Estimates of State-Level Health-Care Expenditures Associated with Disability

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SYNOPSIS

Objectives. We estimated state-level disability-associated health-care expenditures (DAHE) for the U.S. adult population.

Methods. We used a two-part model to estimate DAHE for the noninstitutionalized U.S. civilian adult population using data from the 2002–2003 Medical Expenditure Panel Survey and state-level data from the Behavioral Risk Factor Surveillance System. Administrative data for people in institutions were added to generate estimates for the total adult noninstitutionalized population. Individual-level data on total health-care expenditures along with demographic, socioeconomic, geographic, and payer characteristics were used in the models.

Results. The DAHE for all U.S. adults totaled $397.8 billion in 2006, with state expenditures ranging from $598 million in Wyoming to $40.1 billion in New York. Of the national total, the DAHE were $118.9 billion for the Medicare population, $161.1 billion for Medicaid recipients, and $117.8 billion for the privately insured and uninsured populations. For the total U.S. adult population, 26.7% of health-care expenditures were associated with disability, with proportions by state ranging from 16.9% in Hawaii to 32.8% in New York. This proportion varied greatly by payer, with 38.1% for Medicare expenditures, 68.7% for Medicaid expenditures, and 12.5% for nonpublic health-care expenditures associated with disability.

Conclusions. DAHE vary greatly by state and are borne largely by the public sector, and particularly by Medicaid. Policy makers need to consider initiatives that will help reduce the prevalence of disabilities and disability-related health disparities, as well as improve the lives of people with disabilities.

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As of 2002, 51.2 million Americans (18.1% of the U.S. civilian noninstitutionalized population) reported having a disability.[1] Among young adults, disability might result from a spinal cord injury, a congenital condition such as spina bifida, or a neurological disorder such as multiple sclerosis. Among older people, disability is often associated with the onset or worsening of chronic conditions, including arthritis, heart disease, diabetes, Alzheimer's disease, and cancer. Many people with disabilities, both young and old, experience secondary health problems as a result of their disabilities, including pain, pressure ulcers, obesity, and depression.[2] Consequently, people with disabilities are more likely than those without disabilities to report being in poor health.[1]

Because of the detrimental effects that disabilities have on health, people with disabilities use more health-care services than people without disabilities,[3] resulting in higher health-care costs. These costs, which we define as disability-associated health-care expenditures (DAHE), are in addition to a person's non-disability-related health-care expenditures. DAHE are the additional health-care costs related to injury, diseases, and chronic conditions associated with disability exclusive of those costs not related to disability. Although many people have chronic conditions, most do not have disabilities. Thus, this study attempted to separate the costs of non-disability-related assessment and treatment of injury, diseases, and chronic conditions from the incremental expenditures related to having a disability.

In a separate study, we estimated that U.S. DAHE approached $400 billion in 2006 (26.7% of national health-care spending for the year), with public payers bearing most of these costs (Unpublished data, Anderson WL, Wiener JM, Finkelstein EA, Armour BS. Estimates of national health-care expenditures associated with disability, 2009). In this study, we estimated DAHE at the state level and by public and private payers within each state. State-level estimates of DAHE are needed to inform federal efforts aimed at reducing disability prevalence and disability-associated health disparities. States will also be able to use these results when considering Medicaid access and funding initiatives for people with disabilities. The results of this study will provide policy makers and researchers with state-level estimates of DAHE and the relative fiscal burden these expenditures place on various payers.

METHODS

Data sources

We obtained data for this study from four sources. First, we used a definition of disability from the National Health Interview Survey (NHIS), sponsored by the National Center for Health Statistics.[4] Next, we used data from the Medical Expenditure Panel Survey (MEPS), a nationally representative survey derived in part from the NHIS and developed by the Agency for Healthcare Research and Quality, to develop an econometric model of health-care expenditures, sources of payment, and demographic and socioeconomic information on the civilian noninstitutionalized population.[5] Subsequently, we used state-level data from the Behavioral Risk Factor Surveillance System (BRFSS),[6] developed by the Centers for Disease Control and Prevention, with our linked NHIS/MEPS-based model to estimate the proportions of health-care expenditures associated with disability in each state and for each category of payer within each state. Finally, we used these proportions along with estimates of total health-care expenditures and expenditures by payer for each state from the National Health Expenditure Accounts (NHEA), which is maintained by the Centers for Medicare & Medicaid Services to generate estimates of total DAHE for each state and for each category of payer within each state.[7]

Definition of disability

We considered NHIS respondents to have a disability if they responded "yes" to a question asking whether they had a limitation in any way in any activity because of a physical, mental, or emotional problem. This definition included all people reporting a disability of any type or severity. Examples of disability potentially reported include deficits in activities of daily living (ADL), such as bathing, eating, or toileting; instrumental activities of daily living (IADL), such as shopping and bill paying; and less permanent limitations, such as having a broken bone. Thus, it includes people with both long- and short-term disabilities.

Statistical analysis

We estimated DAHE in six steps. First, we estimated national DAHE for the noninstitutionalized population using a two-part model with Logit and a General Linear Model (GLM) and the linked NHIS/MEPS data. In our expenditure models, disability status was the policy variable of interest, and the models controlled for demographic and socioeconomic factors, category of payer, and national region. The dependent variable included Medicare, Medicaid, other public insurance,

various types of private insurance, and uninsured expenditures.

Second, we predicted total annual health-care expenditures for each BRFSS individual by inputting BRFSS data values in the NHIS/MEPS Logit and GLM and reestimating the models. We also estimated the fraction of DAHE in each state and by payer within each state.

Third, we multiplied these fractions by NHEA estimates of total state-specific health-care expenditures to estimate DAHE for each state and by each payer within each state. This step was undertaken to account for expenditures missing from MEPS but included in the NHEA related to differences in service categories, the scope of the included populations, and nonpatient care revenues.[8] The steps to this point in our approach have been successfully applied in studies estimating state-level health-care expenditures for smoking[9–11] and obesity.[12,13]

Fourth, we combined these results with NHEA state-level estimates of institutional (e.g., nursing home) DAHE to estimate total state DAHE. Fifth, we adjusted the BRFSS-based estimates of DAHE and payer distributions to a MEPS-based DAHE estimate and payer distribution from a prior RTI International study by the authors because of differences in the non-disability characteristics of the populations surveyed. Lastly, we calculated DAHE fractions of total expenditures by state. Complete methods used to estimate state-level DAHE are detailed in the Technical Appendix, which is available online (http://www.publichealthreports.org).

RESULTS

In 2006, the proportion of DAHE was 26.7% for the total U.S. adult population, ranging from 16.9% in Hawaii to 32.8% in New York. This proportion varied greatly by payer, with 38.1% for Medicare, 68.7% for Medicaid, and 12.5% for nonpublic insurance, which includes private employer-based insurance, other types of private insurance, and the uninsured (Table). By state, the proportion of Medicare DAHE ranged from 24.9% in Hawaii to 46.5% in Kentucky; the proportion of Medicaid DAHE ranged from 52.1% in Arizona to 83.9% in Kentucky; and the proportion of nonpublic DAHE ranged from 9.5% in Hawaii to 15.2% in South Dakota.

DAHE for all U.S. adults totaled $397.8 billion in 2006, with state expenditures ranging from $598 million in Wyoming to $40.1 billion in New York. Of the national total, Medicare paid $118.9 billion, Medicaid paid $161.1 billion, and nonpublic sources paid $117.8 billion. By state, Medicare DAHE ranged from $127 million in Alaska to $11.9 billion in California, Medicaid DAHE ranged from $224 million in Wyoming to $24.0 billion in New York, and nonpublic DAHE ranged from $217 million in Wyoming to $11.8 billion in California.

We developed two maps of the United States to convey two different aspects of the magnitude and distribution of DAHE across the country in 2006. The first map (Figure 1), which presents DAHE per person with disability, can be used to analyze the extent to which each person with a disability adds further health-care system expenditures and how those expenditures vary across states. The mean DAHE per person with a disability was $11,637 in the U.S. The highest cost per person with disability occurred in the District of Columbia (DC) ($22,494), which was 2.9 times the lowest cost per person with a disability in Nevada ($7,833). Expenditures per person with a disability were less than $10,000 in 16 states, between $10,000 and $13,000 in 20 states, and more than $13,000 in 15 states. States with DAHE greater than $13,000 per person with a disability were primarily located in the Northeast and the noncontiguous U.S. Eleven of the 16 states with less than $10,000 per person with a disability were in the West or Mountain region.

The second map (Figure 2) presents DAHE divided by the total population in a state, which can be used to identify differences in the societal costs of disability. The mean DAHE per capita was $2,190 in the U.S. In other words, the mean cost borne by each member of society, regardless of whether they have a disability, was $2,190. The highest per capita estimate was in DC ($3,360), which was 2.3 times the lowest per capita estimate in Utah ($1,443). Per capita expenditures were less than $2,000 in 16 states, between $2,000 and $2,500 in 22 states, and more than $2,500 in 13 states. States with DAHE greater than $2,500 per capita were located primarily in the Northeast region and the western half of the Southeast region. Eleven of the 16 states with per capita DAHE less than $2,000 were in the West or Mountain region.

DISCUSSION

In 2006, DAHE accounted for $397.8 billion (26.7%) of all health-care expenditures for U.S. adults, which represents a substantial portion of U.S. health-care expenditures. In part, the magnitude of DAHE stems from the high disability prevalence in the adult population, with 18.2% of all adults reporting a limitation in any way in any activities because of physical, mental, or emotional problems. The NHIS-based definition of

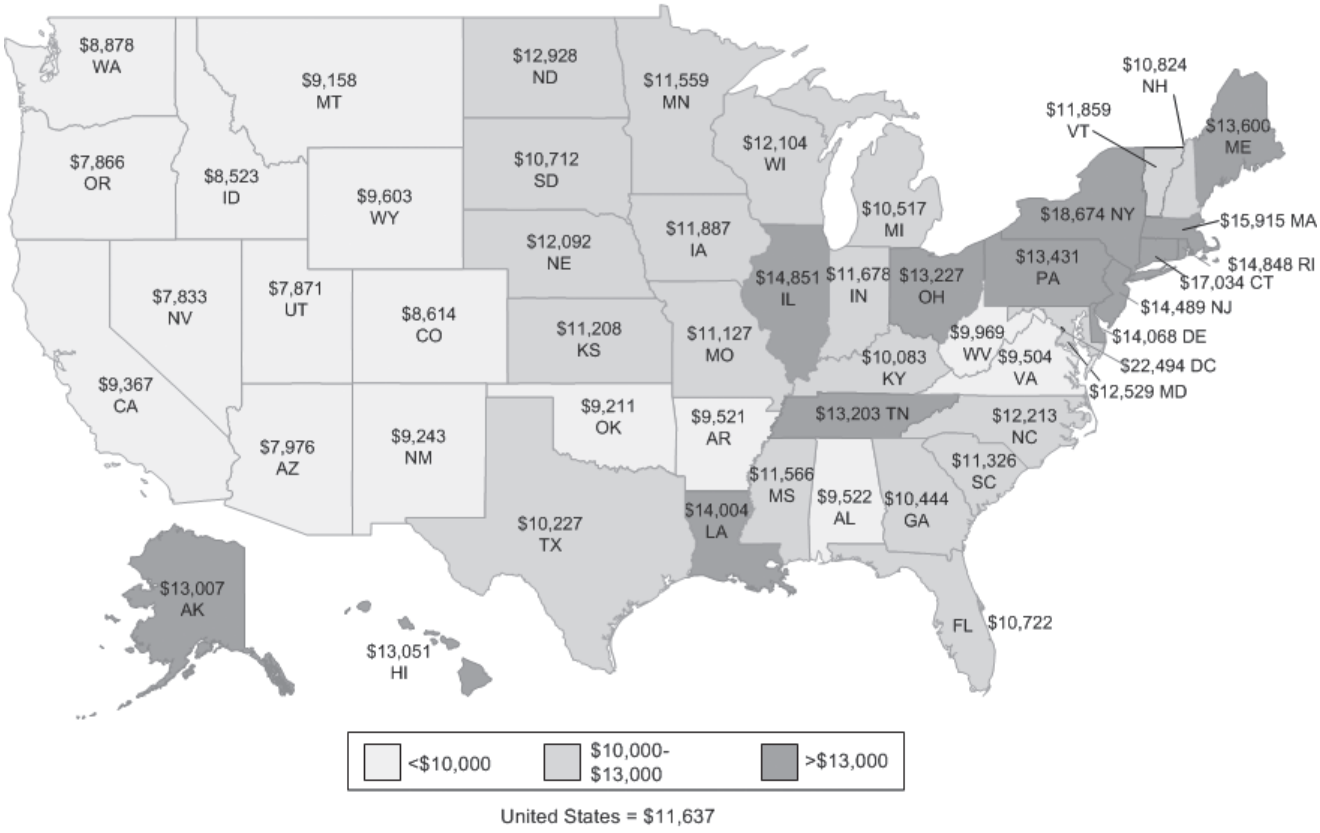
Table. Proportions of health-care expenditures associated with disability and DAHE by state and payer

	Total expenditures		*Medicare*		*Medicaid*		*Nonpublic sources*	
State	*Percent*	*In millions*	*Percent*	*In millions*	*Percent*	*In millions*	*Percent*	*In millions*
Alabama	27.1	$6,181	43.0	$2,326	77.5	$1,899	13.1	$1,956
Alaska	23.7	$967	38.5	$127	65.3	$510	11.1	$330
Arizona	23.0	$5,108	35.5	$1,765	52.1	$1,480	13.0	$1,863
Arkansas	28.3	$3,673	39.9	$1,232	74.0	$1,312	13.9	$1,129
California	23.7	$38,242	35.7	$11,904	58.1	$14,578	11.4	$11,761
Colorado	20.8	$4,388	35.5	$1,193	63.5	$1,355	11.8	$1,840
Connecticut	29.6	$6,341	38.8	$1,709	77.6	$2,810	13.6	$1,822
Delaware	23.9	$1,224	35.2	$328	72.6	$458	12.3	$437
District of Columbia	27.1	$1,251	34.9	$244	73.0	$675	11.1	$333
Florida	25.7	$23,146	36.1	$9,253	72.2	$6,807	12.9	$7,087
Georgia	26.0	$10,151	40.5	$2,915	68.2	$4,269	11.6	$2,968
Hawaii	16.9	$1,018	24.9	$257	56.5	$345	9.5	$415
Idaho	25.1	$1,497	39.0	$418	72.4	$571	12.4	$508
Illinois	24.8	$16,010	37.1	$4,842	72.5	$6,346	11.3	$4,822
Indiana	26.7	$8,362	39.4	$2,480	76.5	$3,168	13.0	$2,714
Iowa	25.5	$3,922	32.6	$943	74.7	$1,571	13.6	$1,409
Kansas	24.2	$3,384	34.8	$986	67.7	$1,099	13.6	$1,298
Kentucky	26.7	$5,821	46.5	$2,159	83.9	$1,539	13.8	$2,122
Louisiana	29.2	$6,593	37.7	$2,148	74.9	$3,065	10.8	$1,380
Maine	30.8	$2,418	38.9	$555	70.8	$1,240	13.3	$622
Maryland	24.4	$7,280	37.3	$2,255	69.7	$2,487	12.5	$2,538
Massachusetts	27.8	$11,659	38.6	$3,189	70.7	$4,924	13.3	$3,546
Michigan	28.2	$13,627	40.4	$4,767	73.7	$4,924	13.2	$3,935
Minnesota	27.6	$7,805	39.8	$1,775	72.9	$3,256	14.3	$2,775
Mississippi	32.5	$4,546	43.3	$1,484	74.6	$2,064	12.8	$998
Missouri	29.4	$8,901	39.8	$2,575	72.3	$3,587	14.5	$2,740
Montana	23.8	$1,088	35.3	$295	70.5	$344	13.9	$450
Nebraska	25.3	$2,340	35.8	$616	69.9	$858	13.7	$866
Nevada	21.1	$2,094	35.4	$738	61.5	$563	11.4	$794
New Hampshire	24.9	$1,655	39.1	$477	69.5	$553	13.5	$625
New Jersey	25.5	$12,434	35.2	$4,017	75.0	$5,154	10.7	$3,263
New Mexico	26.8	$2,162	37.3	$551	59.0	$1,030	12.0	$581
New York	32.8	$40,119	37.3	$8,881	74.5	$23,966	11.0	$7,272
North Carolina	26.6	$11,216	40.3	$3,466	72.5	$4,461	12.0	$3,289
North Dakota	24.8	$870	32.2	$198	73.8	$347	13.4	$324
Ohio	30.2	$18,948	39.4	$5,151	82.3	$8,500	13.4	$5,297
Oklahoma	27.7	$4,701	41.2	$1,652	75.8	$1,547	13.7	$1,502
Oregon	25.3	$4,279	39.1	$1,277	64.6	$1,355	14.3	$1,647
Pennsylvania	28.9	$20,519	36.9	$6,218	79.0	$8,668	13.1	$5,633
Rhode Island	28.2	$1,787	36.3	$450	64.6	$849	12.9	$487
South Carolina	26.7	$5,535	39.0	$1,742	70.9	$2,280	11.6	$1,513
South Dakota	25.3	$1,016	35.6	$256	69.7	$332	15.2	$428
Tennessee	29.0	$8,810	40.7	$2,625	72.4	$3,934	12.1	$2,250
Texas	24.0	$24,059	38.9	$7,961	69.3	$8,703	11.0	$7,395
Utah	22.1	$2,006	39.4	$542	66.3	$690	11.6	$774
Vermont	26.1	$941	37.5	$221	65.2	$405	13.2	$315
Virginia	23.3	$7,977	39.6	$2,532	76.4	$2,400	12.3	$3,045
Washington	26.4	$8,089	41.6	$2,065	68.6	$2,959	14.3	$3,065
West Virginia	31.1	$3,249	43.6	$1,070	73.0	$1,232	15.0	$947
Wisconsin	25.8	$7,751	37.4	$1,923	78.4	$3,382	11.9	$2,446
Wyoming	23.2	$598	36.5	$157	70.4	$224	11.9	$217
Total for all states	26.7	$397,757	38.1	$118,908	68.7	$161,075	12.5	$117,774

Sources: RTI International analyses of 2002 and 2003 Medical Expenditure Panel Survey data, and 2001 and 2003–2006 data from the Behavioral Risk Factor Surveillance System

DAHE = disability-associated health-care expenditures

Figure 1. Estimated mean disability-associated health-care expenditures per disabled population (2006 dollars)



disability used in this study was broad and, therefore, included a large number of people, which contributed to the magnitude of DAHE. Even so, other definitions of disability, such as one used in a 2005 report[14] by the U.S. Surgeon General, provide even higher estimates (22.0%) of the proportion of the population with a disability. If we had chosen a narrower disability definition, such as having only any deficits with ADLs or IADLs, the prevalence of people with disabilities would be lower, although we would likely have captured the highest-cost people.

The disabilities included in our study definition varied in their duration, severity, and cause. Some disabilities, such as an inability to walk because of a broken foot, may be temporary and have low treatment costs, but are experienced more frequently than a permanent disability. Conversely, a permanent disability may more likely be accompanied by chronic conditions, with significantly higher treatment costs than a short-term disability. We were not able to assess the effects on DAHE of short-term vs. permanent disabilities because of the lack of relevant data, nor were we able to distinguish the cause of the reported disability. Both issues could be explored in future work.

The proportion of DAHE of 26.7% was higher than the prevalence of disability of 18.2% because people with disabilities use disproportionately more services than people without disabilities.[3] Even so, DAHE are relative to the health-care costs of all people with chronic conditions. Many more people have one or more chronic conditions or diseases than report disability,[15] and DAHE are smaller than the total cost of chronic conditions and diseases in the U.S. adult population.

The DAHE national estimate masks substantial variation across states, and across payers within states. This variation was associated with variations in the two factors that we multiplied to estimate DAHE for each state and payer within each state: (*1*) the proportion of all adult DAHE and (*2*) total adult health-care expenditures. The proportion of a state's total DAHE was associated with the relative distribution of costs across payers within states, with each payer having different proportions of DAHE. Generally, higher disability prevalence among Medicare and Medicaid beneficiaries in a state was positively associated with the proportion of DAHE. (Detailed information on disability prevalence across payers is available online in the Technical Appendix.)

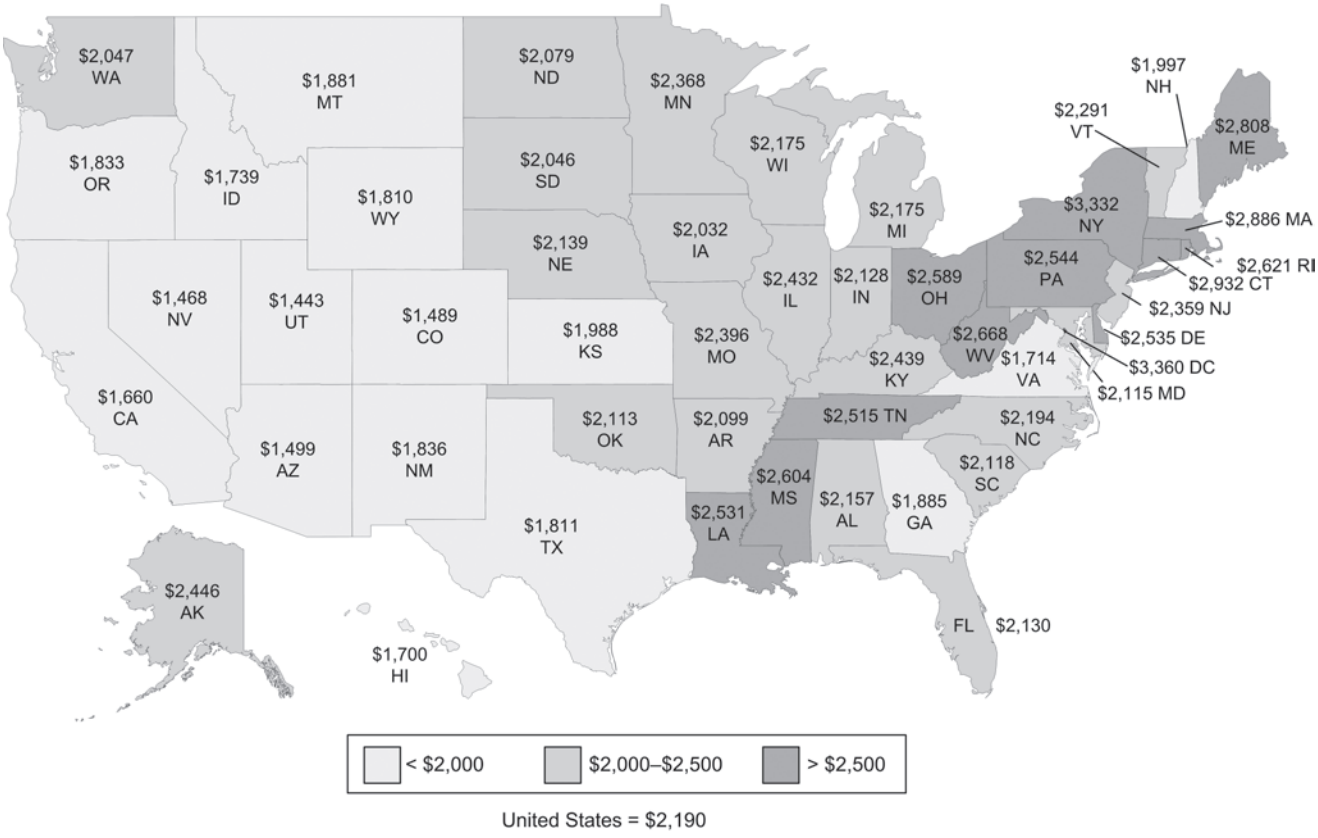
In some cases, states may have similar DAHE but very different proportions of total DAHE. For example, Colorado had a relatively low proportion (20.8%) of DAHE and total health-care expenditures of $21 billion in 2006, giving it DAHE of $4.4 billion. Alternatively, Mississippi had a much higher proportion (32.5%) of DAHE but only two-thirds that of Colorado's total health-care expenditures ($14 billion), giving it approximately the same DAHE ($4.5 billion).

Variations in DAHE in the community population across states are driven by demographic differences, primarily age. States with a larger proportion of older people (e.g., Pennsylvania and West Virginia) are more likely to have higher disability prevalence and, therefore, higher DAHE. Conversely, state variation in DAHE per person living in an institution or per community-dwelling recipient of long-term-care services is driven by the generosity of the states' Medicaid programs.

The Medicaid program is not only the largest payer of DAHE among all payers nationally, but it is also the largest payer of DAHE in two-thirds of the states (33 of the 50 states plus DC) for two reasons. In 2007, Medicaid paid for the care of almost two-thirds (64.6%) of the 1.5 million Americans in nursing homes;[16] payments for this care accounted for 30.6% of all Medicaid DAHE. Second, Medicaid programs in states in the Northeast (e.g., New York) have particularly generous home- and community-based long-term-care programs.[17] In addition, while the difference in mean disability prevalence between the Medicaid and Medicare programs was less than 8 percentage points (46.3% vs. 39.0%), the proportion of DAHE was almost twice as high for Medicaid as for Medicare (68.7% vs. 38.1%) because of the high cost of institutional care paid by Medicaid. Therefore, the Medicaid program disproportionately bears the largest share of DAHE in the U.S.

Although DAHE per person with disability were similar for states in the West and Midwest regions, they varied more for states within the Northeast and Southeast regions, primarily because of greater state-to-state differences in disability prevalence and in the prevalence and cost of institutionalization. DAHE per capita were particularly high in the Northeast region (even though disability prevalence rates in Northeast states were generally below the national mean) and in the western half of the Southeast region. DC had the highest DAHE per capita and per person with

Figure 2. Estimated mean adult per capita disability-associated health-care expenditures (2006 dollars)



disability in part because of the high rates paid to nursing homes.[18] New York, which had the second highest DAHE per capita and per person with disability, has by far the largest Medicaid personal care program in the U.S.[17]

This study's findings demonstrate the need for interventions to prevent or delay disability. Some disability risk factors (e.g., falling, inactivity, and depression) can often be addressed through individual-level interventions. In a review of the literature on individual-level interventions, Freedman et al. found that in the short term, multicomponent fall-prevention interventions would likely have a greater effect on reducing the risk for disability than exercise or depression-treatment interventions alone.[19]

These findings also provide a financial motivation to identify cost-effective strategies to effectively manage the treatment and costs of people with disabilities today. DAHE may be reduced by using preventive care services and health promotion interventions, and by improving access to medical care for people with disabilities to reduce the incidence of secondary conditions to disability through early diagnosis and intervention. For example, disease management programs may help maintain functional independence by preventing or delaying the onset of chronic conditions, resulting in decreased hospitalization and premature nursing home use. At a system level, programs to integrate Medicare and Medicaid payment through capitation for acute and long-term-care services (e.g., the Program of All-inclusive Care for the Elderly [PACE]) or pay-for-performance initiatives[20] might motivate providers to deliver high-quality care cost-effectively across targeted settings.

Limitations

This research had several limitations. First, because we lacked state-level data containing information on both disability prevalence and health-care expenditures, we had to use data from several sources to develop a synthetic estimate of state-level DAHE and, thus, were unable to calculate standard errors for our state-level estimates (see Technical Appendix).

The use of multiple data sources had several ramifications. To develop our DAHE estimate, we inferred that our NHIS/MEPS model estimates applied to the BRFSS population, even though the characteristics of people with disabilities differed between the two datasets. The BRFSS sample population with disabilities was considerably younger, much better educated, considerably less poor, and less likely to have Medicare and Medicaid than the NHIS/MEPS sample population with disabilities. In addition, we had to make predictions of BRFSS sample member insurance status using NHIS/MEPS estimates because the BRFSS sample lacked indicators of insurance status. Consequently, we adjusted our BRFSS DAHE estimate and payer distribution to the NHIS/MEPS DAHE estimate and payer distribution because the NHIS/MEPS population is more like the U.S. adult population.

Second, the DAHE estimate was large in part because we did not explicitly control for injuries and specific diseases and chronic conditions often associated with disability. Thus, some—but not all—of those costs were included in our estimate. Had we controlled for these additional health conditions, the DAHE estimate would have been smaller than reported. However, we used a standard econometric approach common in health services research to estimate the costs of single conditions or health problems.[9–13]

Finally, both BRFSS and NHIS/MEPS rely on self-reported data, and responses can vary by survey administration mode. Recent work by Walsh and Khatutsky[21] has shown that in-person surveys underreport disability levels. In this study, while we used a common measure of disability from both surveys, the disability prevalence in the BRFSS (a telephone survey) was 18.2%, while the disability prevalence in the NHIS (an in-person survey) was 13.6%.

CONCLUSIONS

Results of this study indicated that state-level DAHE varied substantially in 2006 and that the costs of health care for people with disabilities are borne largely by the public sector, and particularly by Medicaid. Policy makers need to consider initiatives that will help reduce the prevalence of disabilities and disability-related health disparities, while also helping to improve the lives of people with disabilities. Knowing the amount and distribution of DAHE in 2006 will serve as a baseline for measuring improvements in access and reductions in disability prevalence resulting from future policy initiatives.

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