due to financial reasons	7.6	4.8	9.3	15.2	17.3
	(0.4)	(0.4)	(4.0)	(1.3)	(1.8)
Not getting care was a big problem[b]	78.3	71.4	91.3	84.7	79.8
	(2.2)	(4.2)	(9.4)	(2.5)	(3.4)
Delaying care was a big problem[b]	73.8	64.1	81.2	79.7	86.0
	(2.2)	(3.7)	(12.3)	(4.1)	(3.4)
Total burden ≥20%					
Was unable to get care due to financial reasons	15.7[c]	7.0	8.3	23.9	35.2[d]
	(1.3)	(1.2)	(3.3)	(2.8)	(4.1)
Delayed care due to financial reasons	13.6[c]	8.2[c]	11.6	15.9	27.6[d]
	(1.2)	(1.3)	(3.4)	(2.1)	(3.6)
Not getting care was a big problem[b]	80.2	61.2	47.5	85.3	91.4
	(3.1)	(9.0)	(19.3)	(3.8)	(3.8)
Delaying care was a big problem[b]	73.4	52.0	39.0	79.7	96.0
	(4.4)	(8.8)	(14.7)	(7.2)	(3.1)

Authors' calculations using the Medical Expenditure Panel Survey-Household Component, 2007-2009.
All monetary amounts are converted to 2009 dollars using the Consumer Price Index for all urban consumers.
[a]Total burden includes out-of-pocket expenditures on healthcare services and health insurance premiums.
[b]Among persons who were unable to get care or delayed care due to financial reasons.
[c]([d]) The difference from the reference category (burden<20%) is significant at the 1 (5)% level.
Standard errors are in parentheses.

uninsured said they were unable to get care due to financial reasons. Among those who said they were unable to get care due to financial reason, 85.3% of those with public coverage and 91.4% among the uninsured said that going without care was a big problem.

Burdens Among Adults With Hypertension Who Are Not Actively in Treatment

We found that burdens among persons who reported having hypertension in the current year but who were not actively in treatment (ie, those who chose not to get treatment for hypertension) were not significantly different statistically from those who were treated for hypertension (6.2% [0.8] and 7.1% [0.3], respectively). Furthermore, among adults with hypertension, we found that average income was significantly lower among those who were not actively in treatment compared with adults who received treatment for hypertension ($42,942 and $50,810, respectively).

DISCUSSION

Among nonelderly adults who received hypertension treatment, those with private non-group insurance were the most likely to have high burdens (49.9%), followed by the uninsured (21.0%), those with public insurance (18.6%), and those with private group insurance (9.3%). Furthermore, among adults with hypertension, we found that average income was significantly lower among those who were not actively in treatment compared with adults who received treatment for hypertension ($42,942 vs $50,810, respectively). Many antihypertensive medications are available in generic form, which has led to more affordable therapies. Despite the availability of more affordable therapies, our results suggest that cost of treatment still may be a factor in the decision by some adults to go without treatment.

Furthermore, we found that a significant proportion of those with high total burdens said they were unable to get care (15.7%) or said they had to delay care (13.6%) due to financial reasons. For persons with high total burdens, 23.9% among those with public coverage and 35.2% among the uninsured said they were unable to get care due to financial reasons.

We also found that the prevalence of high burdens is significantly higher among those who had treatment for at least 1 other chronic condition in addition to hyper-

tension treatment (8.2% vs 14.2%). In our sample, 78% of adults who received hypertension treatment also had treatment for at least 1 other chronic condition. Among patients with hypertension who had at least 1 other chronic condition, 44% had hyperlipidemia, 23% had diabetes, 24% had mental disorders, and 14% had heart disease. These findings highlight the importance of taking into account all health-related expenditures in examining out-of-pocket burdens rather than just condition-specific treatment costs.

In terms of study limitations, note that our goal was to examine the prevalence of high burdens among persons with hypertension. It is beyond the scope of this study to disentangle the multiple potential causal relationships among health conditions, income (which can be reduced due to illness), insurance coverage, and healthcare expenditures, and we do not attempt to do so. Second, we cannot examine the variation in burdens either by treatment type, due to sample size limitations, or by stage of illness, because it is not reported in MEPS. Third, examining the variation in burdens by level of treatment adherence is beyond the scope of this study. Fourth, our findings on financial barriers are self-reported. We cannot tell if patients who "choose" to not get care sometimes use cost as an excuse, when the real reason may be lack of motivation, not wanting to take medication, not understanding the importance of care, or other reasons. This is why the primary focus of our study was the actual burden measure (ie, the ratio of health-related expenditures to family income).

The increased prevalence of hypertension risk factors in the United States, in the form of an obesity epidemic and an aging population, underscores the importance of continued hypertension management and control. With the implementation of the Affordable Care Act (ACA), nonelderly adults with hypertension who are currently uninsured or have private non-group insurance will gain access to affordable coverage through the exchanges. Furthermore, the ACA sets limits on out-of-pocket spending for deductibles, coinsurance, and copayments. For the plan year beginning in 2014, the annual out-of-pocket maximums are $6350 for an individual and $12,700 for a family. Coverage through the exchanges and caps on out-of-pocket spending are likely to reduce the prevalence of high burdens among adults with hypertension.

Hypertension represents the most common reason for office visits to primary care physicians.[32-34] However, recent studies show that 80% of physicians are unaware of medication costs and also misunderstand the complexities of insurance coverage.[35,36] Thus, raising awareness among providers regarding the prevalence of high out-of-pocket burdens and self-perceived financial barriers to care may encourage providers to discuss healthcare coverage and associated costs with their patients. To the extent that patients' perceptions about their ability to pay are incorrect, physicians can change those perceptions. Furthermore, health plans could reduce patient cost sharing on drugs for which there is a strong body of evidence documenting cost-saving treatment such as antihypertensive medication. Addressing financial barriers to care may improve treatment adherence among patients with hypertension.

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eAppendix. Technical Details for Out-of-Pocket Healthcare Expenditure Burdens Among Nonelderly Adults With Hypertension

Pooled data from 2007 to 2009 Medical Expenditure Panel Survey-Household Component (MEPS-HC) includes the second year from Panel 11, 2 years from Panels 12 and 13, and the first year from Panel 14.

Summarizing response rates for our sample is difficult because there are 3 panels and multiple rounds within each panel. Taking account of the National Health Interview Survey response rate, 57.2% of the MEPS-HC-eligible households provided data for all of the 3 rounds in 2009, computed as the product of round specific conditional response rates.

Burden measure: Following previous literature, high burdens are defined as health-related spending in excess of 20% of income. The 2 main methods used elsewhere in the literature are (1) the population mean of the burden ratio and (2) the ratio of aggregate out-of-pocket expenditures to aggregate income.[1] Unlike these alternative measures based on means, our approach identifies those with the highest burdens given the right-skewed distribution of expenditures.

For the after-tax burden analysis, we simulate state and federal income taxes as well as Social Security and Medicare taxes. State and federal income taxes are simulated using the National Bureau of Economic Research's TAXSIM model available at http://www.nber.org/~taxsim/.

Families are defined as health-insurance-eligibility-units (HIEUs) (ie, persons related by blood, marriage, or adoption) who would typically be eligible for coverage under a private family policy.

Health insurance coverage: Persons with multiple types of coverage during the year are assigned the coverage with the longest duration based on monthly insurance indicators.

Health insurance premiums: As the burden measure includes health-related expenses for all family members, we also simulate Medicare Part B premiums, taking into account that Medicaid pays Part B premiums for Medicare beneficiaries enrolled in Medicaid. Only 4.4% of nonelderly patients with hypertension live in a family which includes an elderly person (416 out of 9383).

Income: We construct family-level income, adding income for all persons in the HIEU. We impose a $100 floor for family income to deal with cases where families have very low or negative incomes; the income floor affects only 3.8% of the observations and the results are not sensitive to this adjustment.

All expenditure amounts are converted using the Consumer Price Index for all urban consumers and are reported in 2009 US dollars. While the Personal Healthcare Price Index is recommended for inflating healthcare expenditures, for our purposes, the CPI is the most appropriate, as both income and expenditures need to be adjusted using the same deflator.

Number of chronic conditions: The mean number of chronic conditions was 3.5 among patients receiving hypertension treatment and 1.9 (P <.01) among those receiving treatment for other chronic conditions.

Among patients with hypertension who had at least 1 other chronic condition, 44% had hyperlipidemia, 23% had diabetes, 24% had mental disorders, and 14% had heart disease.

■ **eAppendix Table.** Prevalence of High Financial Burdens by Sociodemographic Characteristics Among Nonelderly Adults With Hypertension: Pooled 2007-2009 (in 2009 US $)

	Average Annual Population (×1000)	Out-of-Pocket Expenditures on Healthcare ($)	Out-of-Pocket Expenditures on Healthcare & Premiums ($)	Family Income ($)	Healthcare Burden >20% of Income	Total Burden >20% of Income
All nonelderly	30,344	1854	3839	50,810	7.1	13.1
Age						
18-39 y	3050	1118	2722	42,678	6.1	8.8
40-54 y	13,076	1695[b]	3581[b]	51,074[b]	6.9	11.3
55-64 y	14,218	2159[b]	4316[b]	52,312[b]	7.6	15.7[b]
Gender						
Male	15,134	1819	3933	55,451	6.4	12.1
Female	15,210	1890	3745	46,193[b]	7.9[c]	14.0[c]
Race/ethnicity						
Hispanic	2977	1402	2674	37,912	7.9	11.5
White and other	22,170	2082[b]	4308[b]	55,498[b]	6.9	13.6
Black (non-Hispanic)	5198	1140*	2503	38,203	7.9	11.6
Marital status						
Married	19,072	2255	4860	64,585	4.5	11.4
Never married	3828	946[b]	1865[b]	27,280[b]	11.3[b]	14.5[c]
Widowed/divorced/separated	7444	1295[b]	2236[b]	27,618[b]	11.7[b]	16.6[b]
Children						
0 children	23,594	1871	3781	48,585	7.8	14.5
1 child	3578	1730	3831	56,198[b]	5.3[c]	8.3[b]
2 or more	3172	1868	4274[c]	61,285[b]	4.1[b]	8.1[b]
Employment status						
Full-time worker	16,698	1798	4025	61,107	2.2	7.0
Part-time worker	4835	2023	4073	50,854[b]	5.0[b]	11.6[b]
Not working	8811	1868	3358[b]	31,273[b]	17.7[b]	25.4[b]
Poverty category[a]						
Poor	3647	1078	1576	7846	33.8	38.6
Near poor/low income	4410	1501[b]	2734[b]	21,030[b]	12.3[b]	23.1[b]
Middle income	8808	1862[b]	3970[b]	37,501[b]	3.3[b]	12.7[b]
High income	13,479	2175[b]	4727[b]	80,876[b]	0.7[b]	3.2[b]

(Continued)

■ **eAppendix Table.** Prevalence of High Financial Burdens by Sociodemographic Characteristics Among Nonelderly Adults With Hypertension: Pooled 2007-2009 *(Continued)*

	Average Annual Population (×1000)	Out-of-Pocket Expenditures on Healthcare ($)	Out-of-Pocket Expenditures on Healthcare & Premiums ($)	Family Income ($)	Healthcare Burden >20% of Income	Total Burden >20% of Income
Education						
Less than high school	4782	1341	2447	26,956	13.1	18.5
High school	9971	1680[b]	3546[b]	42,669[b]	7.6[b]	14.5[b]
More than high school	15,590	2124[b]	4453[b]	63,334[b]	5.0[b]	10.6[b]
Urbanicity						
MSA	24,876	1847	3847	52,584	6.6	12.1
Non-MSA	5468	1889	3803	42,739[b]	9.9[b]	17.8[b]
Region						
Northeast	5480	1452	3328	55,912	4.7	8.8
Midwest	6427	2050[b]	3955[b]	49,058[c]	6.8[c]	12.9[c]
South	12,822	1899[b]	3931[b]	48,111[b]	8.4[b]	15.0[b]
West	5615	1923[b]	3994[b]	54,001	7.1[c]	13.1[b]
Health status						
Hypertension only	5784	1112	3116	53,618	4.0	8.2
Other chronic conditions	24,560	2029[b]	4009[b]	50,149[b]	7.9[b]	14.2[b]

MSA indicates metropolitan statistical area.
Authors' calculations using the Medical Expenditure Panel Survey-Household Component, 2007-2009.
[a]Poverty categories are defined based on the Federal Poverty Level (FPL): Poor (<100% FPL, near poor/low income (100%-199% FPL), middle income (200%-399% FPL), and high income (400%+ FPL).
[b]([c]) Difference from the reference group (first row in each category) is significant at the 1(5)% level.

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