# Aligning the Medical Expenditure Panel Survey to Aggregate U.S. Benchmarks

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## ABSTRACT

Household-level data are valuable for a range of research efforts, including health policy microsimulation analyses, distributional studies, and analyses of condition-specific spending. Household data, however, do not provide a complete picture of health care expenditures, because they exclude certain types of outlays, such as administrative costs, government payments to providers that are not linked to patient events, research, and public health. Household data also do not provide information on employer premium contributions or tax subsidies. This paper describes how data from the Medical Expenditure Panel Survey (MEPS) were aligned with aggregate benchmarks from the National Health Expenditure Accounts (NHEA) and supplemented with tax expenditure estimates to produce a database that will help support a range of health research initiatives that require comprehensive measures of medical expenditures.

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## Introduction

The Medical Expenditure Panel Survey (MEPS) is an annual household survey designed to yield nationally representative estimates of insurance coverage, medical expenditures, insurance premiums, and a wide range of other health-related and socioeconomic characteristics for persons in the civilian, noninstitutionalized population (Cohen et al., 1996, and Cohen, 1997). There are reasons, however, why no household expenditure survey can be expected to provide a complete picture of U.S. health care spending. First, household respondents cannot be expected to report administrative costs or payments to providers that are not linked to specific events. Second, household data can suffer from expenditure shortfalls due to under-reporting and differential attrition of high-cost cases. Third, household data must be augmented with tax simulations to measure the level and distribution of tax expenditures.

MEPS household data are a vital national resource for policy analysis and have already been used in a large number of microsimulation studies of existing or proposed programs. However, we believe the value of MEPS for certain applications can be enhanced through the detailed alignment of MEPS with aggregate expenditure benchmarks – primarily those provided by the National Health Expenditure Accounts (NHEA). [1] In this paper, we provide details regarding our methodology for producing an aligned MEPS dataset. This paper serves in part as a companion piece to "The Distribution of Public Spending for Health Care in the United States." The paper also serves as a background paper for other applications of these enhanced data.

[1] See, for instance, CMS (2006) *NHE Projections 2006-2016, Forecast Summary and Selected Tables* (at http://www.cms.hhs.gov/NationalHealthExpendData/).

**Methods**

The starting point for our analysis is the detailed reconciliation of MEPS and the NHEA in Sing et al. (2006). As in Sing et al., we pool MEPS data from 2002 and 2003 to smooth year-to-year fluctuations in expenditures due in part to random sampling variation (Machlin et al., 2003). The resulting dataset contains 70,099 positively-weighted observations. All health expenditures were inflation-adjusted to 2002 dollars using the gross domestic product deflator for medical goods. This pooled dataset is then aligned with aggregate benchmarks for 2002, adjusted to include only expenditures by or on behalf of the civilian noninstitutionalized population surveyed by MEPS. [2]

Sing et al. (2006) reveal substantial differences between the expenditure estimates in the two sources.[3] Overall, MEPS captures only about half of total expenditures in the NHEA. As explained in Sing et al., not only does MEPS exclude persons in institutions and the active duty military, but also MEPS by its design misses administrative costs and a number of other spending types that household respondents would be unlikely to report accurately. Furthermore, even after adjusting NHEA amounts to correspond as nearly as possible with the scope of MEPS, Sing et al. (2006) found a 13.8 percent shortfall in MEPS. Detailed comparisons between MEPS and private insurance claims data indicate this shortfall likely stems from a combination of attrition of the very highest cost cases combined with some degree of more broadly-based underreporting (Zuvekas, Cohen, and Pylypchuk, 2005).

We began by making minor modifications to the adjusted NHEA benchmarks in Sing et al.(2006). First, we modified the NHEA allocation of capitated Medicaid payments across types of service using the MEPS expenditure distribution, rather than the fee-for-service Medicaid

[2] The Sing et al. (2006) reconciliation was conducted for 2002 to take advantage of estimates from the quinquennial Economic Census.
[3] See also Selden et al. (2001).

distribution used in the construction of NHEA. We also made corresponding adjustments in private insurance and out-of-pocket spending – amounts that are calculated as a residual in NHEA.[4] This yielded a somewhat more even pattern of MEPS-NHEA discrepancies in physician services and hospital care across Medicaid and private health insurance than is reported in Sing et al. (2006). Second, we removed the NHEA adjustment described in Sing et al. (2006) pertaining to drug rebates for public insurance. Third, we increased the NHEA benchmarks to account for non-Medicare spending on ambulances.

Next, we aligned MEPS with the adjusted MEPS-consistent NHEA. We did so in two steps; first adjusting the sampling weights to increase the prevalence of high-cost cases and then scaling MEPS amounts by type of service and source of payment to close the remaining MEPS-NHEA gap. Our motivation for upweighting high-cost cases comes from internal AHRQ research showing attrition among such cases. Zuvekas, Cohen, and Pylypchuk (2005) and other, preliminary results from on-going AHRQ research suggest the shortfall in high-cost cases might account for one-third to one-half of the MEPS-NHEA gap identified by Sing et al. (2006). Given the preliminary nature of these findings, we selected an upweighting strategy that closes just under 40 percent of the combined gap in out-of-pocket, private health insurance, Medicare, and Medicaid (the payment sources that align most directly between MEPS and NHEA). The weighting adjustment approximately doubled the weights on persons in the top 0.5 percent of cases in the expenditure distribution in each of the four coverage groups listed above. Raking was used to preserve MEPS distributions by age, sex, race/ethnicity, poverty status, and insurance coverage. The impact of this reweighting is shown in Table 1. The left-most column

[4] Obtaining accurate NHEA estimates by service type for capitated public insurance poses a significant methodological challenge, and CMS researchers are currently exploring alternative estimation strategies. Our adjustment should be viewed as an interim approach.

shows the MEPS source of payment totals from the public use files. The second column shows the impact of up-weighting high cost cases.

After reweighting, we then scaled MEPS expenditure amounts to align with the MEPS-consistent NHEA totals developed by Sing et al. (2006). One area in which MEPS is particularly low is separately-billed laboratory tests, the number and financing of which are difficult to ascertain either from household respondents or from follow-back visits to providers ordering the tests. We allocated extra spending on laboratory tests based on use of physician services. For most other type of service and source of payment differences, we simply scaled MEPS amounts to close the gap with the adjusted NHEA. The third column of Table 1 shows the effect of this alignment.

The final column in Table 1 shows the impact of augmenting MEPS with NHEA expenditures that Sing et al. (2006) excluded from the MEPS-consistent benchmarks. In each case, care was taken to add in only those amounts attributable to the civilian, noninstitutionalized population. These adjustments are detailed in Table 2. One large group of adjustments is for other personal care, including non-medical assistance with activities of daily living (such as housekeeping assistance). These amounts were subtracted from NHEA by Sing et al. (2006) due to concerns they would fall outside the definition of medical care in MEPS. However, they are clearly within the scope of our more broadly-focused analysis and we have allocated them within MEPS by source of payment in proportion to home health care.

The final column of Table 1 also adds in the cost of program administration. For Medicaid, Medicare, the Veterans Administration, and Workers' Compensation, we allocated administrative costs in proportion to spending on care.[5] In the case of private insurance, the last

[5] A minor exception to this rule is that we allocated a portion of Medicaid administrative costs to new enrollees based on enrollment cost estimates from Fairbrother et al. (2004).

column is the national sum of private premiums for the civilian, non-institutionalized population, inclusive of amounts paid by households and by employers on their behalf. The MEPS household data contain information on premiums paid by households, but not employer premium contributions. We filled this gap with regression-based imputations from employer data in the MEPS Insurance Component.[6]

Another large group of adjustments are hospital subsidies not linked directly to patient care, such as Medicaid and Medicare disproportionate share payments and state and local funding for public hospitals. In each case, allocation to the person level was based on MEPS information regarding the receipt of uncompensated care (UC). MEPS gathers data on both charges and payments, thereby enabling calculation of UC. Medicare disproportional share (DSH) payments were allocated to low-income Medicare beneficiaries by UC. Medicaid DSH payments were allocated to poor non-Medicaid recipients by UC. Because MEPS UC estimates for these two groups roughly matched the DSH amounts, state and local funds for hospitals were allocated across all remaining cases by UC (regardless of income). Medicare hospital subsidies for graduate medical education were allocated to all patients in proportion to physician expenditures under the assumption that lower education costs lead to lower physician pricing.

Many of the remaining adjustments were broad-based in nature, such as research, spending on public health, and investments in plant and equipment. We allocated research spending to the full population in proportion to prescription drug expenditures. Investment in plant and equipment was allocated in proportion to hospital use. Public health dollars were allocated uniformly on a per capita basis.

[6] Our analysis ignores the possibility that employers adjust cash wages across workers to alter the true incidence of employer premium concentrations across workers. For an analysis of how this might affect incidence of the tax subsidy, see Selden and Bernard (2004).

The resulting database provides household-level data for nearly $1.3 trillion in public and private spending out of the 2002 NHEA total of $1.6 trillion. The remaining $300 million difference can be attributed solely to spending by or on behalf of persons outside the scope of MEPS.

The final step in our analysis is the simulation of a comprehensive array of tax expenditures. Marginal tax rates for our work were obtained by processing MEPS through the National Bureau of Economic Research's TAXSIM web-based simulation package (Feenberg and Coutts, 1993; National Bureau of Economic Research, 2007). Estimates by type of subsidy are provided in Table 3. For tax subsidies regarding employer-sponsored insurance (ESI), we assume that the incidence of employer contributions falls on workers who enroll in coverage. Thus, the tax subsidy on employer contributions equals the amount of taxes that would have been paid if the worker instead received cash wages (holding total employer cost constant). Not surprisingly, the largest subsidy is the exclusion of premiums for ESI from federal income, Social Security and Medicare payroll, and state income taxation, which totaled $150.3 billion exclusive of subsidies for retiree coverage. This aligns well with estimates for more recent years if one takes into account rapid premium growth after 2002. For instance, Sheils and Haught (2004) estimate the federal income and federal Social Security and Medicare tax subsidies in 2004 to be $101.0 billion and $66.4 billion, respectively (2004 dollars). Selden and Gray (2006) estimate the federal and state ESI subsidy for current workers in 2006 to be $209 billion (in 2006 dollars).

Perhaps somewhat surprisingly, the second largest component is the exemption of medical care from state and local sales taxes. The average sales tax rate across states and localities in 2002 was approximately 5.9 percent (Fox and Murray, 2005). We assume that a

sales tax, if levied on medical care, would be borne by households and private insurance companies (rather than by providers) in proportion to their payments. Sales taxes, if levied on publicly funded care, would represent an intergovernmental transfer that we did not attempt to simulate. We also assume that absent the exemption, higher payments by insurers would translate into higher premiums – a part of which would be borne by the public sector in the form of premium subsidies. We reduced the sales tax expenditure accordingly. The tax subsidy total for 2002 is estimated to have been $217.6 billion, an amount equal to approximately one sixth of the $1.3 trillion in total spending by or on behalf of the civilian, noninstitutionalized population.

Table 4 summarizes how we allocated each source of payment expenditure estimate from the adjusted MEPS to private and public sources of funds. The top row of this table repeats the source of payment totals for the fully adjusted MEPS expenditures from Table 1. The first two columns of Table 4 show how we re-allocated total estimated private out-of-pocket spending ($172.2 billion) and total estimated private health insurance premiums ($548.8 billion) to public sources to account for tax subsidies ($18 billion and $199.7 billion, respectively). For Medicare and Medicaid (columns 3 and 4), we shifted a portion of these public payments to private sources ($23.3 billion and $1.3 billion, respectively) to account for premiums paid by enrollees (in essence a “user’s fee”). Our treatment of enrollee premiums follows the standard practice described in Selden and Wasylenko (1992). We did not, however, account for the intergovernmental transfer that occurs when federally and state funded Medicaid pays federally-funded Medicare Part B premiums. We also did not account for cases in which Medicaid pays Medicare premiums for persons who are not enrolled in Medicaid. The last row of Table 4 also shows our estimate that public sector spending for health care of the civilian, noninstitutionalized

population, inclusive of tax expenditures and net of premiums paid for public coverage, was $756.8 billion in 2002.

**Discussion**

Any effort to study health care benefit incidence or conduct microsimulation must necessarily rely on household-level data. Household data, however, by their design are unlikely to provide a complete picture of outlays on health care, and they miss tax expenditures entirely. For this reason, we believe that household data from MEPS aligned with aggregate benchmarks from NHEA and supplemented by tax expenditure estimates provide the nation's best resource for conducting an analysis of these types. Nevertheless, our undertaking confronts challenges regarding differences in the scope of populations studied, differences in definitions for types of services and sources of payments, the fact that MEPS expenditures fall short of comparably-defined benchmarks from the NHEA, and the need to simulate tax expenditures. Our hope is that our alignment methodology does not impart biases that would affect mean public spending comparisons across the population subgroups we examine. However, we readily concede that differential under-reporting in MEPS by, for instance, income category would adversely impact the reliability of our estimates. On-going research at AHRQ with matched public claims data may in the future help us to identify and possibly correct for such issues, but for now we believe the importance of generating a version of MEPS aligned to aggregate benchmarks outweighs the potential pitfalls in any such undertaking.

We estimate that public spending on health care on behalf of the civilian, noninstitutionalized population totaled $756.8 billion (2002 dollars) or 58.5 percent of total spending from all sources. Public spending on health care is estimated to have been $2,626 per

capita. Of total public spending, more than a quarter ($217.6 billion) took the form of tax preferences, primarily tax subsidies to private insurance and the exemption of most medical care spending from state and local sales taxes.

The data resource we have produced is a person-level file containing MEPS public use expenditures, as well as our adjusted and augmented amounts from each step of the analysis. We hope that that this file becomes a valuable national resource to those interested both in the incidence of expenditures and the use of household data for microsimulation of public policy.

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**Table 1: Benchmarking Pooled MEPS to 2002 NHEA ($ in billions)**

| | Pooled 2002-2003 MEPS[a] | Post-stratified to up-weight high-cost cases[b] | Aligned to benchmark totals in the Sing et al. (2006) adjusted NHEA | Adjusted to include remaining NHEA amounts[c] |
|---|---|---|---|---|
| Out-of-Pocket | 161.6 | 162.9 | 141.8 | 172.2 |
| | (4.4) | (4.6) | (4.0) | (4.7) |
| Private Health Insurance[d] | 358.0 | 382.4 | 450.1 | 548.8 |
| | (12.7) | (16.4) | (17.5) | (14.6) |
| Medicare | 174.6 | 181.3 | 193.8 | 201.6 |
| | (7.4) | (7.8) | (8.1) | (8.4) |
| Medicaid/SCHIP | 85.5 | 101.5 | 118.7 | 166.7 |
| | (4.1) | (6.2) | (7.2) | (8.7) |
| Other Public[e] | 45.5 | 53.8 | 44.6 | 195.5 |
| | (7.0) | (11.5) | (5.4) | (8.6) |
| Other Sources[f] | 8.0 | 8.2 | 8.2 | 8.2 |
| | (0.6) | (0.8) | (0.8) | (0.8) |
| Total | 833.2 | 890.0 | 957.3 | 1293.1 |
| | (23.3) | (28.5) | (28.3) | (32.5) |
| Sample size = 70,099 | | | | |

Source: Authors' calculations using pooled 2002 and 2003 MEPS aligned with 2002 NHEA and other national benchmarks. Standard errors (in parentheses) are adjusted for the complex design of the MEPS sample, but do not reflect uncertainties regarding the adjustments to align MEPS with national benchmarks.

[a] MEPS 2003 data adjusted downward to 2002 dollars by GDP deflator for medical goods.
[b] Post-stratification approximately doubled weights on top 0.5 percent of cases in the expenditure distributions of each coverage type: private, Medicare, Medicaid/SCHIP, and uninsured. Raking was used to preserve MEPS control totals by age, sex, race/ethnicity, poverty status, and insurance coverage.
[c] Includes only spending amounts for the civilian, noninstitutionalized population. NHEA amounts excluded from the MEPS-consistent NHEA benchmarks in Sing et al. (2006) include personal care, administrative costs, payments to providers not linked to patient care, public health, and research. The public components of these adjustments are detailed in Table 2.
[d] Includes TRICARE.

[e] Includes Veteran's Administration, Workers' Compensation, and the NHEA categories of Other Federal and Other State and Local spending. The last cell in this row of other public expenditures also contains amounts itemized in Table 2.
[f] Includes automobile, homeowner's, and liability insurance, and other miscellaneous or unknown sources.

**Table 2: Additions to Public Spending in MEPS after Calibrating to Adjusted NHEA, 2002 ($ in billions)**

| Description | Allocation Method | Federal | State and Local | Total |
|---|---|---|---|---|
| ***Additions to Medicaid***[a] | | | | |
| Other Personal Care | In proportion to Medicaid Home Health | 20.6 | 14.8 | 35.5 |
| Administrative cost | In proportion to Medicaid expenditures[b] | 7.2 | 5.3 | 12.5 |
| ***Additions to Medicare*** | | | | |
| Non-prescription nondurable goods | In proportion to total prescription spending among Medicare population | 1.6 | 0 | 1.6 |
| Administrative cost | In proportion to Medicare expenditures | 6.3 | 0 | 6.3 |
| ***Additions to Other Public***[c] | | | | |
| Medicare disproportionate share payments to hospitals | In proportion to uncompensated care among Medicare recipients | 0.6 | 0 | 0.6 |
| Medicaid disproportionate share payments to hospitals[d] | In proportion to uncompensated care among poor non-Medicaid or Medicare enrollees | 5.8 | 4.2 | 10.0 |
| Medicare disproportionate share payments[d] | In proportion to uncompensated care among Medicare recipients | 0.6 | 0 | 0.6 |
| Medicare retrospective adjustments and capital pass-through[d] | In proportion to Medicare hospital expenditures | 2.8 | 0 | 2.8 |

| Description | Allocation Method | Federal | State and Local | Total |
|---|---|---|---|---|
| Medicare graduate medical education[d] | In proportion to physician expense[e] | 2.2 | 0 | 2.2 |
| ***Additions to Other Public (cont.)*** | | | | |
| State and local subsidies to public hospitals | In proportion to uncompensated care (all income levels) | 0 | 11.4 | 11.4 |
| Miscellaneous other NHEA amounts in Other Federal (OFD) and Other State and Local (STL) categories. | In proportion to total spending among low-income persons | 3.9 | 11.4 | 15.4 |
| Veterans Administration Other Personal Care | In proportion to VA Home Health spending | 1.4 | 0 | 1.4 |
| Other public administrative costs | In proportion to Other Public expenditures by program | 0.2 | 7.2 | 7.4 |
| Public Health | In proportion to total expenditures | 6.4 | 44.2 | 50.5 |
| Research | In proportion to total prescription drug expenditures | 25.6 | 3.8 | 29.3 |
| Investment in Structures and Equipment | In proportion to hospital expenditures | 5.9 | 14.0 | 19.9 |

Source: Spending amounts excluded from NHEA in the Sing et al. calibration with MEPS, adjusted to exclude amounts attributable to persons in institutions.

[a] Medicaid category includes State Children's Health Insurance Program (SCHIP).
[b] A small proportion was allocated to cover the enrollment costs of new enrollees in Medicaid/SCHIP.
[c] Includes Veteran's Administration, Workers' Compensation, and the NHEA categories of Other Federal and Other State and Local spending, as well as the additions itemized in table.
[d] Medicare and Medicaid lump sum payments to hospitals are allocated to Other Public source of payment, so that the Medicare and Medicaid categories capture only spending linked directly to patient care (inclusive of administration costs).
[e] Graduate medical education subsidies are assumed to lower the prices physicians charge, by reducing the education expenses they must recoup.

**Table 3: Simulated Federal, State, and Local Tax Expenditures, 2002 ($ in billions)**

| | Federal Income Tax Expenditures | Social Security/ Medicare Tax Expenditures | State & Local Tax Expenditures[a] | Total Tax Expenditures |
|---|---|---|---|---|
| Employer-Sponsored Insurance Exemption | | | | |
| Current Workers | 77.1 | 56.6 | 16.6 | 150.3 |
| | (2.3) | (1.6) | (0.1) | (4.3) |
| Retirees | 7.2 | 0 | 1.5 | 8.7 |
| | (0.3) | | (0.1) | (0.4) |
| Self-Employed Tax Deduction | 1.9 | 0 | 0.6 | 2.5 |
| | (0.1) | | (0.05) | (0.2) |
| Medical Expense Deduction | 2.3 | 0 | 0.4 | 2.7 |
| | (0.2) | | (0.04) | (0.2) |
| Sales Tax Exemption | 0 | 0 | 38.0 | 38.0 |
| | | | (1.1) | (1.1) |
| Other[b] | 7.1 | 0.8 | 7.6 | 15.6 |
| | (0.4) | (0.03) | (0.5) | (0.9) |
| Total | 95.7 | 57.4 | 64.6 | 217.6 |
| | (2.7) | (1.6) | (1.7) | (5.9) |

Source: Authors' calculations using pooled 2002 and 2003 MEPS aligned with 2002 NHEA and other national benchmarks. Standard errors (in parentheses) are adjusted for the complex design of the MEPS sample, but do not reflect uncertainties regarding the adjustments to align MEPS with national benchmarks.

[a] Includes state income tax expenditures, state and local sales tax expenditures, and local property tax expenditures. Local income taxes are not modeled. Local tax expenditures only included through state-average local sales tax rates and through a national estimate of non-profit hospital exemptions (primarily for property taxes).
[b] Included are tax subsidies for Flexible Savings Accounts, Medical Savings Accounts, charitable giving, non-profit hospitals, hospital bonds, and Blue Cross/Blue Shield.

**Table 4: Allocating Expenditures to Sources of Funds, 2002 ($ in billions)**

| | Out of Pocket Spending on Care | Private Health Insurance[a] | Medicare | Medicaid, & SCHIP | Other Public[b] | Other Sources[c] | Source of funds Totals |
|---|---|---|---|---|---|---|---|
| **Adjusted Expenditures** | 172.2 | 548.8 | 201.6 | 166.7 | 195.5 | 8.2 | 1293.1 |
| (from Table 1) | (4.7) | (14.6) | (8.4) | (8.7) | (8.6) | (0.8) | (32.5) |
| **Allocation to Sources of funds** | | | | | | | |
| **Private Sources** | | | | | | | |
| Spending on care | 154.3 | 0 | 0 | 0 | 0 | 8.2 | 162.5 |
| | (4.3) | | | | | (0.8) | (4.6) |
| Premiums | 0 | 349.1 | 23.3 | 1.3 | 0 | 0 | 373.7 |
| | | (9.3) | (0.8) | (0.2) | | | (9.8) |
| Private Total | 154.3 | 349.1 | 23.2 | 1.3 | 0 | 8.2 | 536.2 |
| | (4.3) | (9.3) | (0.8) | (0.2) | | (0.8) | (13.9) |
| **Public Sources** | | | | | | | |
| Tax expenditures | 18.0 | 199.7 | 0[d] | 0[d] | 0 | 0 | 217.6 |
| | (0.8) | (5.5) | | | | | (5.9) |
| Public outlays | 0 | 0[e] | 178.3 | 165.4 | 195.5 | 0 | 539.2 |
| | | | (7.9) | (8.7) | (8.6) | | (18.1) |
| Public Total | 18.0 | 199.7 | 178.3 | 165.4 | 195.5 | 0 | 756.8 |
| | (0.8) | (5.5) | (7.9) | (8.7) | (8.6) | | (21.4) |

Source: Authors' calculations using pooled 2002 and 2003 MEPS aligned with 2002 NHEA and other national benchmarks. Standard errors (in parentheses) are adjusted for the complex design of the MEPS sample, but do not reflect uncertainties regarding the adjustments to align MEPS with national benchmarks.

[a] Private health insurance premiums.
[b] Includes Veteran's Administration, Workers' Compensation, the NHEA categories of Other Federal and Other State and Local spending, as well as amounts listed in Table 2.
[c] Includes sources such as automobile, homeowner's, or liability insurance, and other miscellaneous or unknown sources.
[d] In principle, out of pocket spending on Medicare (or Medicaid) premiums could be offset by tax expenditures through the medical expense deduction on federal (and many state) income taxes. Although we included premiums for public coverage in our tax simulation, all tax expenditures for medical expense deductions were attributed to private out-of-pocket spending on care and private spending on health insurance premiums.
[e] We were unable to account for the small amount of private health insurance premiums paid by non-tax-related public premium subsidy programs.