

## **Comparing MEPS Use and Expenditure Estimates for the Privately Insured to Truven MarketScan® and OptumLabs™ Claims Data, 2008-2013**

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### **Disclaimer**

This paper represents the views of the authors, and no official endorsement by the Agency for Healthcare Research and Quality or the Department of Health and Human Services is intended or should be inferred.

## **ABSTRACT**

The Medical Expenditure Panel Survey (MEPS) is a widely used national resource for conducting descriptive, behavioral, and simulation analyses to inform health care policy. AHRQ continually conducts methodological investigations to assess the quality of the data collected in the MEPS. These investigations identify potential improvements in data collection procedures. They also inform the research community about strengths and limitations of the MEPS and provide guidance on methods for enhancing MEPS data for use in health care policy analyses and simulations. This study compares the 2008-2013 MEPS to private insurance claims data in the MarketScan database and in the OptumLabs Data Warehouse (OLDW) to assess the potential for underreporting of health care use and underrepresentation of persons with high expenditures in the MEPS.

## INTRODUCTION

The Medical Expenditure Panel Survey (MEPS) is a widely used national resource for conducting descriptive, behavioral, and simulation analyses to inform health care policy. Conducted annually since 1996 by the Agency for Healthcare Research and Quality (AHRQ), the MEPS is the only source of health care data that combines detailed information about health care spending with individual and family-level characteristics for the U.S. community population as a whole. AHRQ continually conducts methodological investigations to assess the quality of the data collected in the MEPS. These investigations identify potential improvements in data collection and file preparation procedures. They also inform the research community about strengths and limitations of the MEPS and provide guidance on methods for enhancing MEPS data for use in health care policy analyses and simulations.

Data collected through survey methods are subject to a number of sources of error. We focus on two problems in particular. First, previous methodological investigations using MEPS data linked to Medicare claims data found that Medicare beneficiaries systematically underreport some types of health care services, such as office-based visits and durable medical equipment (Zuvekas and Olin 2009a; 2009b), while reporting inpatient stays (Zuvekas and Olin 2009a) and prescription medications well (Hill, Zuvekas, and Zodet 2011). These studies suggest that the extent of underreporting is fairly uniform among Medicare beneficiaries and that behavioral analyses are largely unaffected by underreporting. As a result, simple adjustment factors to correct for underreporting can be applied, at least in the case of Medicare beneficiaries.

Second, studies suggest that the MEPS underrepresents some high expenditure community-dwelling populations (Zuvekas and Olin 2009b; Aizcorbe et al 2012). This creates problems for those wishing to understand the full magnitude of spending implications for health policy proposals—missing even a few high expenditure cases can make a large difference in total cost estimates. Some analysts (Cordova et al 2013, Zuvekas and Olin 2009a; Selden and Sing 2008) propose up-weighting existing high expenditure cases in the MEPS as one method to better align MEPS-based estimates with other aggregate

benchmark data on health spending such as the National Health Expenditure Accounts. However, considerable uncertainty exists concerning the magnitudes of this underrepresentation.

These dual problems of underreporting and underrepresentation of high expenditure cases extends to privately insured populations in the MEPS (Aizcorbe et al 2012). We previously found (see Appendix 1, Memorandum dated October 5, 2005) that the 2002 MEPS estimate of mean total expenditures for privately insured enrollees from large employers was 21% lower than the estimated mean total spending in Truven (formerly Medstat) MarketScan claims data. Inpatient expenditures were found to be comparable but both prescription drug and other health care expenditures were lower in the 2002 MEPS sample in comparison to MarketScan.

This paper updates the 2002 MEPS-MarketScan analysis to the time period 2008 through 2013. We compare the 2008-2013 MEPS to 2008-2013 MarketScan data and to 2008-2013 private insured claims data in the OptumLabs Data Warehouse (OLDW). Our purpose in updating these benchmark comparisons is two-fold. First, the previous comparisons are based on data that are now more than a decade old and may no longer hold. Second, the MEPS experienced a sharp drop in the number of household-reported office-based visits in 2010-2012, requiring adjustments to the final weights included in the full-year consolidated MEPS public use files (PUF) for 2010 through 2012. This also led to intensive efforts to improve MEPS field procedures and interviewer behavior in 2013-2014 and continuing forward to reemphasize the importance of data quality and the collection of accurate reports of use. We seek to validate both the 2010-2012 weight adjustment procedures and the data quality improvement activities in comparing trends in the MEPS with MarketScan and OLDW data.

## **METHODS**

We first constructed comparable person-level analytic files from the 2008-2013 MEPS full-year public use files supplemented with confidential MEPS data, the 2008-2013 Truven MarketScan claims databases, and 2008-2013 OLDW claims data.

The MEPS is nationally representative of the U.S. civilian non-institutionalized population. It employs an overlapping panel design with a new panel of households being introduced each year and interviewed 5 times to gather information covering a reference period of 2 full calendar years. Annual estimates are derived by combining the two panels (one old, one new) fielded for that year. A single household informant reports for each household although others may be present during the interview. The MEPS asks that this respondent be the person most knowledgeable about the health and health care use of the members of the household. The MEPS also conducts follow-back surveys of pharmacies, hospitals, office-based doctors, and home health agencies in the MEPS Medical Provider Component (MEPS-MPC) to obtain more accurate and complete payment data than households typically can provide.

It is important to note that the utilization data reported in the MEPS public use files comes strictly from the household reported data. In contrast, the MEPS expenditure data come from a combination of household reported data, MEPS-MPC provider reported data, and imputed data for each health care event reported by the household.

The MarketScan database is a large convenience sample (roughly one-fifth of the population with employer-sponsored health insurance coverage) containing claims and enrollment data obtained directly from large (mostly Fortune 700 companies, the very largest of employers in the U.S), supplemented with data obtained from insurers for small and mid-size employers that are not self-insured. MarketScan increased the representation of these small and

mid-size employers over the time period 2008-2013. The MarketScan person-level analytic files used in this analysis were constructed by Social and Scientific Systems, Inc. under contract and under our direction from MarketScan claims and enrollment files covering 2008 through 2013.

The OptumLabs Data Warehouse (OLDW) is a similar, large convenience sample. OptumLabs™ is an open, collaborative research and innovation center founded in 2013 as a partnership between Optum and the Mayo Clinic. Its core linked data assets include de-identified claims data for privately insured and Medicare Advantage enrollees and de-identified electronic health record (EHR) data from a nationwide network of provider groups. The database contains longitudinal health information on enrollees and patients, representing a diverse mixture of ages, ethnicities and geographical regions across the United States. The EHR data is sourced from provider groups and reflects all payers, including uninsured patients. Person-level analytic files were developed by staff from the Lewin Group (a subsidiary of Optum) and OptumLabs under our direction through a DHHS contract. All statistical analyses of the OLDW data (including reweighting described below) were performed by AHRQ in the OptumLabs Sandbox (their data processing environment).

### *Sample Construction*

A number of steps were taken to make the analytic samples as comparable as possible between the MEPS and the claims data from MarketScan and OLDW. We first limited all three samples to those persons enrolled in private employer-sponsored health insurance plans for all 12 months of the calendar year. This is to ensure that the data generating processes are as comparable as possible. In the MarketScan and OLDW databases, claims are only observed during the period of enrollment with a particular plan/employer. In contrast, MEPS includes all

reports of health care use and spending throughout the year. For example, a person who switched jobs in the middle of the year could have 2 sets of records in MarketScan or OLDW (the 1<sup>st</sup> set covering the first six months, and a 2<sup>nd</sup> set covering the last six months), both with claims covering only half the year.

We next restricted the samples to persons aged 64 years and younger to avoid issues surrounding coordination of benefits with Medicare.

We further excluded a small percentage of MarketScan enrollees (~3%) and OLDW enrollees missing data on region and/or MSA, which are necessary to post-stratify MarketScan data to the MEPS (see below). We also excluded some cases in the MarketScan data obtained from insurers where there were no drug claims but it was not known whether the plan included drug coverage or not. Because the vast majority of ESI plans include prescription drug coverage, the assumption here is that the drug claim information from the PBMs was missing for most of these cases, rather than that plan offered no prescription drug coverage. Because we seek to obtain estimates of total spending as well as by categories, we excluded these cases.

The analytic samples deviate in several important ways from the 2002 MEPS-MarketScan analyses. First, and most importantly, we no longer restrict the MEPS, MarketScan, and OLDW samples to large employers. In large part, this is because the MarketScan data now contain representation of small and medium-size employers. However, in addition, the 2008-2013 MarketScan data contain less identifying information, which essentially makes it impossible to identify group size in the data, precluding using the MEPS-IC or other sources to set control totals by establishment size. Second, the samples are no longer restricted to enrollees living in MSAs as the rural population is adequately represented in the MarketScan and OLDW data with the addition of the insurer-provided data. Third, we previously limited the MarketScan

sample to enrollees living in MEPS PSUs because health care prices, utilization, and costs vary substantially from area to area. However, this is no longer possible in the MarketScan data because more recent years include more limited geographic identifying information. Fourth, and finally, we are no longer able to restrict the samples to certain industries that are better represented in the MarketScan data because data on industry are largely missing in the 2008-2013 MarketScan.

Applying all of the above sample restrictions resulted in sample sizes ranging from 11,674 to 13,276 observations in the MEPS over the period 2008 and 2013. Sample sizes range from 19.7 to 28.5 million observations in the MarketScan data and 7.6 to 8.1 million in the OLDW data (see Table 2).

For many of the analyses, we further excluded persons with any reported nursing home or other institutional stay during the year or anyone with an inpatient stay 45 days or longer because this is one criterion (either implicitly or explicitly) used by MEPS interviewers to determine an institutional stay. We note that there was only one stay during the five-year period that exceeded 45 days in the MEPS sample.

#### *MarketScan and OLDW Weights*

To further increase comparability, we post-stratified the MarketScan and OLDW convenience samples to MEPS using age, sex, employee/spouse/dependent, Census region, and MSA status using two alternative methods: cell-based reweighting (MarketScan and OLDW) and propensity score reweighting (MarketScan only). Results were not sensitive to this choice of method. We considered two additional adjustments to the MarketScan weights but ultimately rejected them because we could not apply them in parallel to the OLDW data. First, and most

importantly, the MarketScan sample with prescription drug claims available had 2% higher non-drug spending on average controlling for age, sex, employee/spouse/dependent, Census region, and MSA status than the sample excluded because no drug claims were available. Applying this adjustment would have closed the MEPS-MarketScan gap by 1-2 percentage points in each year and brought the MarketScan means closer to the OLDW means. Second, the ratio of insurer provided to self-insured employer data rose substantially over the period 2008-2013 in the MarketScan data (and subsequently falling off again in later years not considered here). Per person costs were slightly lower on average in the insurer provided data but this adjustment would make a negligible difference on overall estimates. For this reason, and because we did not know the composition of the OLDW data over time, we did not apply this potential adjustment.

#### *MEPS weights*

We applied the final MEPS PUF weights in the main comparisons with MarketScan and OLDW. The MEPS PUF weights contain adjustments to correct for reporting problems that occurred for office-based utilization in 2010, 2011, and 2012, and inpatient utilization in 2008 and 2013. We also report the original unadjusted MEPS weights to provide a consistent weighting methodology between 2008 and 2013 and also to show how trends in use and spending for the ESI population would have looked absent the weighting adjustments in the MEPS.

#### *Expenditure and Utilization Variables*

The MarketScan claims data are organized into three files: (1) inpatient claims, including both hospital and separately billing physicians; (2) prescription drug claims; and (3) outpatient

claims, which are essentially all claims not categorized by Truven as inpatient or prescription drugs. We divided outpatient claims using a combination of STDPLAC (MarketScan standardized provider setting), STDPROV (MarketScan standardized provider type), and SVCSCAT (MarketScan standardized services category) into the following mutually exclusive types of outpatient claims: office-based provider; hospital ED; hospital outpatient; home health; other medical; lab; IC (provided in an institutional setting, such as a nursing home); other unclassifiable; and inpatient physician professional claims that Truven was unable to link to an inpatient facility claim. Total spending for each MarketScan enrollee includes all inpatient claims, all prescription drug claims, and all outpatient file claims except those provided in institutional settings, because these are clearly out-of-scope in MEPS.

Similarly, Place of Service (AMA\_CODE), revenue codes, and CPT codes for emergency department claims were used by Lewin/OptumLabs staff to divide OLDW claims into the same categories as the MarketScan claims.

We created the MEPS-equivalent outpatient variables by summing office-based, hospital outpatient department, hospital emergency department, home, and home health expenses. We excluded dental and vision services as they are typically covered under separately administered plans by employers.

We report three payment variables here: (1) total payment (essentially the allowed amount); (2) plan payment (NET payment as labeled in MarketScan and OLDW); and (3) out-of-pocket payment (COPAY+DEDUCT+COINS for MarketScan and OLDW). The MarketScan data also contain a payment amount for coordination of benefits (COB), which was on average a very small proportion of total and not reported here. In theory, the identity that Total=Plan payment+OOP+COB should hold in the MarketScan data. In practice, there is a slight

discrepancy of approximately 1% overall. We created MEPS equivalent payment variables from the person-level files for 2008-2013.

Units of analysis are largely equivalent between MEPS, MarketScan, and OLDW for prescription drug use and spending. There is a one-to-one correspondence between a claim line and fill in the MarketScan prescription drug file. Similarly, each observation in the MEPS prescription drug file represents a unique fill. However, the MEPS includes an indeterminate number of free samples, whereas MarketScan and OLDW claims do not. Six percent of the MarketScan prescription drug fills in the 2008 data have zero payments recorded in all of the payment fields falling to 3 percent in 2012 and less than one percent in 2013. We were unable to obtain an explanation for these zero payment prescription fills and changes over time in their proportion of all claims. Lacking clear direction of what to do we excluded zero payment fills in all three databases in the utilization and payments per fill measures reported.

Units of analysis are also more or less equivalent between MEPS, MarketScan and OLDW data for inpatient stays, with some important caveats. On the MarketScan side, for 2.5%-3.1% of all enrollees in the sample, Truven was unable to link some or all of their inpatient physician professional charges to specific hospital stays included in the inpatient claims file. Truven simply left these unmatched claims in the outpatient claims files—any inpatient professional charges that did match an inpatient facility claim on dates was moved to the inpatient file. We also did not include these dollars as part of the inpatient hospital totals but these unmatched claims are included in the total spending figures for MarketScan. On the MEPS side, it should be noted that household respondents sometimes report a single hospitalization when a person was discharged from a short-term acute care hospital to a rehab hospital and then home. Total LOS for the person would be unaffected but obviously counts of number of stays,

and costs per stays would be affected by how households report hospitalizations in the MEPS. We also note on the MEPS side that Westat, in constructing the inpatient hospital files and estimates, rolled in unmatched hospitalizations in the MPC that occur close in time to hospitalizations recorded in the MPC that match to hospitalizations reported in the MEPS. For example, the household might have reported being hospitalized 1/1-1/8 but there two MPC inpatient stay records for stays occurring on 1/1-1/6 and 1/8-1/11. WESTAT rolls these two MPC events together on the theory that the household is really thinking of these as a single episode of care. Again, this would affect counts and estimates of spending per stay in comparison to MarketScan and OLDW data.

Units of analysis constructed from the outpatient files are much more problematic and units cannot be assumed to be comparable between MEPS and the two claims databases, MarketScan and OLDW, and between the two claims databases. The unit of observation in the MarketScan Outpatient File is a single claim detail line and it is difficult due to a lack of identifying information to put detail lines belonging to the same health care event back together. While there is a Provider ID field on the claims, it contains mostly missing data, and there is no other information besides date and provider type with which to put them back together. Take, for example, someone seeing their primary care doctor and cardiologist on the same day in a multi-specialty practice in which they also got lab work and x-rays done. Most likely this would have been reported as a single visit in MEPS. In the MarketScan data, we aggregated claims detail lines by date and provider type if PROVIDER ID was missing (almost all the time), but this could result in as many as four different visits (internist, cardiologist, lab, and x-ray) for this case. We presume that greater deduplication of claims to the same provider on the same day

occurred in the OLDW data in comparison to MarketScan because the Lewin/OptumLabs analysts had access to more claims detail than is provided in the MarketScan files.

Households in the MEPS are also unlikely to report as separate visits, situations where they went to a doctor who then sent them elsewhere that same day to have lab work and/or x-rays done. Household respondents also historically have some difficulty distinguishing between hospital outpatient department visits and office-based visits, especially when doctors are located on the same campus or close to a hospital. These lines between settings have only grown murkier as hospital systems acquire physician practices outright or physician practices otherwise affiliate with hospital systems. Finally, we note that laboratory tests are particularly problematic when comparing claims data to survey data. It is often not possible to tell in claims data whether a person actually was physically present at the facility or not, as blood could have been drawn elsewhere then sent to the testing facility. Moreover, laboratory tests (also x-rays and other imaging) may be performed or read a day or two and sometimes much longer after the actual visit that precipitated a test.

## **RESULTS**

### *Total Spending*

Table 1 compares spending in the MEPS applying, respectively, the unadjusted MEPS weights and the final MEPS PUF weights, which contain adjustments for utilization reporting declines in certain years. Table 2 then compares MEPS using the final PUF weights to the MarketScan and OLDW claims data.

The MEPS estimate of mean total health expenditures was 26% lower than privately insured enrollees in the 2008 MarketScan and 23% lower than in the 2008 OLDW for the non-

institutionalized samples (27% and 26% lower, respectively, when including persons with stays 45 days or longer or care taking place in institutions). In 2013, mean total health expenditures in the MEPS were 24% lower than in the 2013 MarketScan and 20% lower than OLDW in the non-institutionalized samples. Over the 2008 to 2013 time period, MEPS spending for the noninstitutionalized sample grew a total of 26% in nominal terms from \$2,844 to \$3,591 (Table 2). In comparison, spending in MarketScan and OLDW grew a total of 22% each from 2008 to 2013.

The gaps in average total spending between MEPS and the two claims databases varied across years. It is difficult to assess how much of these differences was due to natural sampling variation in the MEPS, changes from the drop in household reporting of utilization and subsequent recovery from intensive quality improvement efforts, and the effects of the weighting adjustments. Out-of-pocket spending tended to be higher in the OLDW data relative to MarketScan despite similarities in total spending, suggesting a different mix of plan types in the OLDW claims.

Expenditures were consistently lower in MEPS across percentile distributions. This is also seen in the cumulative distribution of spending in the MEPS (unadjusted weights in red, adjusted PUF weights in green vs. MarketScan (blue) and OLDW claims (green) as shown in Figure 1 for 2013. This same pattern was observed in earlier years as well (not shown). MarketScan and OLDW claims consistently retain a slightly thicker tail than MEPS above \$25,000 in total spending (not shown).

### *Use and Spending by Type of Service*

Table 3 compares use and spending by type of service in the MEPS applying, respectively, the unadjusted MEPS weights and the final MEPS PUF weights that contain adjustments for utilization reporting declines in certain years. Table 4 then compares MEPS estimates by type of service using the final PUF weights to the MarketScan and OLDW claims data.

Prescription drug spending in the MEPS increased at a faster rate than in either the MarketScan or OLDW claims data (Table 4). MarketScan use and spending were higher than in OLDW claims in all years with the gaps growing in later years, and particularly in 2013. It is important to note that in the MarketScan data, the gap of 3-4 percentage points between the number of people with a prescription fill claim and the number of people with a claim with payments disappeared altogether in 2013, while the number of fills and spending went up substantially.

Mean prescription drug spending in the MEPS was 6% lower in 2008 compared to OLDW and 15% lower compared to MarketScan. By 2013, spending was 5% higher in the MEPS compared to OLDW and 10% lower compared to MarketScan. This increase in spending in the MEPS relative to the claims databases was primarily driven by faster increases in per prescription drug spending in the MEPS. The percent of the privately insured with fills and the mean number of fills per person are both lower in the MEPS while average cost per fill was higher, particularly in later years. This is consistent with previous methodological studies, which found that MEPS respondents tend to underreport prescriptions such as antibiotics and topical ointments for acute conditions that are relatively inexpensive in comparison to prescriptions for

chronic conditions such as diabetes, hypertension, and cholesterol that tend to be more expensive on average (Hill, Zuvekas, and Zodet 2011).

Inpatient use in the MEPS increased substantially relative to the claims databases using either the unadjusted or final PUF weights, as did spending using the final PUF weights. MEPS inpatient spending rose above that in OLDW beginning in 2010. MEPS mean spending per person was higher than MarketScan in 2012 but lower in 2013 (\$921 vs. \$960). The proportion of people with inpatient utilization declined in the MarketScan and OLDW data, from 4.5% in 2008 to 3.8% in 2013 in both datasets. Using the unadjusted weights, the proportion of the population using inpatient treatment stayed constant from 2008 through 2012 in the MEPS before dropping in 2013. Using the final PUF weights, the proportion in MEPS increased from 4.5 in 2008 to 4.9-5.0 percent in 2010 through 2013. It is possible that some of the divergence between MEPS and the claims databases on the proportion with a stay is due to increased reimbursement of one or two night observational stays by health plans, which would likely still be identified by MEPS respondents as inpatient stays but appear in claims data as outpatient department events. Indeed, the proportion of the population with a hospital stay of 3 or more nights tracks more closely between MEPS and the claims data.

The largest gaps in relative terms between MEPS and the claims databases were in Emergency Department and especially Hospital Outpatient Department Visits. The proportion and average number of ED visits remained relatively flat in the MEPS from 2008-2013 while mean spending rose modestly. In contrast, mean ED spending rose sharply in the MarketScan (up 55%) and OLDW (up 52%) databases between 2008 and 2013. The MarketScan data show an upward trend in use while the OLDW data show a slight downward trend in use, offset by even larger increases in per visit ED spending compared to MarketScan. The differences in

utilization trends may be due to differences in how ED visits can be identified in the two claims databases. By 2013, MEPS spending on ED visits was about half that in the claims databases (\$165 vs. \$328 in the OLDW data and \$315 in the MarketScan).

Mean spending on Hospital Outpatient Department visits in the MEPS started at approximately half that shown in the claims databases in 2008 and declined still further. The gap between MEPS and OLDW in Hospital Outpatient Department spending of \$638 in 2013 represents 70% of the overall gap between MEPS and OLDW in the non-institutionalized sample (\$3,591 vs. \$4,501). The gap in Hospital Outpatient Department Spending represented 55% of the overall gap between MEPS and MarketScan. Only 15% of MEPS respondents reported a hospital outpatient department visit in 2013 compared to 33% in the MarketScan and 28% in the OLDW. There was a three-fold gap in number of visits compared to the two-fold difference in spending between MEPS and MarketScan, suggesting greater unbundling in the MarketScan claims. The differences in counts and per visit spending may also reflect significant underreporting of laboratory services in the MEPS as documented in the previous MEPS-Medicare comparisons. For example, a respondent may report a visit to an office-based doctor for a sore throat in MEPS but not the strep test that was sent by the doctor to a hospital lab, and for which the person never set foot in the hospital. The differences in percent using hospital outpatient department services, mean number of visits, and spending per visit between MarketScan and OLDW may have resulted from differences in how visits were identified and counted in the two claims databases.

The MarketScan and OLDW data strongly suggest that office-based utilization remained essentially flat from 2010-2012 compared to 2008-2009 in contrast to sharp declines experienced in the MEPS, prior to the final PUF weight adjustment. Once the weight adjustment is applied,

the trend in spending on office-based services in the MEPS falls into line with MarketScan and OLDW. While mean visit counts are included in Table 4 for the purposes of comparing trends, we strongly caution that they are not directly comparable. The gap in total spending is much smaller than the gap in visit counts likely reflecting the greater unbundling in the MarketScan and OLDW claims derived counts compared to how households report use. This is further borne out by the higher per visit spending in the MEPS compared to MarketScan and OLDW claims.

### *Concentration of Spending*

Table 5 compares the concentration of spending in the MEPS to the two private claims databases. Concentration at the very top (1 and 2%) spiked up in the MEPS in 2012 compared to earlier years and then fell off again in 2013. Reassuringly, the concentration of spending is fairly similar in the MEPS compared to both MarketScan and OLDW. In part, this reflects the fact that the downward bias in concentration of spending due to the underrepresentation of very high expenditure cases in MEPS is offset by underreporting of ambulatory services which is much more widely distributed (Zuvekas and Olin 2009). Estimates of concentration of spending track closely in MarketScan and OLDW.

### *Spending by Selected Demographic Characteristics*

Like most claims databases, the MarketScan and OLDW data contains very limited information about individual enrollees. We report some comparisons of MEPS to MarketScan by Sex, Age, Census Region, and MSA status in Table 6 for 2009, 2012, and 2013. There are no clear patterns in reporting with respect to age and sex over time. However, there are significant geographic differences in comparing MEPS to MarketScan and OLDW. In particular, the ratio

of MEPS to MarketScan and OLDW spending is consistently highest in the South and generally lowest in the Northeast.

### *Influence of Outliers*

We examined the influence of outliers by simulating the effects of trimming persons with high expenditures on mean expenditures per enrolled person (Table 7) for the years 2009, 2012, and 2013. 2009 was chosen because it represents the last year before the significant drop in reporting of office-based visits in the MEPS before its recovery in 2013-2014. 2012 and 2013 were chosen because they are the latest 2 years for which comparisons between MEPS and MarketScan and OLDW were available. We first dropped those who had either a clearly identifiable institutional stay or an inpatient stay of 45 days or more in the hospital because this is one criterion (either implicitly or explicitly) used by MEPS interviewers to determine an institutional stay. We note that there was only one stay during the five-year period that exceeded 45 days in the MEPS sample. These exclusions dropped the MEPS/MarketScan spending gap in the full sample by 1 percentage point and the MEPS/ OLDW spending gap by 4 percentage points in 2009. The importance of these exclusions increased over time. By 2012, the institutional exclusions dropped the MEPS/MarketScan spending gap by 2 percentage points and the MEPS/ OLDW spending gap by 6 percentage points. In 2013, the spending gap between MEPS and OLDW was 25% in the full sample and 20% in the non-institutional sample. In contrast, the spending gap between MEPS and MarketScan dropped from 26% to 24% when applying the institutional exclusions.

Four times as many observations were dropped in relative terms because of the institutional care exclusions in the OLDW Lab data compared to the MarketScan data in each

year. The single biggest difference was in the many more claims for residential and substance abuse treatment in the OLDW compared to Market Scan, which may reflect differences in carve-out arrangements between plans in the Market Scan data and OLDW plans. The number of weighted observations excluded for institutional care was much smaller in MEPS than in either claims data source. In part, this reflects the fact that the sampling frame for the MEPS is the non-institutionalized population, and anyone institutionalized the entire year is out-of-scope in the MEPS, altogether. Likewise, those who were institutionalized during only part of the year may have been out-of-scope for an entire interview round. Consequently, no health insurance information would be collected for them that round resulting in their exclusion from this analysis, which is restricted to persons with 12 months of coverage. However, persons receiving care in institutions only part of a survey round may either underreport these institutional stays in the MEPS or may be underrepresented in the MEPS sample.

After applying the institutional exclusions, we further truncated observations at different high spending points (\$200K, \$150K, \$100K). Truncating at \$100,000 (99.7 percentile of the MarketScan and OLDW data) drops the gap between MEPS and both MarketScan and OLDW a further 3 percentage points in 2013. In 2013, mean overall expenditures in the MEPS change by 13% when truncating the 36 cases above \$100,000 demonstrating how sensitive estimates are to the presence (or in the case of MEPS, likely absence) of high expenditure outliers. It is likely that illnesses that lead to such high expenditures may substantially impede participation in the NHIS and subsequently in the MEPS.

## DISCUSSION

The MEPS estimate of mean total health expenditures was 26% lower than privately insured enrollees in the 2008 MarketScan and 23% lower than in the 2008 OptumLabs Data Warehouse (OLDW) for the non-institutionalized samples. In 2013, mean total health expenditures in the MEPS were 24% lower than in the MarketScan and 20% lower than OLDW in the non-institutionalized samples. These gaps are substantially higher than that reported by Aizcorbe et al (2012), which found a 10% gap overall between MEPS and MarketScan. A large part of the differences in our estimates and Aizcorbe et al.'s estimates is the inclusion of part-year enrollees in their analyses, which tends to push down the claims-based estimates of mean total spending. Differences in how plans without prescription drug spending in the MarketScan data were treated may also explain the smaller gaps Aizcorbe et al. found.

The gaps in average total spending between MEPS and the MarketScan and OLDW claims databases varied across years. It is difficult to assess how much of these differences were due to natural sampling variation in the MEPS, changes from the drop in household reporting of utilization and subsequent recovery from intensive quality improvement efforts, and the effects of the weighting adjustments.

Over the 2008 to 2013 time period, MEPS spending grew a total of 26% in nominal terms from an average of \$2,844 to \$3,591. Total spending in the OLDW and MarketScan data grew by a similar amount of 22% each. However, there were important differences in trends within spending categories over the period 2008 through 2013 that are masked in the total spending estimates. In particular, prescription drug spending grew more rapidly in the MEPS in comparison to the OLDW and MarketScan claims databases, driven primarily by greater increases in spending per fill. Inpatient use and spending in the MEPS also increased

substantially relative to the two claims databases. The proportion of people with inpatient utilization declined in the MarketScan and OLDW data but increased in MEPS.

Although exact comparisons are impossible, the MarketScan and OLDW claims data strongly suggest that office-based utilization remained essentially flat from 2010-2012 compared to 2008-2009 in contrast to sharp declines experienced in the MEPS, prior to the final PUF weight adjustment. Once the weight adjustment, which ended in 2013, is applied, the trend in spending on office-based services falls into line with MarketScan and OLDW. This gives strong supporting evidence that the fundamental assumption in the weight adjustment that office-based utilization was flat over this period is correct. However, it should be noted that the PUF weight adjustment, being applied at the person level, also had the effect of boosting MEPS inpatient and prescription drug spending substantially.

MEPS estimates of inpatient and prescription drug spending compare well in aggregate to MarketScan and OLDW data. This is consistent with findings of previous comparisons of MEPS to the claims data of MEPS Medicare beneficiaries (Zuvekas and Olin 2009a, 2009b; Hill, Zuvekas, and Zodet 2011). Spending on office-based, emergency department and hospital outpatient services was substantially lower in the MEPS compared to MarketScan and OLDW. Most importantly, mean spending on hospital outpatient services is reported in MEPS to be only half that of the claims data. This gap in hospital outpatient services contributes 70 percent of the gap in total spending between MEPS and the OLDW data in 2013, and 55 percent of the MEPS-MarketScan gap. Some of this difference may be attributable to differences in classification of services between the two data sources, but it is also consistent with findings from the MEPS-Medicare studies (Zuvekas and Olin 2009a, 2009b). These previous studies suggest that many of the missing hospital outpatient services in the MEPS are laboratory and other services that are

difficult to capture in the MEPS (for example, separately billed laboratories are deliberately not followed in the MPC because of cost and feasibility concerns and household respondents are unlikely to report tests sent to a hospital lab by their office-based doctor).

A frequent criticism of the MEPS is underrepresentation of persons with high expenditures. For example, there were only 36 observations in the 2013 MEPS sample with total spending greater than \$100,000 whereas one would expect twice that number based on distributions in the MarketScan and OLDW data. However, we note that many of these MarketScan high expenditure cases may not even be eligible for the MEPS. For example, someone with a 365+ night hospital stay would almost certainly be out of scope. Nevertheless, the MEPS still likely misses some high expenditure cases either through underreporting of services because of the burden of reporting or through attrition that is difficult to adequately compensate for in the survey analytic weights. As the simulations found in Table 7 show, even missing three dozen high expenditure cases can move mean expenditures by as much as 13%. Unfortunately, it is difficult to gauge from these analyses exactly how many high expenditure cases that should be in-scope for MEPS were missing.

We caution that it is difficult to draw strong conclusions from this benchmark exercise. We took a number of steps to increase comparability between the nationally representative MEPS sample and the two claims databases, MarketScan and OLDW. However, the MarketScan and OLDW data remain convenience samples and reweighting to MEPS control totals on limited demographic information may not capture important differences in enrollee populations. For example, certain industries or types of employers (e.g. small employers) are likely underrepresented in the MarketScan data, and perhaps also the OLDW data. Additionally, there is no way to systematically determine whether a specific enrollee in MarketScan or OLDW

would be out-of-scope in the MEPS, a substantial concern especially in the tail of the expenditure distribution. This concern is heightened by the four-fold differences in the size of the population with institutional care in the OLDW data compared to the MarketScan data. Other differences between the MarketScan and OLDW, especially in level and trends in prescription drug spending, also raise concerns. Finally, the MarketScan data provide very limited information on outpatient and office-based services which makes constructing comparable units between the MEPS and MarketScan virtually impossible. In particular, there is likely to be substantially more unbundling of services in the MarketScan than in the MEPS. This is less of a problem in the OLDW data, but there are still likely differences in how services are reported in the MEPS compared to OLDW claims data.

Despite these limitations, it appears that a combination of simple adjustments for underreporting of ambulatory services in the MEPS and adjusting the tail of the expenditure distribution in the MEPS would move MEPS, at least in aggregate, close to MarketScan and OLDW levels. Previous analyses comparing MEPS to Medicare claims (Zuvekas and Olin 2009) suggest these adjustments can still preserve correlations/associations between key covariates and use and expenditure outcomes.

We conclude that the best way to understand potential underestimation of utilization and expenditures in the MEPS is to conduct a comprehensive analysis comparing MEPS household reported data, MPC data, and claims data for the same sample of MEPS respondents. We also conclude that changing MEPS procedures and following people who started in the community regardless of whether they are institutionalized or have a very long hospital stay may incrementally improve MEPS expenditure estimates.

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**Table 1. Comparison of Total Expenditures, MEPS Unadjusted and Final PUF Weights, 2008-2013**

	MEPS Unadjusted Weights						MEPS PUF Weights					
	2008	2009	2010	2011	2012	2013	2008	2009	2010	2011	2012	2013
<b>Full Sample</b>												
% with expense	82.9%	83.6%	81.5%	80.8%	79.7%	83.2%	82.9%	83.6%	83.2%	83.0%	82.8%	83.3%
Mean Total \$	\$2,899	\$3,174	\$2,957	\$3,291	\$3,419	\$3,410	\$2,901	\$3,174	\$3,179	\$3,580	\$3,753	\$3,626
MEPS/MarketScan	0.73	0.76	0.68	0.73	0.73	0.70	0.73	0.76	0.73	0.79	0.81	0.74
MEPS/ OLDW	0.74	0.78	0.69	0.74	0.74	0.70	0.74	0.78	0.75	0.80	0.81	0.75
<b>Noninstitutionalized Sample (no-IC events, Max INP stay&lt;=45)</b>												
% with expense	82.9%	83.5%	81.4%	80.8%	79.7%	83.1%	82.9%	83.5%	83.2%	82.9%	82.8%	83.3%
Mean OOP \$	\$414	\$417	\$411	\$404	\$423	\$455	\$414	\$417	\$440	\$434	\$459	\$467
Mean Plan \$	\$2,275	\$2,503	\$2,226	\$2,561	\$2,652	\$2,610	\$2,276	\$2,503	\$2,393	\$2,784	\$2,913	\$2,797
Mean Total \$	\$2,843	\$3,149	\$2,903	\$3,197	\$3,400	\$3,381	\$2,844	\$3,149	\$3,120	\$3,477	\$3,731	\$3,591
MEPS/MarketScan	0.74	0.77	0.69	0.73	0.76	0.72	0.74	0.77	0.74	0.79	0.83	0.76
MEPS/ OLDW	0.77	0.82	0.73	0.77	0.79	0.75	0.77	0.82	0.79	0.83	0.87	0.80
<b>Distribution of Total Expenditures</b>												
1 <sup>st</sup> Percentile	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
5 <sup>th</sup> Percentile	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
10 <sup>th</sup> Percentile	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
25 <sup>th</sup> Percentile	\$103	\$113	\$88	\$81	\$73	\$120	\$103	\$113	\$108	\$105	\$112	\$122
50 <sup>th</sup> Percentile	\$612	\$662	\$548	\$540	\$502	\$613	\$612	\$662	\$613	\$624	\$607	\$625
75 <sup>th</sup> Percentile	\$2,391	\$2,527	\$2,212	\$2,252	\$2,189	\$2,451	\$2,389	\$2,527	\$2,431	\$2,531	\$2,530	\$2,551
90 <sup>th</sup> Percentile	\$6,930	\$7,425	\$6,838	\$7,437	\$7,521	\$8,034	\$6,930	\$7,425	\$7,440	\$8,230	\$8,338	\$8,474
95 <sup>th</sup> Percentile	\$12,198	\$13,653	\$12,022	\$14,662	\$15,300	\$14,502	\$12,198	\$13,653	\$13,024	\$15,733	\$16,358	\$15,406
99 <sup>th</sup> Percentile	\$33,389	\$41,159	\$37,299	\$43,580	\$43,063	\$40,903	\$33,442	\$41,159	\$40,660	\$45,655	\$46,852	\$44,455
Max	\$180K	\$238K	\$274K	\$391K	\$537K	\$515K	\$180K	\$238K	\$274K	\$391K	\$537K	\$515K
obs	12,018	13,266	11,674	12,060	12,949	11,660	12,018	13,266	11,674	12,060	12,949	11,660

**Table 2. Comparison of Total Expenditures, MEPS, MarketScan, and OLDW, 2008-2013**

	MEPS PUF Weights						MarketScan						OLDW					
	2008	2009	2010	2011	2012	2013	2008	2009	2010	2011	2012	2013	2008	2009	2010	2011	2012	2013
<b>Full Sample</b>																		
% with expense	82.9%	83.6%	83.2%	83.0%	82.8%	83.3%	87.4%	88.2%	87.6%	88.1%	88.2%	88.6%	86.6%	87.6%	87.2%	87.6%	87.5%	87.7%
Mean Total \$	\$2,901	\$3,174	\$3,179	\$3,580	\$3,753	\$3,626	\$3,978	\$4,203	\$4,351	\$4,532	\$4,656	\$4,896	\$3,902	\$4,090	\$4,256	\$4,468	\$4,635	\$4,854
MEPS/MktScan	0.73	0.76	0.73	0.79	0.81	0.74	----	----	----	----	----	----	----	----	----	----	----	----
MEPS/OLDW	0.74	0.78	0.75	0.80	0.81	0.75	----	----	----	----	----	----	----	----	----	----	----	----
<b>Noninstitutionalized Sample (no-IC events, Max INP stay&lt;=45)</b>																		
% with expense	82.9%	83.5%	83.2%	82.9%	82.8%	83.3%	87.3%	88.1%	87.5%	88.1%	88.1%	88.5%	86.5%	87.4%	87.0%	87.4%	87.4%	87.5%
Mean OOP \$	\$414	\$417	\$440	\$434	\$459	\$467	\$543	\$563	\$603	\$629	\$660	\$668	\$612	\$651	\$701	\$737	\$780	\$805
Mean Plan \$	\$2,276	\$2,503	\$2,393	\$2,784	\$2,913	\$2,797	\$3,207	\$3,415	\$3,518	\$3,646	\$3,719	\$3,929	\$3,072	\$3,184	\$3,254	\$3,428	\$3,525	\$3,691
Mean Total \$	\$2,844	\$3,149	\$3,120	\$3,477	\$3,731	\$3,591	\$3,858	\$4,071	\$4,216	\$4,379	\$4,495	\$4,719	\$3,687	\$3,838	\$3,959	\$4,169	\$4,310	\$4,501
MEPS/MktScan	0.74	0.77	0.74	0.79	0.83	0.76	----	----	----	----	----	----	----	----	----	----	----	----
MEPS/ OLDW	0.77	0.82	0.79	0.83	0.87	0.80	----	----	----	----	----	----	----	----	----	----	----	----
<b>Distribution of Total Expenditures</b>																		
1 <sup>st</sup> Percentile	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
5 <sup>th</sup> Percentile	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
10 <sup>th</sup> Percentile	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
25 <sup>th</sup> Percentile	\$103	\$113	\$108	\$105	\$112	\$122	\$234	\$256	\$241	\$262	\$266	\$277	\$217	\$241	\$229	\$243	\$245	\$251
50 <sup>th</sup> Percentile	\$612	\$662	\$613	\$624	\$607	\$625	\$989	\$1,046	\$1,031	\$1,068	\$1,065	\$1,087	\$925	\$969	\$960	\$993	\$1,001	\$1,001
75 <sup>th</sup> Percentile	\$2,389	\$2,527	\$2,431	\$2,531	\$2,530	\$2,551	\$3,261	\$3,409	\$3,420	\$3,507	\$3,497	\$3,580	\$3,024	\$3,132	\$3,163	\$3,254	\$3,301	\$3,335
90 <sup>th</sup> Percentile	\$6,930	\$7,425	\$7,440	\$8,230	\$8,338	\$8,474	\$8,731	\$9,168	\$9,416	\$9,705	\$9,853	\$10,299	\$8,258	\$8,601	\$8,851	\$9,213	\$9,486	\$9,817
95 <sup>th</sup> Percentile	\$12,198	\$13,653	\$13,024	\$15,733	\$16,358	\$15,406	\$15,035	\$15,890	\$16,599	\$17,214	\$17,730	\$18,794	\$14,335	\$14,992	\$15,658	\$16,477	\$17,159	\$18,011
99 <sup>th</sup> Percentile	\$33,442	\$41,159	\$40,660	\$45,655	\$46,852	\$44,455	\$44,193	\$46,906	\$49,801	\$52,090	\$54,566	\$58,593	\$42,628	\$44,229	\$46,598	\$49,971	\$52,713	\$56,362
Max	\$180K	\$238K	\$274K	\$391K	\$537K	\$515K	\$4.7m	\$4.8m	\$20.8m	\$7.0m	\$9.9m	\$8.0m	\$3.6m	\$2.3m	\$4.2m	\$7.3m	\$3.9m	\$5.1m
obs	12,018	13,266	11,674	12,060	12,949	11,660	19.7m	26.3m	24.9m	27.5m	28.3m	23.7m	7.9m	8.1m	7.6m	7.6m	7.6m	7.6m

**Table 3. Comparison of Expenditures\* by Category, MEPS Unadjusted and Final PUF Weights, 2008-2013**

	MEPS Unadjusted Weights						MEPS PUF Weights					
	2008	2009	2010	2011	2012	2013	2008	2009	2010	2011	2012	2013
<b>Rx</b>												
% with fills	64.6%	65.1%	62.3%	63.1%	60.1%	61.7%	64.6%	65.1%	63.7%	64.9%	63.7%	61.9%
% with expense	64.6%	65.0%	62.3%	63.0%	60.0%	61.5%	64.6%	65.0%	63.7%	64.8%	63.5%	61.7%
# of fills >0\$	7.99	7.98	7.70	7.75	7.35	7.55	7.99	7.98	8.06	8.15	7.87	7.63
Mean \$	\$678	\$725	\$671	\$763	\$795	\$865	\$678	\$725	\$704	\$817	\$862	\$872
\$/fill	\$85	\$91	\$87	\$98	\$108	\$115	\$85	\$91	\$87	\$100	\$110	\$114
<b>Inpatient</b>												
% with stay	4.5%	4.5%	4.7%	4.6%	4.6%	4.0%	4.5%	4.5%	5.0%	5.0%	5.0%	4.9%
Mean stays	0.053	0.052	0.056	0.053	0.057	0.048	0.053	0.052	0.060	0.057	0.063	0.058
Mean \$	\$670	\$736	\$807	\$879	\$983	\$764	\$671	\$736	\$869	\$956	\$1,089	\$921
Mean \$/Stay	\$12,653	\$14,091	\$14,389	\$16,639	\$17,187	\$16,023	\$12,654	\$14,091	\$14,414	\$16,710	\$17,423	\$15,932
Mean LOS	3.43	3.42	3.59	3.29	3.79	3.22	3.43	3.42	3.60	3.31	3.83	3.18
<b>ER</b>												
% with visit	10.4%	10.5%	9.1%	10.1%	9.9%	10.0%	10.4%	10.5%	9.5%	10.6%	10.5%	10.3%
Mean visits	0.14	0.13	0.11	0.13	0.13	0.13	0.14	0.13	0.12	0.13	0.13	0.13
Mean \$	\$140	\$154	\$133	\$153	\$162	\$159	\$140	\$154	\$138	\$161	\$173	\$165
Mean \$/visit	\$1,036	\$1,197	\$1,172	\$1,213	\$1,289	\$1,253	\$1,036	\$1,197	\$1,173	\$1,214	\$1,293	\$1,252
<b>OP</b>												
% with visit	15.7%	14.4%	13.3%	13.6%	13.2%	14.8%	15.7%	14.4%	13.9%	14.4%	14.0%	15.0%
Mean visits	0.35	0.35	0.31	0.32	0.31	0.34	0.35	0.35	0.33	0.35	0.33	0.35
Mean \$	\$413	\$445	\$390	\$389	\$471	\$441	\$413	\$445	\$422	\$421	\$513	\$455
Mean \$/visit	\$1,174	\$1,255	\$1,265	\$1,207	\$1,528	\$1,277	\$1,174	\$1,255	\$1,283	\$1,220	\$1,535	\$1,291
<b>Office-Based</b>												
% with visit	77.6%	78.6%	74.9%	73.7%	73.6%	78.4%	77.6%	78.6%	77.4%	76.8%	77.4%	78.6%
Mean visits	4.91	4.99	4.44	4.44	4.42	5.19	4.91	4.99	4.88	4.93	4.90	5.26
Mean \$	\$904	\$1,049	\$875	\$981	\$943	\$1,091	\$904	\$1,049	\$958	\$1,087	\$1,043	\$1,115
Mean \$/visit	\$184	\$210	\$197	\$221	\$213	\$210	\$184	\$210	\$196	\$221	\$213	\$212

\* Noninstitutionalized Sample (no-IC events, Max INP stay<=45)

**Table 4. Comparison of Expenditures\* by Category, MEPS, MarketScan, and OLDW, 2008-2013**

	MEPS PUF Weights						MarketScan						OLDW					
	2008	2009	2010	2011	2012	2013	2008	2009	2010	2011	2012	2013	2008	2009	2010	2011	2012	2013
<b>Rx</b>																		
% with fills	64.6%	65.1%	63.7%	64.9%	63.7%	61.9%	72.8%	73.9%	72.5%	73.0%	72.0%	72.0%	68.7%	68.8%	68.0%	68.1%	67.2%	66.4%
% with expense	64.6%	65.0%	63.7%	64.8%	63.5%	61.7%	69.2%	69.9%	68.8%	70.1%	69.5%	72.0%	68.7%	68.8%	68.0%	68.1%	67.2%	66.4%
# of fills >0\$	7.99	7.98	8.06	8.15	7.87	7.63	9.42	9.47	9.42	9.64	9.47	9.82	9.38	9.25	9.33	9.36	9.31	9.24
Mean \$	\$678	\$725	\$704	\$817	\$862	\$872	\$801	\$817	\$832	\$871	\$879	\$971	\$724	\$734	\$764	\$792	\$814	\$833
\$/fill	\$85	\$91	\$87	\$100	\$110	\$114	\$85	\$86	\$88	\$90	\$93	\$99	\$77	\$79	\$82	\$85	\$87	\$90
<b>Inpatient</b>																		
% with stay	4.5%	4.5%	5.0%	5.0%	5.0%	4.9%	4.5%	4.5%	4.3%	4.2%	4.0%	3.8%	4.5%	4.4%	4.2%	4.1%	4.0%	3.8%
Mean stays	0.053	0.052	0.060	0.057	0.063	0.058	0.055	0.054	0.052	0.051	0.049	0.047	0.053	0.052	0.050	0.048	0.048	0.045
Mean \$	\$671	\$736	\$869	\$956	\$1,089	\$921	\$819	\$866	\$902	\$914	\$922	\$960	\$789	\$802	\$822	\$866	\$875	\$904
Mean \$/Stay	\$12,654	\$14,091	\$14,414	\$16,710	\$17,423	\$15,932	\$14,937	\$15,967	\$17,245	\$17,828	\$18,820	\$20,555	\$14,810	\$15,520	\$16,523	\$17,975	\$18,738	\$19,985
Mean LOS	3.43	3.42	3.60	3.31	3.83	3.18	3.49	3.47	3.49	3.54	3.57	3.58	3.42	3.37	3.33	3.43	3.50	3.50
<b>ER</b>																		
% with visit	10.4%	10.5%	9.5%	10.6%	10.5%	10.3%	13.8%	14.5%	14.0%	14.2%	14.3%	13.7%	13.6%	14.1%	13.3%	12.7%	13.0%	12.8%
Mean visits	0.14	0.13	0.12	0.13	0.13	0.13	0.19	0.21	0.21	0.21	0.22	0.20	0.18	0.19	0.18	0.17	0.17	0.17
Mean \$	\$140	\$154	\$138	\$161	\$173	\$165	\$203	\$238	\$264	\$282	\$305	\$315	\$216	\$250	\$259	\$283	\$312	\$328
Mean \$/visit	\$1,036	\$1,197	\$1,173	\$1,214	\$1,293	\$1,252	\$1,047	\$1,149	\$1,273	\$1,333	\$1,416	\$1,550	\$1,194	\$1,324	\$1,472	\$1,675	\$1,804	\$1,918
<b>OP</b>																		
% with visit	15.7%	14.4%	13.9%	14.4%	14.0%	15.0%	35.9%	36.0%	35.4%	36.3%	35.5%	32.7%	29.1%	29.3%	28.4%	27.9%	27.7%	27.6%
Mean visits	0.35	0.35	0.33	0.35	0.33	0.35	1.13	1.14	1.13	1.19	1.16	1.05	0.73	0.75	0.73	0.72	0.72	0.73
Mean \$	\$413	\$445	\$422	\$421	\$513	\$455	\$865	\$907	\$944	\$1,028	\$1,058	\$1,078	\$825	\$874	\$912	\$974	\$1,018	\$1,092
Mean \$/visit	\$1,174	\$1,255	\$1,283	\$1,220	\$1,535	\$1,291	\$763	\$796	\$834	\$862	\$914	\$1,029	\$1,127	\$1,172	\$1,250	\$1,351	\$1,411	\$1,487
<b>Office-Based</b>																		
% with visit	77.6%	78.6%	77.4%	76.8%	77.4%	78.6%	82.3%	82.3%	81.9%	82.9%	83.5%	84.0%	82.7%	84.0%	83.6%	84.0%	84.0%	84.3%
Mean visits	4.91	4.99	4.88	4.93	4.90	5.26	6.85	7.06	6.95	7.02	7.10	7.29	7.10	7.24	7.10	7.15	7.13	7.16
Mean \$	\$904	\$1,049	\$958	\$1,087	\$1,043	\$1,115	\$1,046	\$1,110	\$1,138	\$1,146	\$1,189	\$1,245	\$1,046	\$1,091	\$1,113	\$1,159	\$1,194	\$1,238
Mean \$/visit	\$184	\$210	\$196	\$221	\$213	\$212	\$153	\$157	\$164	\$163	\$167	\$171	\$147	\$151	\$157	\$162	\$168	\$173

\* Noninstitutionalized Sample (no-IC events, Max INP stay<=45)

**Table 5. Concentration of Total Spending\*, MEPS, MarketScan and OLDW, 2008-2013**

	% of Total Spending					
	2008	2009	2010	2011	2012	2013
<b>MEPS Unadjusted Weights</b>						
Top 1%	21.8%	21.8%	22.8%	22.5%	27.3%	24.9%
Top 2%	31.0%	31.9%	33.1%	33.5%	37.7%	34.9%
Top 5%	48.2%	49.2%	51.4%	52.8%	55.9%	52.2%
Top 10%	64.3%	65.2%	67.1%	69.0%	71.7%	68.2%
Top 25%	85.6%	86.1%	87.3%	88.4%	89.8%	87.7%
Top 50%	97.1%	97.2%	97.5%	97.8%	98.1%	97.5%
<b>MEPS PUF Weights</b>						
Top 1%	21.7%	21.8%	22.0%	21.5%	26.6%	24.6%
Top 2%	31.1%	31.9%	32.3%	32.1%	36.5%	34.9%
Top 5%	48.2%	49.2%	50.5%	51.4%	54.5%	52.5%
Top 10%	64.4%	65.2%	66.3%	67.8%	70.3%	68.6%
Top 25%	85.7%	86.1%	86.8%	87.7%	89.0%	88.1%
Top 50%	97.1%	97.2%	97.3%	97.6%	97.8%	97.5%
<b>MarketScan</b>						
Top 1%	23.7%	23.8%	24.5%	24.7%	25.2%	25.4%
Top 2%	32.7%	32.9%	33.8%	34.1%	34.8%	35.2%
Top 5%	48.4%	48.6%	49.8%	50.1%	51.0%	51.6%
Top 10%	63.1%	63.3%	64.4%	64.7%	65.5%	66.2%
Top 25%	83.8%	83.8%	84.6%	84.6%	85.0%	85.4%
Top 50%	96.0%	95.9%	96.2%	96.2%	96.2%	96.3%
<b>OLDW</b>						
Top 1%	24.7%	24.5%	24.7%	25.2%	25.4%	26.0%
Top 2%	33.8%	33.6%	34.0%	34.7%	35.0%	35.8%
Top 5%	49.4%	49.3%	50.0%	50.7%	51.3%	52.2%
Top 10%	64.0%	63.9%	64.7%	65.4%	65.9%	66.9%
Top 25%	84.3%	84.2%	84.7%	85.0%	85.3%	85.9%
Top 50%	96.1%	96.0%	96.2%	96.2%	96.3%	96.4%

\*Noninstitutionalized Sample (no-IC events, Max INP stay<=45)

**Table 6. Mean Spending\* by Demographic Characteristics, MEPS, MarketScan and OLDW, 2009, 2012 and 2013**

	2009			2012			2013		
	MEPS	MktScan	OLDW	MEPS	MktScan	OLDW	MEPS	MktScan	OLDW
<b>Sex</b>									
Male	2,607	3,547	3,322	3,576	3,926	3,765	3,042	4,137	3,925
Female	3,667	4,571	4,334	3,881	5,043	4,840	4,127	5,282	5,068
<b>Age</b>									
0-17	1,397	1,815	1,777	1,620	2,103	2,107	1,716	2,213	2,197
18-34	2,195	3,031	2,807	2,924	3,268	3,185	2,895	3,395	3,330
35-44	3,107	3,962	3,795	3,034	4,408	4,242	3,215	4,622	4,455
45-54	4,000	5,414	5,029	4,781	5,927	5,578	4,026	6,200	5,790
55-64	6,335	7,656	7,272	7,511	8,208	7,855	7,147	8,584	8,130
<b>Census Region</b>									
Northeast	2,985	4,270	4,130	3,616	4,734	4,745	3,640	5,200	4,981
South	3,532	4,157	3,617	4,275	4,514	4,059	4,385	4,611	4,297
Midwest	3,078	4,066	3,887	3,650	4,450	4,330	3,181	4,701	4,454
West	3,002	3,802	3,726	3,393	4,345	4,166	3,360	4,433	4,365
<b>MSA Status</b>									
MSA	3,133	4,224	3,808	3,977	4,588	4,279	3,697	4,784	4,480
Non-MSA	3,152	4,046	4,086	3,697	4,482	4,658	3,577	4,710	4,740

\*Noninstitutionalized Sample (no-IC events, Max INP stay<=45)

**Table 7. Simulated Effect of Truncating MarketScan and OLDW Distributions on Mean Spending, 2009, 2012, and 2013**

	Mean Total Spending (\$)			MEPS/Claims Ratio		Unweighted N			Weighted N		
	MEPS	MktScan	OLDW	MktScan	OLDW	MEPS	MktScan	OLDW	MEPS	MktScan	OLDW
2009 Full Population	3,174	4,203	4,090	0.76	0.78	13,276	26,403,690	8,215,861	139,647,549	139,647,549	139,647,549
Dropping those with...						dropped N			dropped N		
institutional stays or LOS>45	3,149	4,071	3,838	0.77	0.82	10	82,221	88,453	87,104	448,689	1,604,391
institutional stays or LOS>45 or total>=\$200,000	---- <sup>a</sup>	3,859	3,632	---- <sup>a</sup>	---- <sup>a</sup>	---- <sup>a</sup>	100,022	93,482	---- <sup>a</sup>	542,350	1,694,394
institutional stays or LOS>45 or total>=\$150,000	3,039	3,764	3,541	0.81	0.86	18	115,060	97,712	179,603	621,394	1,769,483
institutional stays or LOS>45 or total>=\$100,000	2,978	3,584	3,375	0.83	0.88	27	155,747	108,682	257,740	834,904	1,964,058
2012 Full Population	3,753	4,656	4,635	0.81	0.81	12,956	28,453,314	7,734,708	137,509,780	137,509,780	137,509,780
Dropping those with...						dropped N			dropped N		
institutional stays or LOS>45	3,731	4,495	4,310	0.83	0.87	7	115,474	102,741	101,501	565,451	1,951,795
institutional stays or LOS>45 or total>=\$200,000	3,505	4,178	4,023	0.84	0.87	13	142,178	109,067	185,556	695,447	2,071,267
institutional stays or LOS>45 or total>=\$150,000	3,349	4,055	3,901	0.83	0.86	20	162,747	114,353	317,763	795,538	2,169,830
institutional stays or LOS>45 or total>=\$100,000	3,253	3,833	3,688	0.85	0.88	35	216,136	127,535	433,851	1,055,096	2,415,893
2013 Full Population	3,626	4,896	4,854	0.74	0.75	11,669	23,808,076	7,766,343	135,400,571	135,400,571	135,400,571
Dropping those with...						dropped N			dropped N		
institutional stays or LOS>45	3,591	4,719	4,501	0.76	0.80	9	115,654	119,772	97,241	666,801	2,188,154
institutional stays or LOS>45 or total>=\$200,000	3,480	4,368	4,161	0.80	0.84	15	140,556	127,155	153,658	808,360	2,325,164
institutional stays or LOS>45 or total>=\$150,000	3,314	4,230	4,028	0.78	0.82	22	160,011	132,890	283,585	919,435	2,430,670
institutional stays or LOS>45 or total>=\$100,000	3,130	3,982	3,794	0.79	0.83	36	210,058	147,350	499,653	1,205,169	2,696,501

<sup>a</sup> Cell suppressed due to small sample size.

Figure 1. Cumulative Percentage Distribution of Spending, 2013

