

Geographic Variations in Spending and Utilization Across Payer Types



The Dartmouth Institute for Health Policy & Clinical Practice



Geographic Variations in Spending and Utilization Across Payer Types

August 30, 2022

Kristen Bronner, MA Jonathan Skinner, PhD

Introduction

In an influential article in *Science* nearly 50 years ago, John Wennberg and Alan Gittelsohn documented widespread variations in health care expenditures and utilization among Vermont communities.¹ They utilized hospital and physician data for the entire age span and for a variety of insurance types, including the then-nascent Medicare and Medicaid programs. Since then, there has been extensive documentation of regional variations at the national level using Medicare claims data for people aged 65 and older through the <u>Dartmouth Atlas</u> and other research groups. However, to date, there have been no national studies of regional variation that capture spending data across all three main health care payers in the U.S.: Medicare, Medicaid, and private insurers, which together provide insurance for about 80% of the U.S. population.

For the first time, a team lead by Yale, Stanford, and Dartmouth researchers has created new measures that capture small area variations in health care spending and utilization across all three insurance payers, as well as a composite measure that captures overall spending by region.² This report reviews the findings of the study (publicly accessible in JAMA Network Open), which used Dartmouth's Medicare and Medicaid data, and was led by Zack Cooper (Yale) in collaboration with Olivia Stiegman and Chima Ndumele (Yale), Becky Staiger (Stanford), and Jonathan Skinner (Dartmouth). The study focused on three key questions: is the geographic pattern of variation similar across payers? Is regional health care spending correlated among payers? And are similar factors correlated with spending and utilization by payer? The data used in the analysis include more than 100 million beneficiaries across the three payers, representing \$683 billion in total health spending during the study period. Among the 306 hospital referral regions in the United States, 241-plus two states, Vermont and Wyoming-had complete data for use in this analysis, for a total of 243 small areas to which we refer broadly as HRRs. The Medicare and Medicaid data can be downloaded from the Dartmouth Atlas website here; we are not able to post publicly the HCCI data on private insurance spending and utilization, nor the composite measure. Please refer to the study for details on the research methods.





Regional Variations in Spending and Utilization by Payer

While both utilization and spending for the elderly beneficiaries in the Medicare program is understandably higher than for those with Medicaid or private insurance, the range of variation in Medicare is comparable to that of private insurance. After adjusting for the age and sex composition of each study population, Medicare spending per beneficiary varied twofold



	Private insurance	Medicare	Medicaid
Maximum	\$6,742	\$15,186	\$10,472
75th percentile	\$4,924	\$11,078	\$7,187
50th percentile	\$4,369	\$10,093	\$6,018
25th percentile	\$3,933	\$9,262	\$5,031
Minimum	\$2,655	\$7,654	\$2,692
Mean	\$4,441	\$10,281	\$6,127
Extremal ratio	2.54	1.98	3.89
Interquartile ratio	1.25	1.20	1.43
Coefficient of variation	0.16	0.13	0.23

across hospital referral regions, from a low of \$7,654 per beneficiary in the Honolulu, Hawaii HRR to \$15,186 in the Bronx, New York HRR. Spending among those covered by private insurance varied by a factor of 2.5, from \$2,655 per beneficiary in the San Bernardino, California HRR to \$6,742 in Huntington, West Virginia. Medicaid spending per beneficiary varied nearly fourfold, from \$2,692 in Springfield, Illinois to \$10,472 in San Angelo, Texas. Average spending per beneficiary was \$10,281 for those with fee-for-service Medicare, \$6,127 for those with Medicaid, and \$4,441 for those with private insurance (Figure 1).

Figure 1. Hospital Referral Region Variation (N=243) in Spending per Beneficiary by Payer (2017)

The figure shows the variation in spending per beneficiary by payer in 2017 (2016 data was used for Medicaid for three states when 2017 data was of poor quality). The dashes at each end of the vertical lines show the rates for the highest and lowest regions, standardized to the average for the payer. The top line of each gray box represents the standardized rate for the region at the 75th percentile among HRRs, and the bottom line shows the standardized rate at the 25th percentile. The table gives the ratio of the highest to lowest value (extremal ratio) and the ratio of the 75th to the 25th percentile value (interquartile ratio), as well as the coefficients of variation and the dollar values for each point on the chart. All spending values are expressed in 2017 dollars. Adapted from Table 1, Cooper Z, Stiegman O, Ndumele CD, Staiger B, Skinner J. Geographical variation in health spending across the US among privately insured individuals and enrollees in Medicaid and Medicare. *JAMA Netw Open*. 2022;5(7):e2222138.

² Geographic Variations in Spending and Utilization Across Payer Types

Inpatient days per beneficiary were more variable than spending across all payer types. Individuals with private insurance spent the fewest days in the hospital, an average of 0.21 days per capita, and inpatient days varied about threefold across the country, from 0.11 to 0.32 days per beneficiary. Medicare beneficiaries spent an average of 1.30 days in the hospital, and

this rate varied more than threefold, from 0.69 to 2.25 days per beneficiary across HRRs. Again, Medicaid utilization demonstrated the most variability; days per beneficiary varied more than fivefold, from 0.20 to 1.01 days, with an average of 0.56 days per beneficiary (Figure 2).



1.30

3.26

1.35

0.21

Figure 2. Hospital Referral Region Variation (N=243) in Inpatient Days per Beneficiary by Payer (2017)

0.21

2.91

1.21

0.18

Mean

Extremal ratio

Coefficient of

variation

Interquartile ratio

The figure shows the variation in inpatient days per beneficiary by payer in 2017 (2016 data was used for Medicaid for three states when 2017 data was of poor quality). The dashes at each end of the vertical lines show the rates for the highest and lowest regions, standardized to the average for the payer. The top line of each gray box represents the standardized rate for the region at the 75th percentile among HRRs, and the bottom line shows the standardized rate at the 25th percentile. The table gives the ratio of the highest to lowest value (extremal ratio) and the ratio of the 75th to the 25th percentile value (interquartile ratio), as well as the coefficients of variation and the values for each point on the chart. Adapted from Table 1, Cooper Z, Stiegman O, Ndumele CD, Staiger B, Skinner J. Geographical variation in health spending across the US among privately insured individuals and enrollees in Medicaid and Medicare. *JAMA Netw Open*. 2022;5(7):e2222138.

0.56

5.05

1.62

0.30



Correlations Between Spending and Utilization Across Payers

Spending per beneficiary was not highly correlated across the three dominant payers in 2017; Medicare spending was unrelated to private spending per beneficiary (r=0.020), and the correlations between Medicare and Medicaid spending (r=0.162) and private and Medicaid spending (r=0.213) were low (Table 1). Only four HRRs—including three in the New York City metropolitan area (the Bronx, Manhattan, and White Plains) as well as Dallas, Texas—were among the highest quintile for all three payers, while only three were in the lowest quintile: Boulder, Colorado; Bloomington, Illinois; and Olympia, Washington.

There were stronger relationships across payers in inpatient days per beneficiary, with the correlation coefficients between private insurance and Medicare (r=0.465), and private insurance and Medicaid (r=0.527) strongly associated; the association between Medicare and Medicaid (r=0.278) was more modest but still statistically significant (Table 1).

Table 1. Correlations Between Spending per Beneficiary and Inpatient Days per Beneficiary Across Payers (2017)

	Correlation coefficient (r)	
	Spending per beneficiary	Inpatient days per beneficiary
Private insurance & Medicare	0.020	0.465*
Private insurance & Medicaid	0.213*	0.527*
Medicare & Medicaid	0.162†	0.278*

*p < .01, *p < .05. N = 243. The table gives the correlation coefficients for each pair of insurer types for spending and inpatient days per beneficiary at the HRR level. Both measures are age and sex adjusted using indirect standardization. Spending measures are inflation adjusted to 2017 dollars. Adapted from Table 2, Cooper Z, Stiegman O, Ndumele CD, Staiger B, Skinner J. Geographical variation in health spending across the US among privately insured individuals and enrollees in Medicaid and Medicare. JAMA Netw Open. 2022;5(7):e2222138.

In the Medicare program, inpatient days per beneficiary were strongly correlated with spending per beneficiary across HRRs (r=0.665). The associations were weaker for Medicaid (r=0.347) and much weaker for private insurance (r=0.131) (Table 2).

Table 2. Correlations Between Spending per Beneficiary and Inpatient Days per Beneficiary by Payer (2017)

	Correlations (r) between spending and inpatient days per beneficiary
Private insurance	0.131†
Medicare	0.665*
Medicaid	0.347*

*p < .01, *p < .05. N = 243. The table gives the correlation coefficients between spending and inpatient days per beneficiary for each insurer type at the HRR level. Both measures are age and sex adjusted using indirect standardization. Spending measures are inflation adjusted to 2017 dollars. Adapted from Supplement eTable 1, Cooper Z, Stiegman O, Ndumele CD, Staiger B, Skinner J. Geographical variation in health spending across the US among privately insured individuals and enrollees in Medicaid and Medicare. *JAMA Netw Open*. 2022;5(7):e2222138.

Correlates of Spending and Inpatient Days per Beneficiary Across Payers

A number of factors were included in the analysis as possible correlates of spending and utilization. These included supply variables, such as the number and profit status of hospitals, and beds and physicians per capita; and factors related to demand for health care, such as births and deaths per capita, median household income, the unemployment rate, and the share of the population that live in poverty, who smoke, and who are obese.²

None of these factors were consistently correlated across all three payers, reinforcing the notion that the determinants of spending variation, in particular, are specific to the payer type. For the privately insured, regions with high prices tended to have higher spending; for Medicare, regions with more specialist physicians per capita tended to have higher spending; and for Medicaid, regions with more hospital beds and births per capita experienced higher spending. By contrast, poor health (smoking, obesity) and poverty were associated with higher hospital utilization across all payers, while generalist (non-specialist) physicians per capita were negatively associated with hospital utilization, also across all payers.



Conclusion: Implications for Health Policy

Previous research has identified specific regions as having efficient—and inefficient—health care systems using Medicare data.³ More recently, some studies have been able to use both private insurance and Medicare data.⁴⁻⁶ The *JAMA Network Open* study has extended this type of analysis by including high-quality claims data for Medicaid (both fee-for-service and managed care plans) linked by region to private insurance claims from several large insurers (including Aetna, Humana, and United Health) through the Healthcare Cost Institute (HCCI). Together with Medicare and Medicaid data based at Dartmouth, these data have allowed researchers to expand the analyses beyond the Medicare fee-for-service program to a wider focus on overall health care costs.

This report, and the study upon which it is based, shows that studying only one payer or a few specific regional health systems as models of efficiency provides an inadequate understanding of the overall performance of the U.S. health system. The factors determining per capita health spending within and across regions are specific to the type of payer, suggesting that policies focusing on specific payers will be required to reduce unwarranted variation and improve efficiency in the U.S. health care sector.

Many years ago, John Wennberg synthesized the Dartmouth Atlas body of research in a three-word phrase: Geography is Destiny. He had in mind how older patients are treated by physicians: whether they are hospitalized (or not) for chronic diseases that could be treated at home; whether they are involved in the decision to undergo "preference-sensitive" surgical procedures such as prostatectomies; and whether they are more likely to die at home or in the hospital, regardless of their preferences.⁷ This study finds that regions with high rates of hospital days for Medicare beneficiaries also tend to be high for Medicaid patients and the privately insured, with high rates associated with both poorer health and hospital beds and lower rates in regions with more generalist physicians. Thus, a regional "signature" of health care providers is observed for inpatient hospital utilization across all three insurance plans.

This study also indicates another way in which geography is destiny: where one lives affects how much consumers, employees, and governments pay for health care. However, for spending, the very low correlations across

⁶ Geographic Variations in Spending and Utilization Across Payer Types

Medicare, Medicaid, and the privately insured indicate that there is no regional "signature," as there is for utilization. Because of this low correlation, there are only three HRRs in the bottom 25% of HRRs for each of the three payers.

These findings have important implications for health policy, most notably that policy makers may wish to focus on reforms that are specific to each payer; for example, policies designed to improve efficiency in Medicare could target unwarranted quantity variation, while policies for private insurance could target inefficient hospital pricing. In sum, policies designed to improve health care quality and reduce cost must consider payer-specific reforms to reduce unwarranted variations in both spending and utilization.



References

1. Wennberg JE, Gittelsohn A. Small area variations in health care delivery: A population-based health information system can guide planning and regulatory decision-making. *Science*. December 14, 1973 1973;182(4117):1102-08. doi:10.1126/science.182.4117.1102

2. Cooper Z, Stiegman O, Ndumele CD, Staiger B, Skinner J. Geographical variation in health spending across the US among privately insured individuals and enrollees in Medicaid and Medicare. *JAMA Netw Open*. Jul 1 2022;5(7):e2222138. doi:10.1001/jamanetworkopen.2022.22138

3. Obama B. Remarks by the President in town hall on health care, Grand Junction, Colorado. Accessed July 27, 2022. <u>https://obamawhitehouse.archives.gov/the-press-office/remarks-president-town-hall-health-care-grand-junction-colorado</u>

4. Chernew ME, Sabik LM, Chandra A, Gibson TB, Newhouse JP. Geographic correlation between large-firm commercial spending and Medicare spending. *Am J Manag Care*. Feb 2010;16(2):131-8.

5. Cooper Z, Craig SV, Gaynor M, Van Reenen J. The price ain't right? Hospital prices and health spending on the privately insured. *Q J Econ*. Feb 2019;134(1):51-107. doi:10.1093/qje/qjy020

6. Franzini L, Mikhail OI, Skinner JS. McAllen And El Paso revisited: Medicare variations not always reflected in the under-sixty-five population. *Health Aff (Millwood)*. Dec 2010;29(12):2302-9. doi:10.1377/hlthaff.2010.0492

7. Wennberg JE. *Tracking Medicine: A Researcher's Quest to Understand Health Care.* Oxford University Press; 2010.



Contact:

Media inquiries: TDI.Communications@dartmouth.edu General inquiries: TDI.Atlas@dartmouth.edu

The Dartmouth Atlas Working Group:

Kristen Bronner, MA Elliott Fisher, MD, PhD David Goodman, MD, MS Ashleigh King, MPH Christopher Leggett, PhD Sukdith Punjasthitkul, MS Jonathan Skinner, PhD John Wennberg, MD, MPH

Copyright 2022 The Trustees of Dartmouth College

