REPORT TO THE CONGRESS

Regional Variation in Medicare Part A, Part B, and Part D Spending and Service Use

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Executive summary

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Regional variation in spending and service use among Medicare beneficiaries is an issue of interest among policymakers and health service researchers (Fisher et al. 2003a, Fisher et al. 2003b, Gottlieb et al. 2010, Institute of Medicine 2013, Kaiser Family Foundation 2015, Medicare Payment Advisory Commission 2011, Medicare Payment Advisory Commission 2009, Zhang et al. 2010, Zuckerman et al. 2010). There is little evidence that higher service use results in higher quality (Baicker and Chandra 2004, Institute of Medicine 2013, Wennberg et al. 2002). Moreover, it is plausible that health care service use and spending could be substantially reduced without harming quality if service-use patterns of high-use areas were reduced to the level of low-use areas.

In previous work, we looked at variation in spending and variation in use and contrasted the two (Medicare Payment Advisory Commission 2011). In response to the Commissioners' request, we reevaluated spending and service use, using more recent data. Our findings are generally consistent with our previous work. We found that there is an important difference between regional variation in Medicare spending and regional variation in use of Medicare-covered services. Regional variation in Medicare spending per beneficiary reflects many factors, such as differences in beneficiaries' health status, Medicare payment rates, service volume, and service intensity. In contrast, regional variation in use of Medicare services reflects differences only in the volume and intensity of services that beneficiaries with comparable health status receive. We also found that, although service use varies less than spending, service use still varies substantially. Specifically, service use in higher use areas (90th percentile) is 24 percent higher than in lower use areas (10th percentile); the analogous figure for spending is 47 percent higher.

Regional variation is relatively high for post-acute care services and especially high for home health services. The contribution of post-acute care services to overall variation is disproportionate to their absolute dollar value. Also, areas that are high use in one sector (such as inpatient, ambulatory, and post-acute care) tend to be high use overall.

Additionally, we found:

- Variation in service use is similar across metropolitan and nonmetropolitan areas, and average service use in both metropolitan and nonmetropolitan areas is close to the national average.

- There is variation at other levels of geography such as areas within a state.

- Regional variation also exists in the use of drugs covered under Medicare Part D. Specifically, drug use in higher use areas (90th percentile) is about 21 percent higher than in lower use areas (10th percentile).

Important similarities between the results in this report and the results from our previous study include the following: The areas that have the highest (or lowest) **service use** are often different from those that have the highest (or lowest) unadjusted **spending**; post-acute care—and home

health care in particular—is the sector with the greatest variation and the primary driver of variation in service use.

Important differences between the results in this report and the results from our previous study include the following: Variation in service use is slightly lower in the current study; variation in use of post-acute care services—while still large—is lower in the current study; and Miami, FL, and McAllen, TX, were the highest use areas by a substantial margin in our previous study, but the current study indicates that service use in both areas declined relative to the overall average (though they are still above the average). ∎

Regional variation in Medicare Part A, Part B, and Part D spending and service use

Regional variation in spending and service use among Medicare beneficiaries is an issue of interest among policymakers and health service researchers (Fisher et al. 2003a, Fisher et al. 2003b, Gottlieb et al. 2010, Institute of Medicine 2013, Kaiser Family Foundation 2015, Medicare Payment Advisory Commission 2011, Medicare Payment Advisory Commission 2009, Zhang et al. 2010, Zuckerman et al. 2010). There is little evidence that higher service use results in higher quality (Baicker and Chandra 2004, Institute of Medicine 2013, Wennberg et al. 2002). In previous work, we looked at variation in spending and use and contrasted the two (Medicare Payment Advisory Commission 2011). In this report, we reevaluate regional variation in spending and service use, using more recent data.

We emphasize that it is important to distinguish between spending and service use. Variation in spending reflects geographic differences in health care prices, beneficiaries' health status, their preferences for health care, and providers' practice patterns. Our definition of service use removes the effects of health care prices and beneficiaries' health status and reflects only differences in beneficiaries' preferences and providers' practice patterns.

Identifying areas with high use is a necessary first step to decreasing use in those areas. We then determine which health care sectors contribute to the differences between high-use and low-use areas by analyzing service use by sector and by examining the relationship between service use across different sectors. We close by comparing the findings from our 2011 analysis to what we found in this more recent analysis.

Data and methods

We conducted two sets of analyses. One focused on Part A and Part B spending and service use by all fee-for-service (FFS) beneficiaries who had at least one month of Part A, Part B, or both Part A and Part B coverage and were never in a Medicare Advantage plan in the year of analysis. The second analysis was limited to a subset of FFS beneficiaries who received outpatient prescription drug coverage through the Part D program (prescription drug plan (PDP) enrollees).

The analytical approach used in this report generally follows the approach we used in our 2011 analysis of the regional variation in Medicare spending and service use. We used the combination of beneficiary-level program spending data (when available), claims-level information (from the Medicare Provider Analysis and Review (MedPAR) file, and Part D prescription drug event (PDE) data aggregated to the beneficiary level. (We report on the raw spending listed in the Medicare Beneficiary Summary File (MBSF) for Medicare beneficiaries.) We aggregated the data by geographic area based on where the beneficiaries reside, not on where the services were provided. To isolate service use, we first adjusted the spending reported in these files for geographic differences in wages and special payments to some hospitals and physicians. We then adjusted for beneficiaries' health status and demographic characteristics.

Regional variation in Medicare spending per beneficiary reflects many factors, including differences in beneficiaries' health status and demographic characteristics. For Part A and

Part B services, the variation also reflects differences in Medicare payment rates, service volume (number of services), and service complexity (such as MRIs being more complex than simple X-rays) across regions. Medicare pays different prices for medical services in different geographic areas because, for example, it takes into account that nurses earn higher wages in San Francisco than in rural Alabama. To understand differences in service use—which means differences in the volume and complexity of services furnished to beneficiaries who have similar health status—we need to adjust spending data to remove the effects of the other factors that determine total spending, such as differences in prices and health status. Otherwise, we could wrongly conclude that an area had high use when in fact it had high prices, a relatively sick population, or both.

Medicare Part A and Part B spending

To determine service use in Part A and Part B, we started with program spending at the beneficiary level reported in the MBSF. For the analysis in this report, we aggregated the data to geographic areas (which we call "MedPAC areas") that we define as metropolitan statistical areas (MSAs) within a state or rest-of-state nonmetropolitan areas, depending on where beneficiaries reside. For MSAs that cross state borders, we divided the MSAs into the portions that fall within each state. For example, the Saint Louis MSA had 15 counties—8 in Illinois and 7 in Missouri. The eight Illinois counties formed one MedPAC area, and the seven Missouri counties formed another.

This level of aggregation is intermediate between using individual counties, which can have very small populations and hence unstable spending data, and using states, which can combine very different health care market areas and thus obscure important differences. We averaged two years of data (2013 and 2014) to minimize any remaining instability due to some areas having very few beneficiaries. For purposes of presentation, we weighted each geographic unit by its Medicare population.

Translating Medicare spending to a measure of service use

The set of beneficiaries that we used in this analysis were those who were enrolled in Part A, Part B, or both for at least one month in the year of analysis (2013 or 2014) and were never enrolled in a Medicare Advantage plan in that year. This number of beneficiaries in our analysis was about 38 million for both 2013 and 2014. To arrive at a measure of service use for the Part A and Part B services provided to these beneficiaries, we first adjusted for regional differences in prices and special payments to certain providers. Specifically, we adjusted for:

- regional prices (measured by hospital wage indices and geographic practice cost indices);

- additional payments to hospitals above the standard rates in the inpatient prospective payment system, including graduate medical education, indirect medical education, disproportionate share payments, and uncompensated care payments;

- additional payments to clinicians beyond the standard rates in the physician fee schedule, including primary care incentive payments, adjustments for having a system of electronic health records, and additional payments in health provider shortage areas (HPSA); and

- additional payments above standard rates to critical access hospitals in the inpatient prospective payment system, the outpatient prospective payment system, and the skilled nursing facility (SNF) payment system.

Our adjustments for factors that accounted for areas' differences in wages and special circumstances, such as the wage index and HPSA payments, do not mean we view them as unimportant. We had to adjust for those factors to arrive at service use, but setting the appropriate levels for them involves important issues that deserve consideration in their own right.

We then adjusted for beneficiaries' health status and demographic characteristics. Using a regression-based method, we conducted a beneficiary-level analysis. These adjustments are summarized in the text box on adjusting Part A and Part B spending data to measure Part A and Part B service use (pp. 6–8).

Together, the adjustments produced a measure of service use that reflects regional differences in physician practice patterns, entrepreneurial tendencies, and beneficiaries' predilection for seeking care (including differences in supplemental insurance, family support, and ease of access).

Medicare Part D spending

The method we used to estimate drug use in each geographic area (MedPAC area) parallels the method used to estimate medical service use from the MBSF. We obtained estimates of prescription drug use from 2013 and 2014 Part D PDE data. We used gross drug spending from the PDE data that reflect ingredient costs—that is, payments to pharmacies for covered drugs excluding dispensing fees, sales tax, and any retrospective rebates and discounts from manufacturers and pharmacies. (This measure of Part D drug spending and use differs from those used to measure spending and service use covered under Part A and Part B in that it includes beneficiary cost sharing.) Because there are no special payment adjustments (such as indirect medical education) like there are in Part A and Part B Medicare spending, we estimated gross drug spending adjusted for regional differences in prices and for beneficiary demographic characteristics and health status. After adjustment, the spending figure reflects volume (number of prescriptions) and intensity (choice of medication, such as brand-name versus generic drugs).[1]

To allow for an examination of the relationship between variation in drug use and variation in medical service use, we limited our study sample to beneficiaries for whom we had both medical claims and prescription drug spending data. That is, we analyzed a subset of beneficiaries who were enrolled in Part D's stand-alone PDPs and received their medical services under Part A and Part B of Medicare. We excluded beneficiaries enrolled in Medicare Advantage–Prescription Drug [plans] (MA–PDs) from our analysis because we did not have medical claims data for them. PDP enrollees accounted for 62 percent of FFS beneficiaries in 2014 (see Table 1, p. 9). (Those 25.1 million account for about 63 percent of Part D enrollees (data not shown).)

We used a regression-based method to obtain estimated service use by adjusting for area-specific effects and differences in beneficiary demographic characteristics (e.g., age, sex, institutionalized status, low-income subsidy status) and health status as measured by the prescription drug hierarchical condition categories (RxHCCs) (see text box on adjusting Part A and Part B spending data to measure Part A and Part B service use, pp. 6–8).

Adjusting Part A and Part B spending data to measure Part A and Part B service use

We used data from the Master Beneficiary Summary Files (MBSFs) and Medicare Provider Analysis and Review (MedPAR) files to obtain service use estimates in this analysis. We based the geographic areas on the metropolitan statistical areas (MSAs) of the core-based statistical area definitions. Within each state, we collected counties that were in the same MSA into a geographic area. If an MSA crossed state borders, we created different geographic areas for the portion of the MSA in each state. For example, the Minneapolis-Saint Paul MSA consisted of 16 counties in Minnesota and 4 counties in Wisconsin. We created one geographic area for the 16 Minnesota counties and a separate geographic area for the 4 Wisconsin counties. Finally, within each state, we collected all of the counties that were not in MSAs into a single statewide, non-MSA geographic area. The result was 484 geographic areas.

We used the MBSF data to determine Medicare expenditures in six health care sectors: hospital outpatient, skilled nursing facility, home health, durable medical equipment, hospice, and carrier. The carrier sector is a combination of claims for services provided by physicians, physician assistants, clinical social workers, nurse practitioners, independent clinical laboratories, ambulance providers, and ambulatory surgical centers.[2] We computed Medicare program spending and did not include beneficiaries' payments for cost sharing. We tracked the data to each beneficiary's area of residence, not to where the services were provided.

For all services other than hospital inpatient care, we obtained beneficiary-level spending data from the MBSFs for both 2013 and 2014. We adjusted the spending data in the MBSFs for geographic differences in regional prices, including geographic practice cost indices (GPCIs) for clinicians (physicians, physician assistants, nurse practitioners, and clinical social workers) and hospital wage indices (HWIs) for all other providers. We also adjusted spending for additional payments to clinicians in health professional service areas, clinicians who established electronic health record systems, and clinicians who received primary care incentive payments. Moreover, we adjusted for special outpatient and skilled nursing payments for critical access hospitals. We removed the effects that these special payments had on variation in spending by calculating the national per beneficiary amount of these special payments and adding it to each beneficiary's service use.

Unlike hospital inpatient services, we did not address the issue of border crossing for services in these six sectors. This approach could result in some overestimation of service use in rural areas if patients received their ambulatory care or post-acute care in higher priced urban areas. However, we believe this issue is smaller for these services than for inpatient services, especially with regard to clinician services. For example, it is plausible that patients are less likely to travel long distances for clinician services than for inpatient care. In addition, the payment areas represented by GPCIs (89 payment areas) in the physician payment system tend to be larger than the payment areas in the hospital inpatient payment system (about 430).

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We used the MedPAR data to compute service use for hospital inpatient care. To determine service use, for each inpatient claim, we multiplied the relative weight for the claim's diagnosis-related group by the national standardized rate to create an estimated payment for the claim that excludes the effects of adjustments for regional prices. We summed these results from the claims to the beneficiary level to create an estimate of adjusted inpatient service use for each beneficiary. Some hospitals received additional payments in the form of payments for graduate medical education, indirect medical education, and treating disproportionate shares of low-income patients. These special payments were unevenly distributed across beneficiaries and regions, so they contributed to the variation in spending. We removed the uneven distribution of the special payments by first removing the special payments from the hospital inpatient spending for each beneficiary. Then, we added the national per beneficiary amount of these special payments to each beneficiary's adjusted inpatient service use. Finally, we adjusted the inpatient service use to include outlier payments and adjustments for transfer cases. For outlier adjustments, we removed the effects of regional differences in input prices.

We used claims data from the MedPAR as the source for inpatient services because beneficiaries frequently obtained care in locations where the HWI used to adjust inpatient payments for geographic differences in wages is different from the HWI of their area of residence. Use of the claims data allowed us to adjust beneficiaries' inpatient spending using the HWIs from where their services were provided. If we had used spending on inpatient services from the MBSF, we would have had to adjust that spending for the "border crossing" that occurs more often with inpatient care than other service types. Adjusting for border crossing is more difficult than our method that used the inpatient claims from the MedPAR.

We added the price-adjusted inpatient spending from the claims to the price-adjusted spending for the six health care sectors from the MBSFs to estimate total price-adjusted spending for each beneficiary. We created monthly price-adjusted total spending and monthly price-adjusted spending in each health care category for each beneficiary by dividing the price-adjusted amounts by the number of months the beneficiary participated in fee-for-service (FFS) Medicare. We then further adjusted the price-adjusted spending amounts for regional differences in demographics and health status using a regression-based method. We performed a separate set of regressions for the 2013 data and the 2014 data. In both years, we performed a regression for price-adjusted total spending and regressions for price-adjusted spending in each of the health care categories. In each regression, the dependent variable was a beneficiary's monthly FFS spending adjusted for regional prices and additional payments. Explanatory variables included:

- demographic variables such as age and sex;

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Adjusting Part A and Part B spending data to measure Part A and Part B service use (cont.)

- all 70 conditions in CMS's hierarchical condition category (CMS–HCC) model that CMS used to risk adjust Medicare Advantage payments in 2013;

- other beneficiary-level factors in the CMS–HCC model such as disability, dual eligibility, and institutional status; and

- an indicator of the beneficiary's geographic area.

The regression produced coefficients on the demographic variables, the 70 conditions, the other factors in the CMS–HCC model, and the 484 geographic areas.

We used results from the regressions to estimate both per capita total service use and per capita service use for 2013 and 2014 for each health care category in each geographic area, as follows:

- We created national average spending amounts by multiplying each coefficient estimate—except for the MedPAC area indicators—by the mean value of each variable and summing these products. These calculations had the effect of removing the variation in service use resulting from the population characteristics such as demographics and health status.

- We added the coefficient for each geographic area from the regressions to the national average spending amounts. We used these results as our measures of service use for each geographic area.

- We used this process for total Part A and Part B services and for service use in each health care category. ∎

Findings

As we discussed earlier, we conducted two sets of analyses, one for Part A and Part B services, and one for the Part D program. One notable finding is that the share of Medicare FFS beneficiaries covered under Part D has grown over time, from about 50 percent in 2008 to 62 percent in 2014. Some of the differences in spending on and use of Part A and Part B services between all FFS beneficiaries and PDP enrollees are likely attributable to the differences in demographic characteristics between the two populations (see text box on the characteristics of Medicare beneficiaries in FFS and PDPs, pp. 9–10).

Characteristics of Medicare beneficiaries in FFS and stand-alone PDPs in 2014

In 2014, there were 40.8 million beneficiaries enrolled in Medicare fee-for-service (FFS). Sixty-two percent of FFS beneficiaries were enrolled in stand-alone prescription drug plans (PDPs). Compared with the overall FFS population, PDP enrollees were more likely to be female (58 percent compared with 54 percent) and disabled beneficiaries under age 65 (22 percent compared with 20 percent) (Table 1). Among the elderly individuals (ages 65 and older), the overall FFS population tended to be younger (between ages 65 and 69) compared with the PDP population, reflecting the recent increase in the number of beneficiaries who choose to enroll in Medicare Advantage plans that also offer prescription drug coverage.

Table 1

Characteristics of Medicare beneficiaries in FFS and stand-alone PDPs, 2014

	All FFS	Part D PDPs
Beneficiaries, in millions	40.8	25.1
Percent of FFS		62%
Gender		
Male	46%	42%
Female	54	58
Race/ethnicity		
White, non-Hispanic	77%	77%
African American, non-Hispanic	10	11
Hispanic	7	7
Asian/other	5	5
Age (years)*		
<65	20%	22%
65–69	27	23
70–74	18	19
75–79	13	14
80+	21	23

Note: FFS (fee-for-service), PDP (prescription drug plan). Percentages may not sum to 100 due to rounding. Figures for FFS and PDP enrollees include all beneficiaries with at least one month of enrollment in the respective program.
*Age as of July 2014.

Source: MedPAC analysis of Medicare Part D denominator file from CMS.

Use of Medicare services varied less than Medicare spending

Our analysis of the Part A and Part B data shows that per capita monthly service use varied less than per capita monthly (unadjusted) spending (Figure 1, p. 11). For example, 45 percent of FFS beneficiaries lived in areas that had **service use** within 5 percent of the national average. In contrast, only 24 percent of FFS beneficiaries lived in areas where **spending** was within 5 percent of the national average (bars for the 95–105 category in Figure 1). Less than 1 percent lived in areas that had service use greater than 25 percent above the national average, while about 5 percent lived in areas where spending was greater than 25 percent above the national average (last two light bars in Figure 1).

Another way to consider the variation is that service use was 24 percent higher for beneficiaries in the area at the 90th percentile compared with beneficiaries in the area at the 10th percentile; the corresponding figure for unadjusted spending was 47 percent (Table 2, p. 11).[4] At the extremes, service use was 73 percent greater in the highest area than in the lowest area, whereas spending in the highest area was 117 percent higher than in the lowest area.

The average distance from the national mean (per capita) was about $56 under the service use measure compared with $101 under the unadjusted spending measure (Table 2, p. 11). (To determine average distance from the mean for each area, we calculated the absolute difference in dollars between the area and the national mean. We then calculated the mean of those absolute differences.) Because we constructed service use to equal the same sum of dollars as spending, the means of both distributions are equal and the values for the average difference from the mean are directly proportional.

For the subset of FFS beneficiaries who received their prescription drug coverage from stand-alone PDPs, we found that drug use (drug spending adjusted for variation in prices, demographic characteristics, and health status) varied less than drug spending. For example, Figure 2 (p. 12)

Figure 1

Medicare Part A and Part B service use varied less than Medicare Part A and Part B spending, but large differences remained, 2013 and 2014

Percent of national average spending or service use
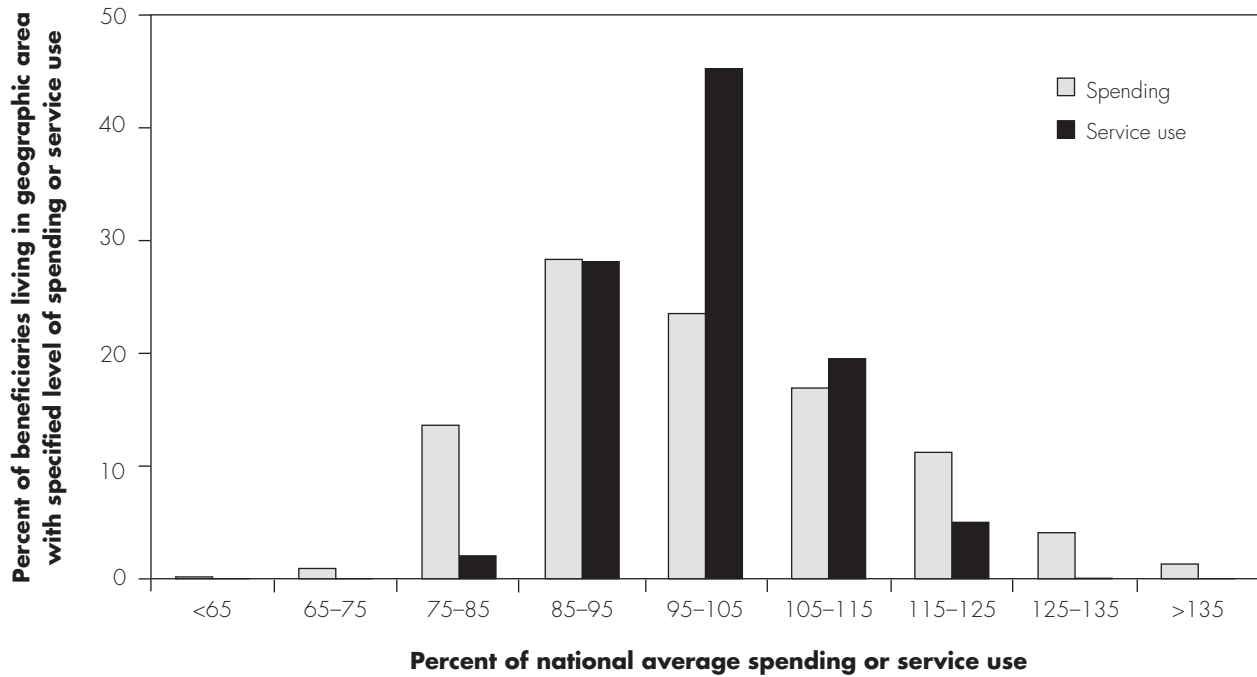
Note: "Spending" is per capita monthly Medicare Part A and Part B spending among fee-for-service beneficiaries in each area. "Service use" is per capita monthly Part A and Part B service use among fee-for-service beneficiaries in each area. We defined areas as metropolitan statistical areas within each state for urban counties and rest-of-state nonmetropolitan areas for nonurban counties.

Source: MedPAC analysis of 2013 and 2014 beneficiary-level spending from the Medicare Beneficiary Summary Files and Medicare inpatient claims.

Table 2

Medicare Part A and Part B service use had less regional variation than Medicare Part A and Part B spending, but large differences remained, 2013 and 2014

Measure of variation across areas	Spending	Service use
Ratio of 90th to 10th percentile	1.47	1.24
Ratio of maximum to minimum	2.17	1.73
Average distance from the mean (per beneficiary per month) (Mean = $863)	$101	$56

Note: "Spending" is per capita Medicare Part A and Part B spending among fee-for-service beneficiaries in each area. "Service use" is per capita Part A and Part B service use among fee-for-service beneficiaries in each area. We defined geographic areas as the metropolitan statistical areas (MSAs) of the core-based statistical areas for urban counties and rest-of-state non-MSAs for nonurban counties. If an MSA crosses state borders, we divided the MSA into multiple areas based on state borders. The units of analysis for determining the percentile distribution were the 484 MedPAC geographic units, weighted by beneficiary count.

Source: MedPAC analysis of 2013 and 2014 beneficiary-level spending from the Medicare Beneficiary Summary Files and Medicare inpatient claims.

Figure 2

Medicare Part D drug use varied less than Medicare Part D drug spending for PDP enrollees, 2013 and 2014
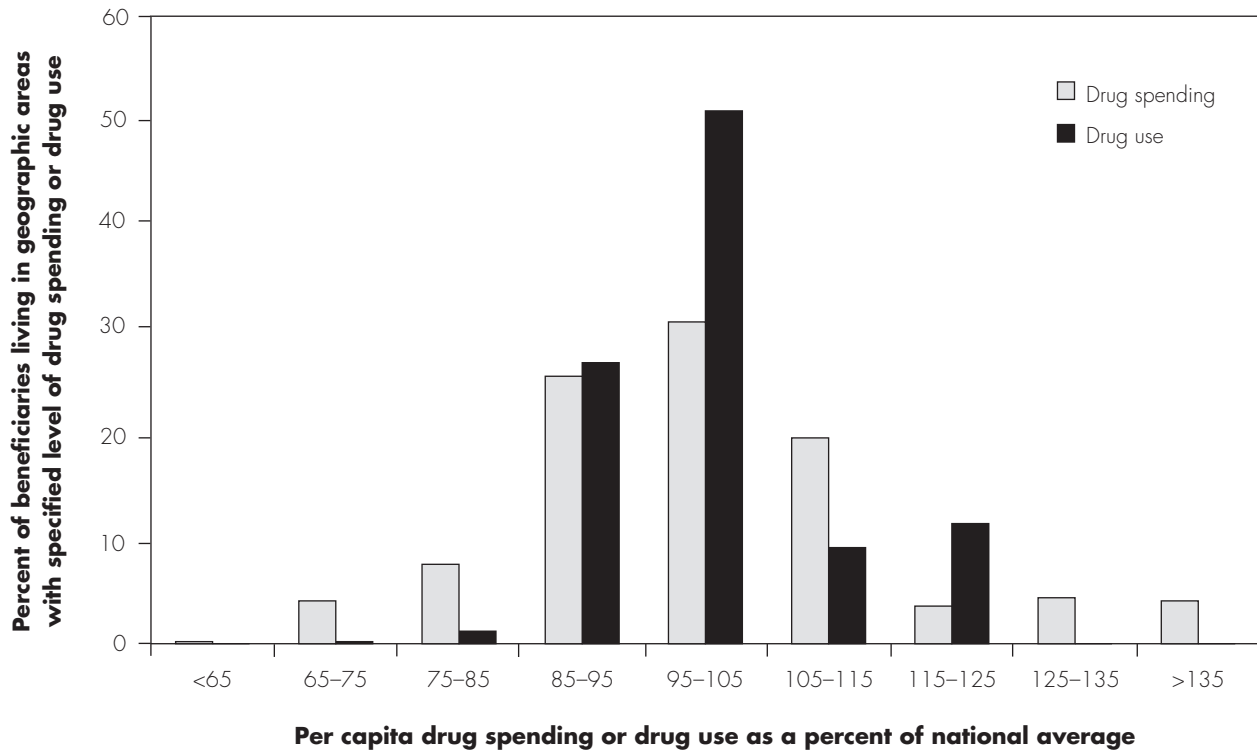
Note: PDP (prescription drug plan). "Drug spending" is average gross drug spending among beneficiaries enrolled in stand-alone PDPs. "Drug use" is average gross drug spending among Part D PDP enrollees, adjusted for prices and beneficiary characteristics. Per capita spending (or use) is calculated as spending (or use) per beneficiary divided by the number of months of Part D enrollment. "Geographic areas" are the metropolitan statistical areas (MSAs) of the core-based statistical areas for urban counties and rest-of-state non-MSAs for nonurban counties. If an MSA crosses state borders, we divided it into multiple areas based on state borders.

Source: MedPAC analysis of 2013 and 2014 prescription drug event data.

shows that 51 percent of PDP enrollees had drug **use** within 5 percent of the national average compared with 31 percent for drug **spending**. At the extremes, no areas had drug use greater than 125 percent of the national average, and only 1.5 percent of beneficiaries lived in areas with drug use less than 85 percent of the national average.

Adjusting drug spending for variation in prices, demographic characteristics, and health status reduced variation across geographic areas. As shown in Table 3 (p. 13), drug spending in high-use areas (the area at the 90th percentile) was 38 percent higher than in low-use areas (the area at the 10th percentile).[5] Drug use in the high-use area was 21 percent higher than the low-use area. At the extremes, drug spending in the highest spending area was 2.51 times that in the lowest

Table 3

Medicare Part D drug use had less regional variation than Medicare Part D drug spending, but differences remained, 2013 and 2014

Measure of variation	Drug spending	Drug use
Ratio of 90th to 10th percentile	1.38	1.21
Ratio of maximum to minimum	2.51	1.67
Average distance from the mean (per beneficiary per month)	$33	$19

Note: "Drug use" is the average drug use per beneficiary per month among stand-alone prescription drug plan enrollees in each area. "Geographic areas" are the metropolitan statistical areas (MSAs) of the core-based statistical areas for urban counties and rest-of-state non-MSAs for nonurban counties. If an MSA crosses state borders, the MSA is divided into multiple areas based on state borders. The units of analysis for determining the percentile distribution are the 484 geographic units, with each unit weighted equally (i.e., not weighted by beneficiary count).

Source: MedPAC analysis of the 2013 and 2014 prescription drug event data.

spending area, whereas drug use in the highest use area was 1.67 times that in the lowest use area.

Similar to the findings in our previous study, we find that drug use varies less than medical service use, and that combined medical and drug service use exhibits less variation than medical service use or drug use alone (see text box on relationship between medical service use and drug use, pp. 14–15). Additionally, we do not find a systematic relationship between medical service use and drug use across regions. That is, in many areas that have very low or very high medical service use, we do not consistently find correspondingly very low or very high drug use. In addition, our regression analysis did not find a statistically significant relationship between medical service use and drug use. However, given the level of aggregation (our analytical unit is average medical and drug service use for each region) and the complexity involved in linking medical service use to drug use, these findings cannot be used to determine whether prescription drug use is a substitute for or complement of medical services (Medicare Payment Advisory Commission 2014).

Regional variation in service use by sector

Our analysis thus far has focused on total medical service and drug use in FFS Medicare. In this section, we examine regional variation in medical service use by sector to try to understand which sectors contribute the most to regional variation. The MBSFs and our analysis of the MedPAR file allow us to look at regional variation for 10 sectors: short-term hospital inpatient, inpatient psychiatric, hospital outpatient department (OPD), carrier (physician, ambulatory surgical center, and lab combined), durable medical equipment (DME), hospice, home health, SNF, long-term care hospital (LTCH), and inpatient rehabilitation facility (IRF). For purposes

Relationship between medical service use and drug use among FFS beneficiaries enrolled in PDPs

In our previous analysis using data from 2007 and 2008, we found that, for fee-for-service (FFS) beneficiaries enrolled in stand-alone prescription drug plans (PDPs), combined medical service and drug use varied less than medical service use alone (Medicare Payment Advisory Commission 2011). We also found that the distribution of combined medical service and drug use was similar to that of medical service use, reflecting the fact that Part D drugs accounted for a small share (about 20 percent) of overall Medicare spending and use. The analysis also did not find a consistent relationship between medical service use and drug use measured at the metropolitan statistical area level.[6]

Among the PDP enrollees, on a per beneficiary per month basis, Part D (drug) spending grew more rapidly than Part A and Part B spending over the 2007 to 2008 period (used in the previous analysis) and 2013 to 2014 period (used in our current analysis) (Table 4). On average, drug spending between the two study periods grew by nearly 22 percent cumulatively compared with 8.7 percent for Part A and Part B spending. Given the growing importance of Part D drugs within the overall health care provided to the Medicare population, we reexamined the relationship between medical service use and drug use.

Our analysis of the 2013 and 2014 data shows that the distribution of drug use among PDP enrollees was somewhat more concentrated compared with Part A and Part B (medical) service use (Table 5, p. 15). For example, 51 percent of the beneficiaries lived in regions that had per capita drug use within 5 percent of the average for all PDP enrollees compared with 47 percent for medical service use. The smaller variation in drug spending may, in part, have been due to the differences in how payments are made for drugs provided under Part D compared with services under Part A and Part B of Medicare; the Part D benefit

Table 4

Among the subset of Medicare FFS beneficiaries with Part D, drug spending has grown more rapidly than Part A and Part B spending, 2007–2008 to 2013–2014

	2007–2008	2013–2014	Percent change
Part A and Part B spending	$976	$1,060	8.7%
Part D (drug) spending	$239	$291	21.9

Note: FFS (fee-for-service). Dollar amounts are average spending per beneficiary per month.

Source: MedPAC analysis of the 2007, 2008, 2013, and 2014 prescription drug event data.

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is a competitive system in which the market determines what is ultimately paid for the prescription drugs, while CMS uses administrative pricing to determine payments for most Part A and Part B services.

The distribution for combined medical service and drug use varied less than either medical service use or drug use alone. Similar to our previous findings, there was very little correlation between medical service use and drug use for this population across regions.[7] However, this analysis cannot be used to inform whether medical services and prescription drugs are substitutes or complements because we examined the correlation after aggregating across services and across beneficiaries in a region. ∎

Table 5

Combined Medicare medical and drug use varied less than either component, 2013 and 2014

Measure of variation	Medical service use	Drug use	Combined medical and drug use
Ratio of 90th to 10th percentile	1.26	1.21	1.20
Ratio of maximum to minimum	1.78	1.67	1.59
Share of beneficiaries within 5% of the national average	47%	51%	53%

Note: "Drug use" is the average drug use per beneficiary per month among stand-alone prescription drug plan enrollees in each area. "Geographic areas" are the metropolitan statistical areas (MSAs) of the core-based statistical areas for urban counties and rest-of-state non-MSAs for nonurban counties. If an MSA crosses state borders, the MSA is divided into multiple areas based on state borders. The units of analysis for determining the percentile distribution are the 484 MedPAC geographic units, with each unit weighted equally (i.e., not weighted by beneficiary count).
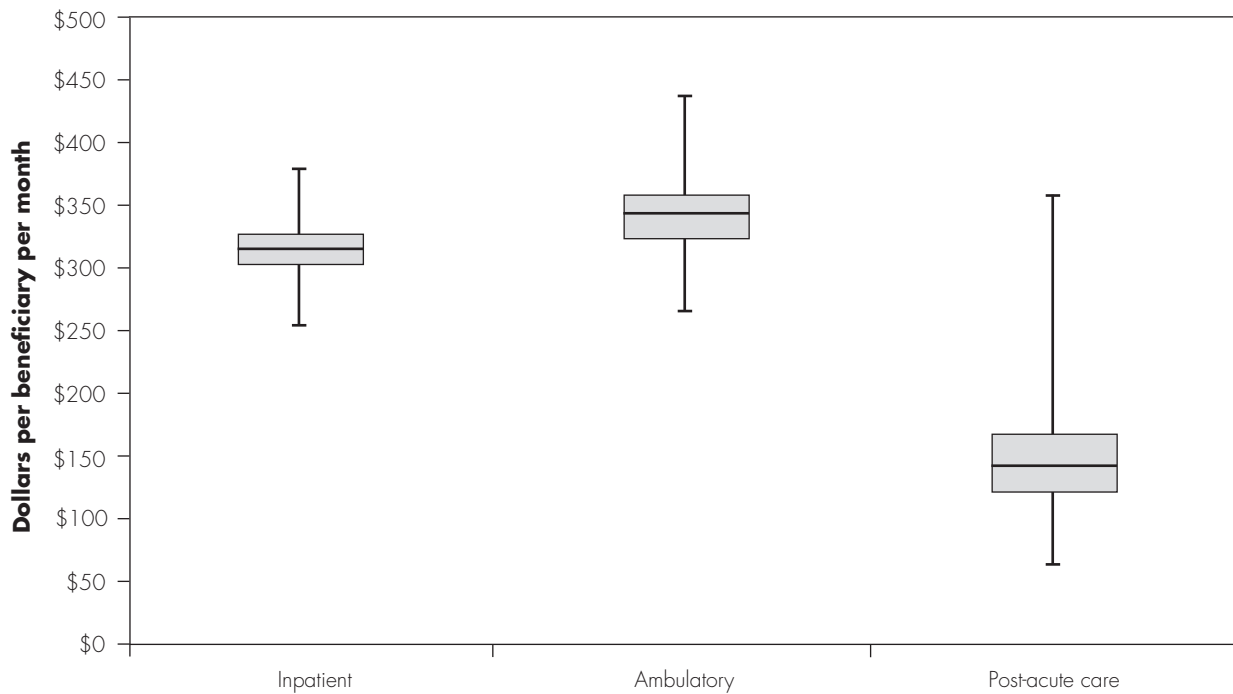
Source: MedPAC analysis of the 2013 and 2014 prescription drug event data, Medicare Beneficiary Summary Files, and Medicare hospital inpatient claims.

of this analysis, we created three composite sectors, which include all the above sectors except DME and hospice:

- the acute inpatient sector, which combines the short-term inpatient and inpatient psychiatric sectors;

- the ambulatory sector, which combines the services from claims processed by carriers (carrier sector) and the OPD sector; and

- the post-acute care (PAC) sector, which combines the home health, SNF, LTCH, and IRF sectors.

Figure 3

Post-acute care had the greatest variation, 2013 and 2014

Note: Figure shows maximum, 75th percentile, median, 25th percentile, and minimum of the distribution of per capita service use in each sector.

Source: MedPAC analysis of 2013 and 2014 beneficiary-level spending from the Medicare Beneficiary Summary Files and Medicare inpatient claims.

For each sector, we again ran the regression model and recalculated the weights for each variable. In essence, this calculation creates a sector-specific health status adjuster. For example, metastatic cancer has a much greater coefficient for total service use than it does for post-acute service use. Therefore, our results by sector differ from those that would result from using a beneficiary's HCC risk score to adjust sector spending for health status.

Regional variation in service use differed by sector

Figure 3 shows the variation in service use for the composite sectors across our geographic areas in dollars per capita. The 25th percentile, the median, and the 75th percentile of the distribution for each sector are indicated by a box, and vertical lines extend to the extreme values (the minimums and the maximums).[8] The PAC sector had the greatest variation among the sectors, ranging from $63 in the lowest use area to $357 in the highest use area. The range between the 25th percentile and the 75th percentile was also wider for the PAC sector than for the other two sectors. The inpatient sector showed the smallest variation, ranging from $254 to $378.

Table 6

The post-acute sector had the greatest variation in service use, 2013 and 2014

Measure of variation across areas	Inpatient	Ambulatory	Post-acute care
Ratio of 90th to 10th percentile	1.16	1.20	1.88
Ratio of maximum to minimum	1.49	1.65	5.66
Average distance from the mean (per beneficiary per month)	$15	$20	$32

Note: "Service use" is per capita Medicare Part A and Part B service use among fee-for-service beneficiaries in each area. We defined areas as metropolitan statistical areas within each state for urban counties and rest-of-state nonmetropolitan areas for nonurban counties. The units of analysis for determining the percentile distribution are the 484 MedPAC geographic units, weighted by beneficiary count.

Source: MedPAC analysis of 2013 and 2014 beneficiary-level spending from the Medicare Beneficiary Summary Files and Medicare inpatient claims.

Because of its wide variation, the PAC sector had an effect on the overall variation disproportionate to its dollar value. For example, removing PAC use from total use reduced the average difference from the mean from $56 to $34—that is, by 39 percent, even though PAC services were only 17 percent of the total. The variation in use of PAC services is particularly evident at the top and bottom of the distribution. At the top 10th percentile of areas ranked on total service use, use of PAC services was about $232 per capita compared with $100 per capita at the bottom 10th percentile.

Table 6 illustrates the variation in each composite sector. The ratio of the 90th percentile to the 10th percentile was 1.88 for the PAC sector, 1.20 for the ambulatory sector, and 1.16 for the inpatient sector. [9] Looking at the maximum and minimum values, the PAC sector had the largest ratio at approximately 5.7, while the ambulatory sector was at about 1.6, and inpatient was at about 1.5. The average distance from the mean was larger for the PAC sector than the other two sectors, even though the average service use was lower in the PAC sector than in the ambulatory and inpatient sectors. Nevertheless, it is important to address variation in each of these sectors, not just the high-variation PAC sector.

Service use was positively correlated between sectors

We also found a positive correlation between composite sectors. We found a correlation of 0.31 between inpatient and ambulatory services, 0.37 between inpatient and PAC, and 0.23 between ambulatory and PAC. These correlations indicate that these services tend to be higher (or lower) in the same geographic locations rather than substituting for each other. In contrast, the two subsectors of ambulatory services—carrier services and OPD services—have a negative correlation of –0.64, which indicates they are substitutes. For example, a beneficiary could choose to have a clinic visit in a hospital outpatient department or an office visit in a physician's office.

Each of the three sectors was highly correlated with total service use: 0.65 for inpatient, 0.63 for ambulatory, and 0.83 for PAC. This finding is not surprising because each is a component of total service use. The PAC sector, which had the greatest variation, also had the greatest correlation with total service use.

For the subset of FFS beneficiaries with Part D drug coverage, we also evaluated the correlation between the inpatient, ambulatory, and post-acute sectors and use of Part D drugs. We did not find a statistically significant correlation between Part D drugs and the inpatient, ambulatory, or post-acute care sectors.

Additional findings on medical service use

We have two additional observations about Medicare service use.

Variation in service use was similar in metropolitan and nonmetropolitan areas

The average service use was similar in our metropolitan geographic areas and nonmetropolitan areas. For the metropolitan areas, average service use was 99.9 percent of the national average, and for nonmetropolitan areas, average service use was 100.2 percent of the national average.[10] That service use in both metropolitan and nonmetropolitan areas were close to the national average is an important finding in itself, and it reinforces the importance of looking at service use and not just unadjusted spending. In addition, wide variation in use was present among both metropolitan areas and nonmetropolitan areas. Among nonmetropolitan areas, service use ranged from 21.2 percent below the average to 22.6 percent above the average. Similarly, metropolitan service use ranged from 23.7 percent below the average to 32.0 percent above the average. Therefore, variation was not solely a metropolitan phenomenon. There was variation among both the nonmetropolitan and metropolitan areas, and there were both nonmetropolitan and metropolitan areas near the top of the distribution and near the bottom of the distribution.

There was variation within states

Variation in service use exists at other levels of geography as well. Thus far, we have examined variation across the nation, but we also found variation within states. For example, among the nonmetropolitan and metropolitan areas in Louisiana, per beneficiary service use was 24.5 percent higher in the highest use area (Hammond) than in the lowest use area (New Orleans).

Unique factors may drive extreme levels of service use

Many factors drive service use, such as differences in physicians' practice patterns and differences in beneficiaries' preferences for care. But service use among areas could differ for more idiosyncratic reasons as well.

In areas that have the highest service use, factors such as physicians' practice patterns and beneficiaries' preferences for care may drive service use above the average, but other factors may account for the most extreme reported service use in areas like Hammond, LA, where service use was 32 percent above the national average. Hammond had very high use in the PAC sector, 2.2

times the national average, and in the home health component, 2.7 times the national average. Service use in the inpatient and ambulatory sectors was also higher than the national average, but not extremely: 1.11 times the national average for inpatient and 1.15 times the national average for ambulatory. Our finding that PAC use was extremely high while inpatient and ambulatory use were only moderately high may reflect the fact that PAC services (especially home health) are more discretionary than services in the other two sectors.

Current analysis has similarities and differences from previous analysis

The study presented in this report is similar to a previous Commission study, with the primary difference being that we used data from 2006 through 2008 in the previous study, while we used data from 2013 and 2014 in this study.[11] There are important similarities and differences between the previous study and this one.

Important similarities between the results in this report and the results from our previous study include:

- There was substantial variation in both unadjusted spending and service use.

- Service use varied less than unadjusted spending.

- Regional variation in service use and drug use combined was less than variation in medical service use alone.

- Average drug use and service use do not appear to be correlated.

- The areas that had the highest (or lowest) service use were often different from those that had the highest (or lowest) unadjusted spending.

- Post-acute care—and home health in particular—was the sector with the greatest variation and was the primary driver of variation in medical service use.

- Medical service use was similar for nonmetropolitan and metropolitan areas.

Important differences between the results in this report and the results from our previous study include:

- Variation in service use was lower in the current study. For example, the average distance from the mean declined from $61 in the previous study to $56 in the current study. Also, Figure 4 (p. 20) illustrates a slightly tighter distribution in this study compared with our previous study. For example, in this study we found that 93 percent of beneficiaries lived in areas that had service use within 15 percent of the national average while in our previous study we found that 88 percent lived in areas that had service use within 15 percent of the national average (Figure 4, p. 20).

- Variation in use of post-acute care services—while still large—was lower in the current study. For example, the ratio of the 90th percentile to the 10th percentile declined from 2.01 to 1.88.

Figure 4

Medical sevice use variation decreased slightly from 2006–2008 to 2013–2014
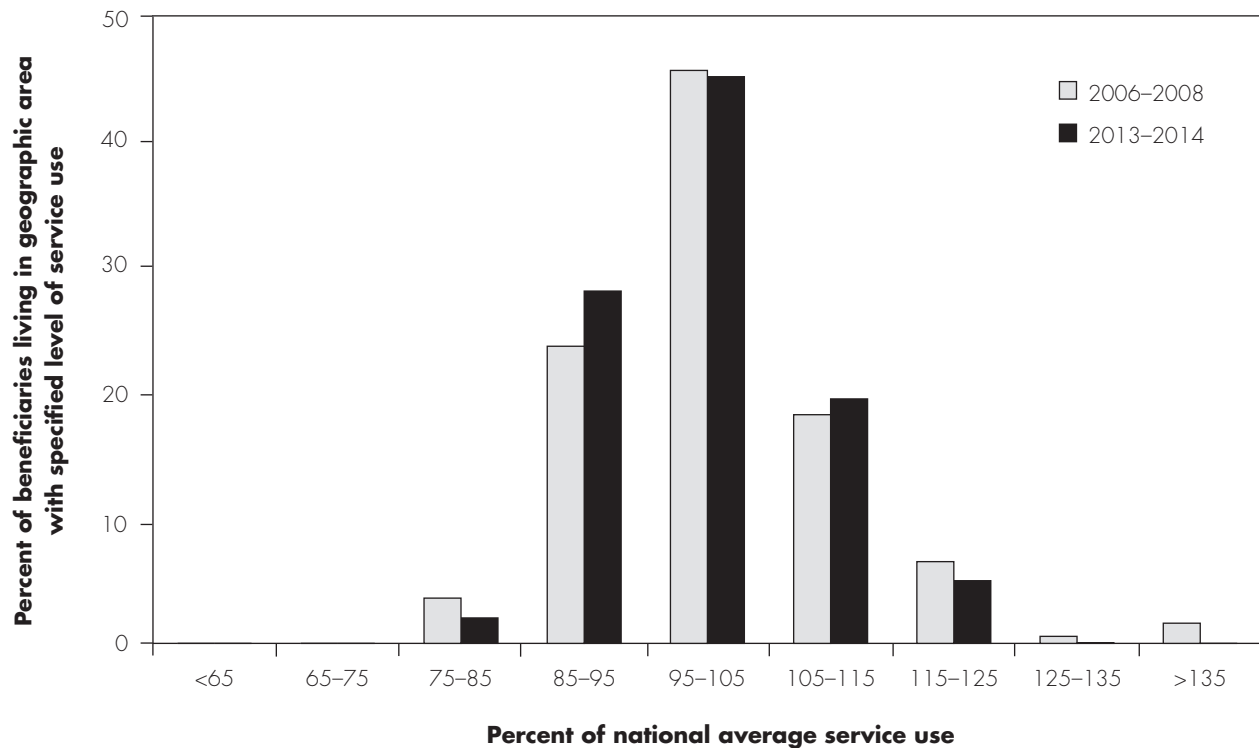
Note: "Service use" is monthly per capita Part A and Part B service use among fee-for-service beneficiaries in each area. We defined areas as metropolitan statistical areas within each state for urban counties and rest-of-state nonmetropolitan areas for nonurban counties.

Source: MedPAC analysis of 2006, 2007, 2008, 2013, and 2014 beneficiary-level spending from the Medicare Beneficiary Summary Files and Medicare inpatient claims.

- Miami, FL, and McAllen, TX, were the highest use areas by a substantial margin in our previous study. In both areas, we found much lower service use in this study. Service use in Miami declined from 40 percent above the national average to 22 percent above the national average. Service use in McAllen declined from 38 percent above the national average to 10 percent above the national average.

- In the previous study, Miami had an extremely high level of DME use, 2.3 times the national average and 35 percent higher than the next highest area. In this study, use of DME in Miami was 15 percent below the national average.

- McAllen had an exceptionally high level of home health use in the previous study, 6.7 times the national average. While it was still high in this study—3.0 times the national average— it dropped substantially. ∎

Endnotes

1   Factors used to adjust for variation in prices across regions are based on analysis by Acumen LLC for the Commission. Regional variation in drug prices ranged from 2 percentage points below the national average to 7 percentage points above the national average in 2014. These prices result from negotiations between Medicare Part D plans and pharmacies and do not reflect manufacturer rebates.

2   We estimated that Medicare expenditures for clinician services (including Part B drugs) were about 90 percent of Medicare expenditures in the carrier sector.

3   CMS–HCCs use inpatient and outpatient diagnostic information to adjust payments to Medicare Advantage plans for their enrollees' actual health status.

4   The units of analysis for determining the percentile distribution are the 484 MedPAC geographic units, weighted by beneficiary count.

5   The units of analysis for determining the percentile distribution are the 484 MedPAC geographic units, with each unit weighted equally (i.e., not weighted by beneficiary count).

6   The geographic units we used in the previous analysis differed slightly from those we used for the current analysis. In the previous analysis, we defined geographic units as MSAs for metropolitan counties and rest-of-state non-MSAs for nonmetropolitan counties. In the current analysis, if an MSA crosses state borders, we divided it into multiple areas based on state borders.

7   The results of a regression with average monthly use of all Part A and Part B services as the dependent variable and average monthly drug use in each MedPAC area as the single explanatory variable suggest that there is no systematic relationship between medical service use and drug use across MedPAC areas (coefficient on drug use = 0.15 (p-value = 0.3839) and R^2 = 0.0016).

8   The units of analysis for determining the percentile distribution are the 484 MedPAC geographic units, weighted by beneficiary count.

9   The units of analysis for determining the percentile distribution are the 484 MedPAC geographic units, weighted by beneficiary count.

10 For metropolitan areas, per capita monthly spending was 101.9 percent of the national average. For nonmetropolitan areas, per capita monthly spending was 92.7 percent of the national average.

11 For our previous analysis involving prescription drugs used by Part D enrollees, we used data from 2007 and 2008 since 2006 was the first year when the Part D program was implemented, and therefore the data were likely not comparable to other years of data.

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About MedPAC

The Commission

The Medicare Payment Advisory Commission (MedPAC) is an independent congressional agency established by the Balanced Budget Act of 1997 (P.L. 105–33) to advise the U.S. Congress on issues affecting the Medicare program. In addition to advising the Congress on payments to health plans participating in the Medicare Advantage program and providers in Medicare's traditional fee-for-service program, MedPAC is also tasked with analyzing access to care, quality of care, and other issues affecting Medicare.

The Commission's 17 members bring diverse expertise in the financing and delivery of health care services. Commissioners are appointed to three-year terms (subject to renewal) by the Comptroller General and serve part time. Appointments are staggered; the terms of five or six Commissioners expire each year. The Commission is supported by an executive director and a staff of analysts, who typically have backgrounds in economics, health policy, and public health.

MedPAC meets publicly to discuss policy issues and formulate its recommendations to the Congress. In the course of these meetings, Commissioners consider the results of staff research, presentations by policy experts, and comments from interested parties. (Meeting transcripts are available at www.medpac.gov.) Commission members and staff also seek input on Medicare issues through frequent meetings with individuals interested in the program, including staff from congressional committees and the Centers for Medicare & Medicaid Services, health care researchers, health care providers, and beneficiary advocates.

Two reports—issued in March and June each year—are the primary outlets for Commission recommendations. In addition to annual reports and occasional reports on subjects requested by the Congress, MedPAC advises the Congress through other avenues, including comments on reports and proposed regulations issued by the Secretary of the Department of Health and Human Services, testimony, and briefings for congressional staff.

The Commission's goal is to achieve a Medicare program that ensures beneficiary access to high-quality care, pays health care providers and health plans in a manner that is fair and rewards efficiency and quality, and spends tax dollars responsibly.

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