



February 2022

MEDICARE

Information on Geographic Adjustments to Physician Payments for Physicians' Time, Skills, and Effort

Accessible Version

GAO Highlight

Highlights of [GAO-22-103876](#), a report to congressional requesters

Why GAO Did This Study

Legislative modifications to the work GPCI have been made over the years. Specifically, the work GPCI has been modified to limit the range in the work GPCI values to one-quarter, and to apply a temporary floor to raise the work GPCI value to the national average for localities with values below it. The temporary floor will be applied through the end of 2023.

GAO was asked to review several aspects of the work GPCI used for Medicare physician payments. Among other objectives, this report describes the effect of hypothetical modifications to the work GPCI on physician payments across localities and the characteristics of localities affected; and the extent to which the work GPCI accounts for geographic variation in physician earnings.

GAO analyzed several data sources from CMS, including summary physician payment data for 2018, which was the most recent full year data available. GAO also developed a model and analyzed data from the Census Bureau, and IRS from 2012 through 2018.

The Department of Health and Human Services provided technical comments on a draft of this report, which GAO incorporated as appropriate.

View [GAO-22-103876](#). For more information, contact Jessica Farb at (202) 512-7114 or farbj@gao.gov.

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What GAO Found

The Social Security Act requires that the Centers for Medicare & Medicaid Services (CMS) use three geographic practice cost indices (GPCI) to adjust Medicare physician payments to account for differences in the costs of providing care across various geographic locations (called payment localities). One of these indices, the work GPCI, adjusts for the relative cost of a physician's labor—their time, skill, and effort. It is based on each locality's costs compared to the national average, meaning that higher cost areas have higher work GPCI values.

GAO analyzed CMS data on physician payments in 2018 and found that aggregate Medicare payments would decrease under three hypothetical modifications to the work GPCI: (1) removing the work GPCI floor, which raises the work GPCI value to the national average for any locality lower than it; (2) removing the floor and one-quarter adjustment, which limits the range in all localities' values to one-quarter of the true variation; or (3) removing the work GPCI entirely, which would mean setting all localities' values to the national average.

The effect of the hypothetical modifications on each locality's total payments would vary depending on whether the locality's actual work GPCI value was above or below the national average. (See table.) GAO found that localities with actual work GPCI values above the national average differed on key characteristics compared to localities with actual values below it. For example, localities with values below the national average generally had lower percentages of health care providers who are physicians and more of their population living in non-metropolitan counties.

Estimated Payment Changes to Medicare Physician Payments in 2018 under Hypothetical Modifications to the Work Geographic Practice Cost Indexes, by Locality Group

	Localities where the actual work GPCI was below the national average in 2018	Localities where the work GPCI value was above the national average in 2018
Number of localities	52	59
Removing the work GPCI floor adjustment	↓ \$415.8 million (-1.0%)	No payment change
Removing the work GPCI floor and one-quarter adjustments	↓ \$1.52 billion (-3.8%)	↑ \$1.14 billion (4.3%)
Removing the work GPCI and setting all localities to the national average	No payment change	↓ \$350.6 million (-1.3%)

Source: GAO analysis of 2018 physician payments under traditional Medicare. | [GAO-22-103876](#)

GAO also developed a model to determine the extent to which the work GPCI accounts for geographic variation in physician earnings—that is, the work GPCI values should be higher in areas with higher physician earnings (a proxy for labor costs) and lower in areas with lower physician earnings. GAO found that, as implemented, the work GPCI accounted for geographic variation in actual physician earnings in most localities (90 of 119 localities). However, in 14 localities, physician earnings were lower than the amount suggested by the work GPCI value, and in 15 localities, actual physician earnings were higher.

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Abbreviations

ACS	American Community Survey
CMS	Centers for Medicare & Medicaid Services
GPCI	geographic practice cost index
HCPCS	Healthcare Common Procedure Coding System
HHI	Herfindahl-Hirschman Index
HPSA	health professional shortage area
MedPAC	Medicare Payment Advisory Commission
MSA	metropolitan statistical area
RVU	relative value unit

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February 4, 2022

The Honorable Ron Wyden
Chairman
Committee on Finance
United States Senate

The Honorable Tammy Baldwin
United States Senate

The Honorable Chuck Grassley
United States Senate

Traditional Medicare pays for physician services using a fee schedule based on the resources required to deliver each service.¹ In 2019, Medicare spending for services paid through the physician fee schedule totaled \$74 billion for the nearly 1.4 million clinicians—including physicians—who billed Medicare for services provided to beneficiaries enrolled in traditional Medicare.² Since 1992, when Medicare’s physician fee schedule was put into place, physicians’ payments have been adjusted for differences across geographic areas in physicians’ costs to operate a medical practice. The purpose of these adjustments is to help ensure that Medicare’s payment is appropriate in all areas. That is, if an area’s costs for staff and other expenses are above the national average, payments for services in those areas under traditional Medicare are increased accordingly.

The Social Security Act requires that the Centers for Medicare & Medicaid Services (CMS) use three separate indices, known as geographic practice cost indices (GPCI) to adjust Medicare physician payments under traditional Medicare to account for geographic differences in physicians’ costs.³ Each GPCI corresponds to one of the three main components of a Medicare physician payment—physician work, practice

¹Medicare beneficiaries can enroll in traditional Medicare or can enroll in a Medicare Advantage plan, which is a private plan alternative to traditional Medicare fee-for-service. For beneficiaries that choose traditional Medicare, physicians’ services are paid under Medicare Part B.

²The term “clinicians” includes, for example, physicians, nurse practitioners, physician assistants, and psychologists.

³Social Security Act (SSA) § 1848(e) is codified at 42 U.S.C. § 1395w-4(e).

expense, and malpractice expense. The physician work GPCI adjusts the physician work component of the Medicare payment to account for geographic differences in the cost of physician labor (i.e., the time, effort, and skill that are associated with providing health care services).

Legislation enacted in 1989 established the work GPCI and limited the original variation in work GPCI values to 25 percent of the difference between the relative value of physicians' work effort and the national average (often referred to as the one-quarter adjustment).⁴ Over the years, the physician work GPCI has been legislatively modified: since 2003, legislation has been enacted that temporarily raises the values of the work GPCI to the national average for areas with values below the average (this is often referred to as the work GPCI floor); the most recent extension is applied through 2023.⁵

Several organizations, including the Medicare Payment Advisory Commission (MedPAC), and we have analyzed elements of the physician work GPCI, including whether CMS should make geographic adjustments for physician work and whether the methodology used for and the modifications applied to the work GPCI are appropriate.⁶ In 2013, MedPAC reported that there is a need for some level of geographic adjustment for physician work, but it noted that the labor market for the reference occupations (e.g., engineers and architects) used to calculate the work GPCI may not resemble the labor market for physicians and other health professionals.⁷ In addition, one of MedPAC's recommendations was that Congress should let the provision for the work GPCI floor expire, as it increases Medicare spending. In 2005, we

⁴Omnibus Budget Reconciliation Act of 1989, Pub. L. No. 101-239, § 6102, 103 Stat. 2106, 2177 (1989) (codified at 42 U.S.C. § 1395w-4(e)(1)(A)(iii)).

⁵Medicare Prescription Drug, Improvement, and Modernization Act of 2003, Pub. L. No. 108-173, § 412, 117 Stat. 2066, 2274 (2003) (codified, as amended, at 42 U.S.C. § 1395w-4(e)(1)(E)); Consolidated Appropriations Act, 2021, Pub. L. No. 116-260, Div. CC, Title I, § 101, 134 Stat. 1182, 2940 (2020).

⁶See, for example, National Academy of Medicine, *Geographic Adjustment in Medicare Payment: Phase I: Improving Accuracy* (Washington, D.C.: 2012); Medicare Payment Advisory Commission, "Mandated report: Geographic adjustment of payments for the work of physicians and other health professionals" in *Report to the Congress: Medicare and the Health Care System* (Washington, D.C.: June 2013); and GAO, *Medicare Physician Fees: Geographic Adjustment Indices Are Valid in Design, but Data and Methods Need Refinement*, [GAO-05-119](#) (Washington, D.C.: Mar. 11, 2005).

⁷Medicare Payment Advisory Commission, "Mandated report: Geographic adjustment of payments," 198-199.

reported that, while the GPCIs were generally valid in their designs, CMS's data and methods had weaknesses, and the GPCIs appeared to have little effect on physicians' incomes, location, recruitment, and retention.⁸ In 2007, we found that more than half of the geographic areas used for physician payment (often referred to as localities) had counties within the localities with large payment differences.⁹

You asked us to review adjustments to Medicare physician fees for geographic differences in physicians' costs for providing services. This report describes

- 1) what stakeholders have identified as the primary issues with the work GPCI;
- 2) the effects of hypothetical modifications to the work GPCI on the total amount of physician payments under traditional Medicare as well as the payments for each locality; and
- 3) the extent to which values of the work GPCI account for geographic variation in physician earnings across localities.

To describe what stakeholders have identified as the primary issues with the work GPCI, we interviewed a non-generalizable sample of 12 stakeholders. Specifically, we interviewed two contractors who have worked with CMS to update the GPCIs, three physician associations, four researchers who have studied GPCIs or geographic differences in wages, one health care consultant, a research organization, and a Medicare advisory organization.¹⁰ In addition, we reviewed reports on GPCIs, including reports issued by the National Academy of Medicine (formerly known as the Institute of Medicine) and MedPAC. We also reviewed public comments summarized in the CMS Physician Fee Schedule final rules for 2017 and 2020, the two most recent final rules in which the GPCIs were updated, to identify issues with the work GPCI. In addition,

⁸[GAO-05-119](#).

⁹GAO, *Medicare: Geographic Areas Used to Adjust Physician Payments for Variation in Practice Costs Should Be Revised*, [GAO-07-466](#) (Washington, D.C.: June 29, 2007).

¹⁰We identified stakeholders to interview based on recommendations we received from other stakeholders and through our review of relevant research papers and reports about the work GPCI.

we reviewed other CMS documents, reports, and final rules to identify CMS efforts to address stakeholder issues.

To describe the effects of hypothetical modifications to the work GPCI on the total amount of physician payments under traditional Medicare as well as the payments for each locality, we tested the effects of three modifications as applied to CMS physician payment data from the 2018 Physician/Supplier Procedure Summary file—the most recent year in which full payment data were available when we started our work.¹¹ For our analysis, we also used other CMS data, including information on localities and GPCI values related to specific Medicare services. We calculated each locality’s work GPCI value by modifying it in three ways: (1) by removing the work GPCI floor for localities where the value had been raised to the national average; (2) by removing the work GPCI floor and removing the one-quarter adjustment, which limits the variation in work GPCI values to one-quarter; and (3) by removing the work GPCI altogether by setting each locality’s work GPCI value to the national average.¹² Using the Medicare physician payment and fee schedule data files, we summed Medicare physician payments within each payment locality, estimated the portion of the payments that were associated with the physician work component, and calculated how payments would change under each of the three modifications.¹³ We also looked at the characteristics of localities that were affected by the hypothetical modifications by analyzing 2018 data from the Area Health Resource file. Specifically, we examined the percentages of the population that lived in whole county health professional shortage areas (HPSA) for primary care

¹¹Our analysis of the 2018 Physician/Supplier Procedure Summary file data included physician payments and did not include cost-sharing payments for which Medicare beneficiaries may be responsible.

¹²In each of the three modifications, we also removed the statutorily-required floor for the Alaska locality that raises its work GPCI value to 1.50. In addition, the one-quarter adjustment is calculated before budget neutrality, which is done to ensure that total physician payments do not increase as a result of the updated GPICs. As a result, we removed the one-quarter adjustment from the locality’s work GPCI values and then re-calculated the values so that they were budget neutral.

According to CMS, each of these three modifications would require legislation in order to implement.

¹³Our analysis is based on hypothetical modifications to the work GPCI. It is possible that modifying the work GPCI in the ways we hypothesize would change physician behavior, such as changing where physicians choose to practice or what types of services they provide most frequently. In addition, our analysis is based on a single point in time, 2018, and would likely look different in other years. As a result, the payment changes we report for each modification should be considered estimates that would likely be different if the work GPCI were actually modified.

or mental health, lived in non-metropolitan counties, lived in poverty, and were Medicare beneficiaries. We also looked at the total number of providers (physicians, nurse practitioners, and physician assistants) per capita and the percent of these providers who are physicians.

To describe the extent to which the values of the work GPCI account for geographic variation in physician earnings across localities, we analyzed data from multiple sources to develop two econometric models. In our models, we used physician earnings data from 2012 through 2018 as a measure of physician labor costs and controlled for several factors that could affect physicians' earnings. If the work GPCI is appropriately accounting for geographic variation in physician earnings, we would expect that, once we control for factors that affect physicians' earnings, the work GPCI values assigned to localities would be higher in localities with higher physician labor costs and lower in localities with lower physician labor costs. Appendix I describes these two models in more detail, including the dependent variable, model specification, explanatory variables, the specific data sources used for each variable, and model results. To develop the models, we used data from 2012 through 2018 on physician earnings and other data and analyses conducted by the Enhancing Health Data program at the U.S. Census Bureau, which included data from IRS, CMS, and the Census Bureau's American Community Survey. We also analyzed data from other sources, such as the Area Health Resource File, to obtain information on individual physician characteristics (such as age, gender, race, and physician specialty); characteristics of each locality's health care market (such as concentration of physicians and health insurance, and percentage of Medicare beneficiaries), and characteristics of the locality more broadly that may affect a physician's decision on where to live and practice (such as rate of college graduation).

To assess the reliability of the electronic data used, we reviewed relevant documentation, interviewed CMS and U.S. Census Bureau officials, and examined the data for obvious errors. We determined that the data were sufficiently reliable for the purposes of our reporting objectives.

We conducted this performance audit from October 2019 to February 2022 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

Background

Medicare Physician Payment

Under traditional Medicare, CMS determines payment amounts for physicians' services based on the underlying relative values that CMS assigns to about 10,000 services included in the physician fee schedule. Specifically, for each of these services, there are three relative value units (RVU) that correspond to the three components of physician payment:

- Physician work—the financial value of physicians' labor (i.e, the time, effort, and skill that are associated with providing the service).
- Practice expense—the costs incurred by physicians in employing office staff, renting office space, and buying supplies and equipment.
- Malpractice expense—the premiums paid by physicians for professional liability insurance.

Each RVU measures the relative costliness of providing a particular service. For example, in 2020, for an office visit for an established patient that requires a moderate amount of medical decision-making, the three RVUs sum to 3.06.¹⁴ In contrast, total RVUs for an MRI of the chest in an office setting are 15.58, indicating that this procedure is about 5 times as resource intensive as the office visit.¹⁵ Further, the relative contribution of the three components varies by type of service. For example, the composition of the total RVU for an office visit is roughly 49 percent work RVU, 47 percent practice expense RVU, and 4 percent malpractice expense RVU. An MRI of the chest is roughly 15 percent work RVU, 85 percent practice expense, and 1 percent malpractice expense RVU.

CMS separately adjusts each of the three RVUs to account for variations in physicians' costs of providing care in different geographic areas. The GPCIs are numerical factors expressed as the ratio of an area's cost to the national average cost. For example, in 2020, the physician work GPCI

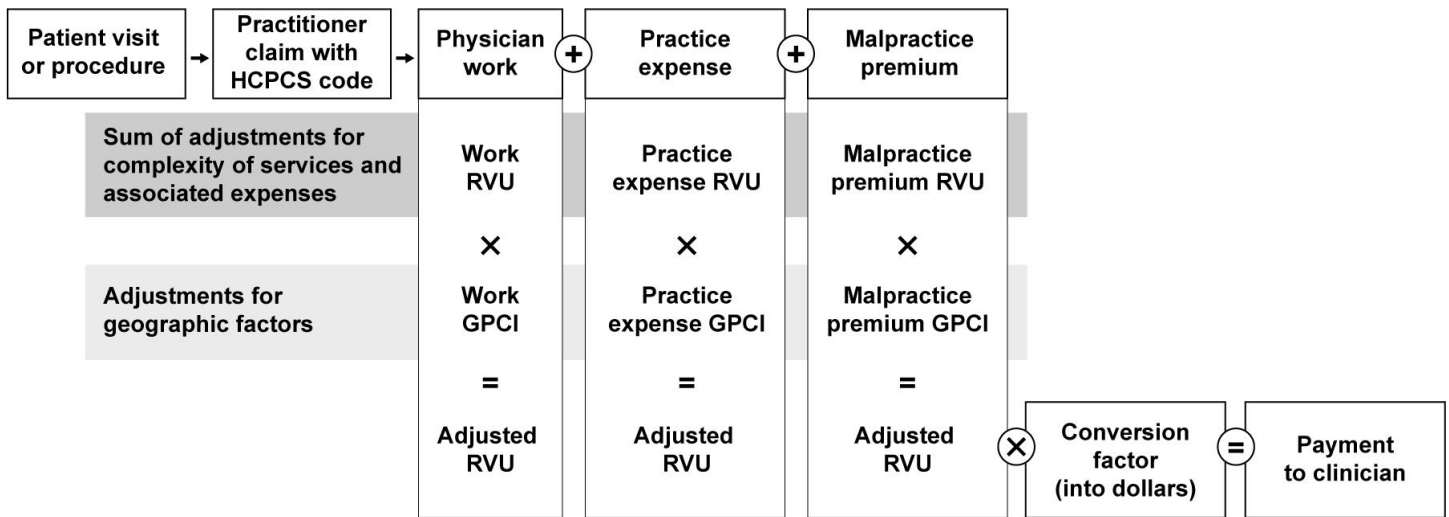
¹⁴A more complete description is office or other outpatient visit for the evaluation and management of an established patient. The Healthcare Common Procedure Coding System (HCPCS) code associated with this service is 99214.

¹⁵The full description for this procedure is magnetic resonance imaging, chest without and with dye (e.g., for evaluation of hilar and mediastinal lymphadenopathy). The HCPCS code associated with this service is 71552.

for Houston, Texas was 1.026, which means that the physician work GPCI value is 2.6 percent above the national average.

To calculate the Medicare payment amount for a service in a particular geographic area, each of the three RVUs for a service is adjusted by the appropriate GPCI and then converted into dollars. This process has several steps (see fig. 1). First, to adjust for differences in costs, each of the three RVU components are multiplied by the appropriate GPCI. Second, these adjusted RVUs are added together. Third, that sum is converted into dollars using a conversion factor—a dollar amount CMS calculates that translates each service’s RVUs into a payment amount. The result equals the Medicare payment for that service in that payment locality.

Figure 1: Medicare Physician Fee Schedule Payment Calculation



GPCI Geographic practice cost index
 HCPCS Healthcare Common Procedural Coding System
 RVU Relative value unit

Source: GAO analysis of Centers for Medicare & Medicaid Services documents. | GAO-22-103876

Note: Physician payments under traditional Medicare may also be adjusted in other ways, such as by an added incentive payment for providing the service in a health professional shortage area.

Physician Work GPCI

The work GPCI measures relative costs exclusively by an indirect measure: the relative wages of seven categories of non-physician professional occupations. Specifically, to calculate the work GPCI for

each payment locality, CMS uses wage data from the Bureau of Labor Statistics for seven selected reference occupation categories, including architects, engineers, computer scientists, attorneys, and registered nurses.¹⁶ These data are used to calculate the average of hourly earnings for these occupations, and they are weighted for the particular occupation category's share of national wages.¹⁷ Then, a numerical value for the work GPCI is calculated for each payment locality relative to the national average (indicated with a work GPCI value of 1.00). As a result, a work GPCI value lower than 1.00 indicates that the average wages of the proxy occupations in that locality are lower than the national average; a work GPCI value higher than 1.00 indicates average wages are higher. These professional occupation categories were selected because they generally require at least 5 or more years of college education, and they were assumed to be similar to physicians in the types of goods and services they purchase and in their preferences for area amenities.¹⁸ In many of the recent Physician Fee Schedule final rules, CMS stated that it does not use physician wages in calculating the work GPCI because it would create a circularity issue, as physician wages are at least partially dependent on Medicare payments.

After the initial work GPCI is calculated, CMS applies several modifications.

- **One-quarter adjustment.** In establishing the index for the work GPCI in 1992, CMS was required by statute to limit the range of the work GPCI to 25 percent of the original variation in the index for each locality compared with the national average.¹⁹ For instance, if a locality's work GPCI value is calculated at 1.10 (10 percent higher than the national average), the one-quarter adjustment would reduce this locality's work GPCI value to 1.025. According to a 2004 research

¹⁶The seven non-physician professional occupation categories include architecture and engineering; computer, mathematical, life, and physical science; social science, community and social services, and legal; education, training, and library; registered nurses; pharmacists; and art, design, entertainment, sports, and media.

¹⁷The calculation also accounts for the share of work RVUs for each county within the locality. For example, if one county within the locality represents 40 percent of the locality's total work RVUs, then that county's average hourly wages for the reference occupations would be 40 percent of the locality's average.

¹⁸S. Zuckerman and S. Maxwell, *Reconsidering Geographic Adjustments to Medicare Physician Fees* (Washington, D.C.: The Urban Institute, 2004).

¹⁹42 U.S.C. § 1395w-4(e)(1)(A)(iii).

study on the GPCIs, the one-quarter adjustment was included in law due to concerns that the data used to calculate the work GPCI reflected a variation in physician work costs that appeared to be too large.²⁰

- **Floor.** Legislative extensions of a “floor” of 1.0 for the work GPCI have frequently occurred, whereby any localities that are below the national average work GPCI value are automatically raised to the national average.²¹ The work GPCI floor was originally established as a temporary adjustment for areas with low work GPCI values as a part of a legislative package of payment increases to Medicare providers in rural areas. In 2018, 52 of the 112 payment localities had their work GPCI values raised by the floor to the national average.
- **Alaska floor.** A permanent work GPCI floor of 1.5 for Alaska’s statewide locality has also been established.²²
- **Budget neutrality adjustment.** The work GPCI, along with the practice expense and malpractice premium GPCIs, are subject to a budget neutrality adjustment to ensure that total physician payments do not increase as a result of the updated GPCIs. In theory, this should keep overall Medicare physician payments the same, as localities with increases are offset by decreases in equal amounts in other localities. However, the total Medicare physician payments may increase or decrease because the budget neutrality adjustment is applied after the one-quarter adjustment but before other adjustments, like the work GPCI floor.

These adjustments reduce the range in GPCI values. For example, without the work GPCI floor applied, the work GPCI in 2021 ranged from 0.949 in the Montana locality to 1.096 in the Santa Clara County, California locality. In addition, as demonstrated above, the one-quarter adjustment further limits the range of GPCI values.

²⁰S. Zuckerman and S. Maxwell *Reconsidering Geographic Adjustments to Medicare Physician Fees*.

²¹42 U.S.C. § 1395w-4(e)(1)(E). The work GPCI floor was initially established in the Medicare Prescription Drug, Improvement, and Modernization Act of 2003 and has continued with a series of extensions since. Pub. L. No. 108-173, § 412, 117 Stat. 2066, 2274 (2003). The most recent extension was enacted in the Consolidated Appropriations Act, 2021, extending the floor through calendar year 2023. Pub. L. No. 116-260, Div. CC, Title I, § 101, 134 Stat. 1182, 2940 (2020).

²²42 U.S.C. § 1395w-4(e)(1)(G).

Other Medicare adjustments to physician fees are used to address issues other than geographic variation in costs. For example, physicians practicing in designated HPSAs receive a 10 percent bonus payment for Medicare services they provide. A HPSA is a geographic area that has been designated by the Health Resources and Services Administration within the Department of Health and Human Services as having a shortage of health professionals, such as a shortage of primary care physicians (known as primary care HPSAs) or a shortage of mental health care providers (known as mental health HPSAs).²³

Payment Localities and Updates to the GPCIs

The GPCIs are calculated for 112 distinct geographic areas, referred to as physician payment localities.²⁴ As part of its responsibility to adjust Medicare payments, CMS generally sets the boundaries of the payment localities.²⁵ Of the 112 payment localities, 36 are statewide areas, meaning that all physician fees in the state are adjusted by a uniform amount.²⁶ The remaining 76 payment localities are composed of one or

²³Geographic areas that may be designated as a HPSA include counties, Census tracts, and Minor Civil Divisions. The Health Resources and Services Administration designates HPSAs using several factors, such as the number of primary care physicians practicing in an area relative to its total population. Physicians are eligible to receive the bonus payments in geographic primary care HPSAs, and psychiatrists are eligible to receive bonus payments in geographic mental health HPSAs. There are other types of HPSAs, including those associated with certain types of populations (like low-income population) or for specific facilities (like Federally Qualified Health Centers). However, we excluded these two types from our analysis.

²⁴There were previously 89 physician payment localities. However, beginning in 2017, the physician payment localities expanded to 112. Specifically, the Protecting Access to Medicare Act of 2014 increased the number of payment localities in California from nine to 32, with the revised localities in the state based on metropolitan statistical areas (MSA). For some of these new localities, the GPCI values under the new MSA-based locality structure are to be gradually phased in (in one-sixth increments) over a 6-year period. Pub. L. No. 113-93, § 220(h), 128 Stat. 1040, 1074 (2014) (codified at 42 U.S.C. § 1395w-4(e)(6)).

²⁵Although CMS has the responsibility to set payment locality boundaries, the Protecting Access to Medicare Act of 2014 required CMS to implement changes to the localities used for calculating GPCIs in California beginning in calendar year 2017. Specifically, CMS was required to set all MSAs in California as separate payment localities. § 220(h), 128 Stat. at 1074.

²⁶The U.S. territories of Puerto Rico and the U.S. Virgin Islands each have their own payment locality and are included in the 36 statewide localities. The other U.S. territories—Guam, American Samoa, and the Northern Mariana Islands—are assigned to the statewide locality for Hawaii.

more counties within a state and differ in size, population density, and the extent to which they are urban or rural.²⁷ For example, Atlanta, Georgia (a metropolitan area) is one payment locality and the rest of Georgia (excluding the Atlanta area) is a separate payment locality.

CMS uses updated data to calculate the GPCIs at least once every 3 years, though the updated GPCIs are phased in during the first year of an update. Specifically, in the first year of an update, the adjustment applied to the GPCI values is equal to half of the full adjustment that otherwise would be made. The purpose of the transition year is to avoid large changes when data are updated. The most recent update occurred for calendar year 2020 and has been fully phased in for calendar years 2021 and 2022.

Stakeholders Views on Work GPCI Design and Data and Methodology

The 12 stakeholders we interviewed and reports that we reviewed highlighted issues with the work GPCI within two main categories: (1) design of the work GPCI, and (2) the data and methodology used to calculate the work GPCI.

Design

Stakeholders we interviewed and reports that we reviewed noted issues with the design of the work GPCI, including its original intent and purpose—accounting for geographic differences in labor costs—and statutory structure that might affect its effectiveness.

Need for Work GPCI

Stakeholders had different opinions on whether the work GPCI was needed. For example, one stakeholder questioned whether the work GPCI was needed, as a physician's work in one locality is likely the same as another physician's work in a different locality. According to a 2012 report by the National Academy of Medicine, Medicare physician payments already take into account the effort required to provide the

²⁷Seventy-five of these 76 localities are in 16 states. The District of Columbia and the adjacent Maryland and Virginia suburbs make up the remaining locality.

specific service (as measured through the work component RVUs), and that effort should be the same regardless of the geographic area in which it is provided.²⁸ In contrast, some stakeholders discussed the differences between rural and urban physicians that they believe are not accounted for in the work GPCI calculation. For example, two stakeholders told us that physicians in rural areas may spend more time traveling between facilities or practice locations to provide care, thus it would take them longer to perform the same number of services as a physician that does not have to travel to provide care. A 2013 MedPAC report that we reviewed also noted that the portion of payments related to labor for other Medicare providers, such as hospitals, are adjusted for geographic variation, so adjusting physician payments for geography maintains consistency.²⁹ As a part of the rulemaking process, CMS solicits comments on changes it makes to Medicare payment policy, including the work GPCI, and according to CMS officials, they were not aware of any comments they received through the rulemaking process about this issue.

Interaction of Work GPCI with Other Incentive Programs

A few stakeholders identified issues with the work GPCI's design and how it might interact with other physician incentive programs. For example, one stakeholder said that the work GPCI favors urban areas by paying physicians more in these areas for the services they provide and thus might work against programs that incentivize physicians to practice in physician shortage areas. One stakeholder, a few commenters in the 2020 final rule, and a 2012 National Academy of Medicine report also noted that the work GPCI should not be designed to address physician shortage issues and instead suggested that a better approach would be to encourage physicians through the other existing incentive programs.³⁰

Implications of the One-Quarter Adjustment

A few stakeholders questioned whether the work GPCI as implemented can accurately account for geographic variation in labor costs due to the one-quarter adjustment being applied, while a report we reviewed outlined the possible merits of the adjustment. One stakeholder said that

²⁸National Academy of Medicine (formerly known as Institute of Medicine). *Geographic Adjustment in Medicare Payment*.

²⁹Medicare Payment Advisory Commission, "Mandated report: Geographic adjustment of payments."

³⁰National Academy of Medicine, *Geographic Adjustment in Medicare Payment: Phase II: Implications for Access, Quality, and Efficiency* (Washington, D.C.: 2012).

there is substantial variation in housing costs across geographic locations, and limiting the range of the work GPCI may be unfair to locations with above-average costs. Another stakeholder told us that there seems to be few reasons to limit the adjustment to one-quarter, and instead, a full adjustment should be used.

For context, a 2013 MedPAC report we reviewed noted that the one-quarter adjustment may have been implemented to address data limitations. Specifically, the report noted that the earnings for the reference occupations may be partially, but not completely, correlated with physicians' earnings, and applying a one-quarter adjustment to the work GPCI might account for this partial correlation.³¹ The report also mentioned a study—conducted after the physician fee schedule was first implemented—that modeled variation in physician earnings and found that the one-quarter adjustment model accounted for variation in physician earnings better than a full adjustment or no adjustment. A 2012 report from the National Academy of Medicine recommended that CMS consider an alternative method for setting the percentage of the work adjustment based on a systematic empirical process.³²

In response to the concerns identified by our stakeholders, CMS officials noted that the one-quarter adjustment is a statutory requirement, and they have not conducted any additional studies on this issue.

Concerns over the Work GPCI Floor

Some stakeholders also shared concerns with the statutory provision related to the work GPCI floor, which raises the work GPCI value to the national average in localities where the work GPCI would have been below it. Specifically, two stakeholders said that the work GPCI floor may overcompensate physicians in localities where costs are below the national average. In this way, some of the original intent of the work GPCI—to account for geographic differences—could be undermined. In contrast, a few commenters in the 2020 CMS final rule noted concern about how removal of the work GPCI floor could negatively affect rural areas as physician payments in those areas would be lower without a work GPCI floor.

³¹Medicare Payment Advisory Commission, "Mandated report: Geographic adjustment of payments."

³²National Academy of Medicine, *Geographic Adjustment in Medicare Payment: Phase I*.

Data and Methodology

The 12 stakeholders we interviewed and reports we reviewed also identified issues with the data and methodology used to develop and implement the work GPCI. Specifically, stakeholders identified issues that were related to the current locality boundaries or structure, the use of proxy occupations data, and whether variation in physicians' work is fully accounted for in the work GPCI calculation.

Size of Payment Localities

Some stakeholders noted an issue with the methodology: the current localities that CMS uses may be too large and thus may not capture variation that might occur within states. For example, a physician working in a rural county in Kentucky (one of the state-wide localities) might face different costs in providing services than a physician working in an urban area in Kentucky. One stakeholder suggested that CMS consider implementing different locality boundaries that would better reflect this variation, such as metropolitan statistical areas (MSA).

According to CMS officials, they considered changing the localities but have not pursued this further because of possible payment decreases and administrative challenges. Specifically, in the 2014 Physician Fee Schedule final rule, CMS stated that it had considered several options to expand the number of Medicare payment localities. CMS noted that a contractor's analysis showed that changing the localities to a more granular geographic level would result in payment reductions to primarily rural areas.³³ Specifically, the analysis noted that, on average, counties in MSAs would see increases to their GPCI values if the localities were changed, while counties not in these areas would see decreases.

In the 2014 final rule, CMS also noted comments it received on how lowering payment amounts in rural areas could threaten beneficiary access to physicians' services. CMS pointed to conclusions from a National Academy of Medicine report that the GPICs are not a strong determinant of access problems and that the GPICs are not the most

³³The contractor's analysis calculated a single adjustment for each locality called a geographic adjustment factor, which sums each of the three GPICs (for physician work, practice expenses, and malpractice premiums). They calculated the geographic adjustment factor using four options that would change the localities and found that changes under each option would result in disproportionately lower geographic adjustment factors in non-MSAs. Acumen, LLC, *Review of Alternative GPCI Payment Locality Structures – Final Report* (Burlingame, CA: 2010).

appropriate tool for resolving problems in the supply and distribution of health care providers.

According to CMS officials, they have not pursued a change to the locality structure in more recent updates because of the possible payment reductions that some areas would see. In addition, CMS stated that transitioning to reconfigured localities may result in operational and administrative challenges.³⁴

Comparability of Wages for Proxy Occupations and Physicians

A few stakeholders, a report, and commenters on the 2017 final rule identified an issue with the data used to calculate the work GPCI values for each locality: specifically that variation in the wages from the seven reference occupation groups may not be very comparable to physicians. For example, one stakeholder noted that attorneys—one of the proxy occupation groups—may have higher wages than physicians in certain areas (such as large cities) but lower wages in other areas with fewer needs for attorneys (such as rural areas). As a result, there may be variation across localities in the extent to which attorney and physician wages are similar. In addition, a 2013 MedPAC report studied whether the wages for proxy occupation groups were correlated with physician wages within two sub-sets of physicians (family and general practice, and internal medicine).³⁵ The report found no statistically significant correlation between the proxy occupation group wages and wages of family and general practice physicians. It found a negative correlation for internal medicine physicians, meaning that as the wages for the reference occupation categories increased, wages for internal medicine physicians decreased. These results suggest that the wages of the proxy occupation groups might not be comparable to these types of physicians. A few commenters in the 2017 final rule suggested that CMS reevaluate these proxy occupations to determine if any modifications are needed.

In contrast with the concerns identified about the use of reference occupations, CMS has long maintained that using proxy occupations to model differences in relative costs is more appropriate than using physician wages to calculate the work GPCI. Using physician wages would create a circularity problem, as physician wages are, in part,

³⁴CMS officials also said that there has been one recent change to the payment localities in California, which were revised in 2017 as required by law. 42 U.S.C. § 1395w-4(e)(6).

³⁵Medicare Payment Advisory Commission, “Mandated report: Geographic adjustment of payments.”

dependent on Medicare payments. CMS officials told us that they believe that the earnings of physicians will vary in the same ways that the earnings of the proxy occupation groups do. CMS officials told us that they review the occupation codes within each proxy occupation group and update them as necessary.

Under Three Work GPCI Modifications, Medicare Physician Payments Decrease Overall, with the Effects on Localities Varying Depending on Modification

Overall Physician Payments Decrease under Three Modifications, with Size of Changes and Number of Localities Differing Depending on Modification

We assessed the effect of three hypothetical modifications to the work GPCI and their effects on the amount and distribution of Medicare physician payments under traditional Medicare.³⁶ We assessed the likely effect of these changes using Medicare payment data for 2018, the most recent year for which complete data were available. We found that overall physician payments under traditional Medicare in 2018 would have decreased under each of the three hypothetical modifications of the work GPCI we analyzed. Specifically,

³⁶Our analysis is based on hypothetical modifications to the work GPCI. It is likely that modifying the work GPCI in one of the ways we hypothesize would change physician behavior, such as changing where physicians choose to practice or what types of services they provide most frequently. In addition, our analysis is based on a single point in time, 2018, and would likely look different in other years. Based on these pieces, the payment changes we have reported here for each modification should be considered estimates that would likely be different if the work GPCI were actually modified. In addition, our analysis of the 2018 Physician/Supplier Procedure Summary file data included physician payments and did not include cost-sharing payments for which Medicare beneficiaries may be responsible. As a result, our findings here are limited to the three hypothetical modifications we analyzed.

- When removing the work GPCI floor (modification 1), overall payments would decrease by \$438.7 million, about 0.7 percent of all physician payments under traditional Medicare in 2018.³⁷
- When removing the work GPCI floor and one-quarter adjustment (modification 2), overall payments would decrease \$399.2 million, about 0.6 percent of all physician payments under traditional Medicare in 2018.³⁸
- When removing the work GPCI entirely and instead setting all localities to the national average (modification 3), overall payments would decrease \$374.99 million, about 0.6 percent of all physician payments under traditional Medicare in 2018.³⁹

In addition to assessing the effects of the three modifications on overall traditional Medicare physician payments, we also examined the effects of these modifications on total Medicare physician payments in each of the 112 localities. We calculated what each locality's work GPCI value would be under the three modifications and then calculated how total payments in that locality would have changed under each modification.⁴⁰ We also categorized localities as below, or equal to or above the national average based on what the work GPCI value would have been in 2018 without the work GPCI floor or one-quarter adjustment. We found that whether

³⁷In modification 1, we removed the work GPCI floor, which raises the work GPCI value to the national average for localities with actual work GPCI values below the national average. We also removed the statutorily required floor for the Alaska locality that raises its work GPCI value to 1.50.

³⁸In modification 2, we removed the work GPCI floor and the one-quarter adjustment. The one-quarter adjustment reduces the variation in the work GPCI values for all localities to 25 percent of the original variation. For instance, if a locality's work GPCI value is calculated to be 1.10 (10 percent higher than the national average), the one-quarter adjustment would reduce this locality's work GPCI value to 1.025. When computing payments under this modification, we also removed and re-calculated the budget-neutrality factor, so overall payments remain budget-neutral. As a result, overall changes to physician payments were similar in value between modifications 1 and 2, but not equal. Because the budget neutrality factor is based on a fixed distribution of GPCI-weighted RVUs, modifying the GPCI value for each locality (and thus the distribution of GPCI-weighted RVUs) will likewise lead to slight differences in budget-neutral payments, nationally.

³⁹In modification 3, we set all the localities' work GPCI values to the national average (1.00), meaning that physician payments would not account for geographic differences in physician labor costs.

⁴⁰Payments for physicians' services under traditional Medicare can differ in terms of the portion of the payment that is associated with the physician work component. To account for this, we used summary payment data to estimate changes in payment for the work component of services provided in each locality. We then summed the payment changes for each locality.

localities would see payment increases or decreases varied by the type of modification made and depended on whether the locality's actual work GPCI value in 2018 was above or below the national average. In addition, one payment locality—the state of Alaska—would have payment decreases in each modification despite having an actual work GPCI value above the national average. This is because work GPCI value for Alaska's locality is set at 1.50 (1.5 times the national average), and the work GPCI value would have been lower than 1.50 in each modification. (See table 1.)

Table 1: Estimated Effects on Traditional Medicare Physician Payments under Hypothetical Modifications to the Work Geographic Practice Cost Index (GPCI), by Locality Group, 2018

Hypothetical modification to the work GPCI value	52 localities where actual work GPCI would have been below national average in 2018 without statutory adjustments	1 locality where actual work GPCI would have been above the national average in 2018 without statutory adjustments but still sees payment decreases	59 localities where the work GPCI value would have been at or above the national average in 2018 without statutory adjustments
Removing the work GPCI floor (modification 1)	↓ \$415.8 million (-1.0%)	↓ \$22.89 million (18.5%)	No payment change
Removing the work GPCI floor and one-quarter adjustment (modification 2)	↓ \$1.52 billion (-3.8%)	↓ \$18.03 million (14.6%)	↑ \$1.14 billion (4.3%)
Removing the work GPCI and setting all localities to the national average (modification 3)	No payment change	↓ \$24.40 million (19.7%)	↓ \$350.6 million (-1.3%)

Source: GAO analysis of 2018 physician payments under traditional Medicare. | GAO-22-103876

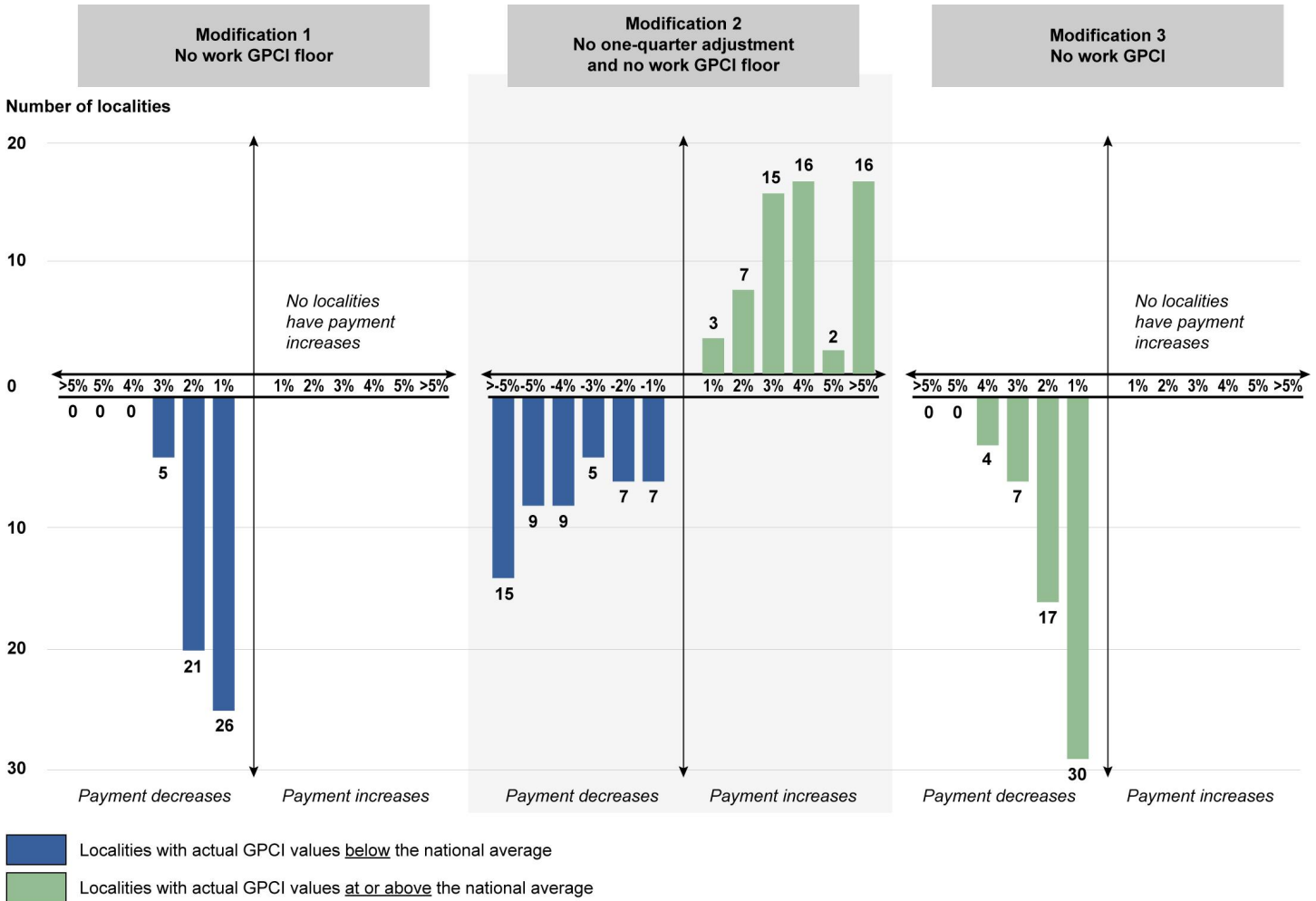
Notes: Localities are categorized into one of two groups: (1) those with GPCI values below the national average or (2) those with GPCI values at or above the national average—based on what the locality’s work GPCI value would have been without the work GPCI floor or one-quarter adjustment applied. In addition, one payment locality—the state of Alaska—had payment decreases in each modification despite having an actual work GPCI value above the national average. This is because work GPCI value for Alaska’s locality is set at 1.50 (one and a half times the national average) per statute. As a result, Alaska’s work GPCI value under each of the 3 modifications would have been lower than 1.50 and thus would have payment decreases under each modification.

Percentages are calculated based on payments for the particular grouping of localities.

Payments for physicians’ services under traditional Medicare can differ in terms of the portion of the payment that is associated with the physician work component. To account for this, we estimated changes in payments for the work component portion of the payment for summary data for each specific service. We then summed the payment changes for each locality.

The magnitude of payment changes across localities also varies depending on the modification. Specifically, in modifications 1 and 3, most localities affected—meaning payments would change under the modifications—would see less than 2 percent decreases in payments. However, in modification 2, many localities would see more than 5 percent payment decreases or increases (see fig. 2). Additional details about the effect on payments under each modification for all payment localities are available in appendix II.

Figure 2: Range of Estimated Percent Changes to Medicare Physician Payments, by Modification to the Work Geographic Practice Cost Index (GPCI) and Locality Grouping, 2018



Source: GAO analysis of 2018 physician payments under traditional Medicare. | GAO-22-103876

Notes: Percentages are calculated based on the change in payments within each locality. The percentage bars included above indicate a range. For example, localities with an estimated change in payments between 0 and 1 percent are included in the 1 percent bar.

Localities are categorized as below, or at or above the national average based on what the locality's work GPCI value would have been without the work GPCI floors or one-quarter adjustment.

In addition, we have excluded one payment locality—the state of Alaska—from this figure, as the locality had payment decreases in each modification despite having an actual work GPCI value above the national average. This is because work GPCI value for Alaska's locality is set at 1.50 (one and a half times the national average) per statute. As a result, Alaska's work GPCI value under each of the three modifications would have been lower than 1.50 and thus would have payment decreases under each modification.

59 Localities with Work GPCI Values at or above the National Average Differed on Key Characteristics from 52 Localities with Values Below the National Average

We also looked at characteristics of the two categories of localities—those whose work GPCI values would have been below the national average in 2018 without the statutory adjustments of the work floor and one-quarter adjustment applied (52 localities), and those with work GPCI values that would have been at or above the national average (59 localities)—to identify any statistically significant differences between the two categories. We found that in general, the 52 localities of which the actual work GPCI values would have been below the national average without the work floor and one-quarter adjustment tended to have

- Higher shares of their locality population who were Medicare beneficiaries (19.2 percent on average compared to 16.7 percent for the 59 localities whose work GPCI values were at or above the national average);
- Lower percentages of health care providers (physicians, physician assistants, and nurse practitioners) who were physicians (about 66.1 percent on average compared to about 73.0 percent for the 59 localities);
- More of their population living in primary care HPSAs (about 8.5 percent on average compared to 0.2 percent for the 59 localities) and mental health HPSAs (about 29.7 percent on average compared to 14.4 percent for the 59 localities);⁴¹ and

⁴¹Our analysis was limited to entire counties that had been deemed HPSAs. There are some counties where part of the county is a HPSA. However, we did not include these areas in our analysis, as the data do not distinguish areas that are partial counties and facility or population-based HPSAs.

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- More of their populations living in non-metropolitan areas (about 26.2 percent on average compared to 2.8 percent).⁴²

We also found that there were characteristics in our analysis for which there were no statistically significant differences between localities that were at or above the national average and localities below the national average. Specifically, both locality groups had similar rates of the percent of their population in poverty and rate of health care providers per capita. Additional details about characteristics of each locality is available in appendix II.

The Work GPCI as Implemented Generally Accounts for Geographic Variation in Physician Earnings in the Most Localities

Using IRS data on physician earnings and other data for 2012 through 2018, we developed a base econometric model to determine the extent to which the work GPCI values across localities accounts for differences in physician earnings. Specifically, we used physician earnings as a proxy for labor costs, controlled for factors that affect physicians' earnings, and used the model to determine whether work GPCI values were higher in areas with higher physician earnings and lower in areas with lower physician earnings. Based on this econometric model, where we controlled for individual physician characteristics and factors associated with health care in a locality (such as the percentage of Medicare beneficiaries), we found that the work GPCI as implemented accounted for geographic variation in physician earnings in the majority of localities (90 of 119 localities).⁴³ We interpret this to mean that the work GPCI

⁴²The work GPCI floor was originally established as a temporary adjustment for areas with low work GPCI values as a part of a legislative package of payment increases to Medicare providers in rural areas. In addition to this adjustment for particular areas, eligible providers in areas deemed HPSAs receive bonus payments. According to CMS data, for all localities (regardless of whether their actual work GPCI was above or below the national average), CMS paid \$144.5 million in total HPSA bonus payments in 2018 to physicians that qualified. This total includes all HPSA payments made to providers by the Medicare Administrative Contractors and may not include any recoupments for payments made in error or other incentives paid. This total also includes all types of HPSAs, including primary care, and mental health shortage areas as well as payments to facilities in addition to physicians.

⁴³A work GPCI value is said to generally reflect geographic variation in physician earnings when the locality-specific dummy variable was not significant at the 5 percent level in the results of our model. We use the term 'work GPCI as implemented' to refer to the 2018

value is appropriately adjusting for geographic variation in physician earnings in these localities. The 90 localities where the work GPCI as implemented reflected geographic variation in physician earnings accounted for about 82 percent of all physicians from 2012 through 2018.⁴⁴

Our model also found that the work GPCI as implemented did not reflect geographic variation in physician earnings in 29 localities. Specifically,

- In 14 localities, the work GPCI value as implemented was below the level needed to reflect geographic variation in physician earnings. Among these (14) localities, the size of the model coefficients were between 0 and 0.25 in six localities, and more than 0.25 in eight localities.⁴⁵
- In the other 15 localities, the work GPCI value as implemented was above the level needed to reflect geographic variation in physician earnings. In these (15) localities, the model coefficients were between 0 and 0.25 in 13 localities, and more than 0.25 in two localities.⁴⁶

We also examined the three hypothetical modifications to the work GPCI in our base model. We found that while these modifications generally reflected variation in physician earnings, the work GPCI as implemented

work GPCI values as they were applied to Medicare payments, meaning that the work GPCI values had the floor and one-quarter adjustment applied. Additional details about our models, including the factors that we controlled for and the specific tests we used are included in appendix I.

The total number of localities for our analysis in this objective is higher than the current 112 payment localities. This is because our model included data from 2012 through 2018, and in 2017, many of California's localities split into smaller localities. As a result, the total number of localities increased in 2017. For our analysis, we included the localities in California prior to 2017 along with the new localities that were implemented in 2017, which totals to 119 localities for our analysis.

⁴⁴This percentage is an estimate based on the total number of active physicians that are not federal employees averaged across 2012 through 2018.

⁴⁵A coefficient of 0.25 translates to about 28.4 percent, meaning that a locality with a model coefficient of 0.25 had physician earnings that were 28.4 percent higher than the work GPCI value needed to reflect geographic variation.

⁴⁶For these localities, a coefficient of 0.25 means that physician earnings were 22.1 percent lower than the work GPCI value needed to reflect geographic variation. We state our results here in absolute value terms but the model's coefficients for these 15 localities were negative and significant.

reflected variation in the most localities (90 of the 119 localities). Specifically,

- In modification 1 where we removed the work GPCI floor that raises the work GPCI value to the national average for any locality with a value below it, 87 localities would have work GPCI values that accounted for geographic variation in physician earnings. In 32 localities, the work GPCI value was either below (22 localities) or above (10) the level needed to account for geographic variation in physician earnings.
- In modification 2 where we removed the work GPCI floor and removed the one-quarter adjustment that reduces the variation in the work GPCI values for all localities to 25 percent of the original variation, we found that 88 localities would have work GPCI values that accounted for geographic variation in physician earnings. In 31 localities, the work GPCI value was either below (16 localities) or above (15) the level needed to account for geographic variation in physician earnings.
- In modification 3 where we removed the work GPCI entirely and set every locality's work GPCI value to the national average, we found that 87 localities had work GPCI values that accounted for geographic variation in physician earnings. In 32 localities, the work GPCI value was either below (23 localities) or above (9) the level needed to account for geographic variation in physician earnings.

We also developed a full model, which accounted for additional measures of local amenities, quality of life, other social factors, and the measures included in the base model (which were primarily focused on aspects of health care). Additional results for both models and a discussion of limitations for the full model are listed in appendix I. For additional output by locality for the base model, see appendix III.

We also looked at the localities to identify whether certain characteristics might be related to how well the work GPCI accounted for geographic variation in physician earnings. We found little evidence that the work GPCI was too low compared to physician earnings in localities with higher concentrations of certain vulnerable populations, with one exception. Specifically, we found that localities with a larger percentage of Latino people were associated with the work GPCI value being lower than needed to match physician earnings with the work GPCI as implemented in modification 1 (the work GPCI floor is removed) and modification 3 (the work GPCI is set to the national average). We also found instances where the work GPCI value was above the level needed to match physician

earnings in localities with higher concentrations of certain vulnerable populations. For instance, we found that localities with higher percentages of the population living in poverty were associated with the work GPCI value being above the level needed to match physician earnings in modification 1 and modification 3. We also found that localities with higher percentages of the population living in whole county primary care HPSAs were associated with the work GPCI value being above the level needed to match physician wages in modification 3.⁴⁷

Agency Comments

We provided a draft of this report to the Department of Health and Human Services for comment. The Department of Health and Human Services provided technical comments, which we incorporated as appropriate.

As agreed with your offices, unless you publicly announce the contents of this report earlier, we plan no further distribution until 30 days from the report date. At that time, we will send copies to the appropriate congressional committees, the Secretary of Health and Human Services, and other interested parties. In addition, the report will be available at no charge on the GAO website at <https://www.gao.gov>.

If you or your staff have any questions about this report, please contact me at (202) 512-7114 or FarbJ@gao.gov. Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this report. GAO staff who made key contributions to this report are listed in appendix IV.



Jessica Farb
Managing Director, Health Care

⁴⁷For modification 2 in which the work GPCI floor and one-quarter adjustment were removed, we did not find characteristics that were associated with a modified work GPCI value being higher or lower than the level needed to match physician earnings.

Appendix I: Scope, Methodology, and Regression Results

To describe the extent to which the work geographic practice cost index (GPCI) as implemented and three hypothetical modifications of the physician work GPCI would reflect geographic variation in physician earnings—a measure of physician labor costs—from 2012 through 2018, we analyzed data on categories of characteristics that might affect physician earnings. Specifically, we collected data on individual physician characteristics (such as age, gender, race, and physician specialty); characteristics of each locality’s health care market (such as concentration of physicians and health insurance and percentage of Medicare beneficiaries), and characteristics of the locality more broadly that may affect a physician’s decision on where to live and practice (such as rate of college graduation). We also used data and analyses conducted by the Enhancing Health Data program at the U.S. Census Bureau, which included data from IRS, Centers for Medicare & Medicaid Services (CMS), and the Census Bureau’s American Community Survey (ACS).

We developed two econometric models—a base model and a full model—to estimate whether the work GPCI value for each locality reflected geographic variation in physician earnings, while holding certain factors constant. The base model contains variables related to the individual characteristics of the physicians in the sample and variables related to the characteristics of the locality’s health care market. The full model contains variables from the base model as well as measures of local amenities, quality of life, and other social factors associated with the locality that may affect a physician’s decision on where to live and practice. The information below describes our models in more detail, including the dependent variable, model specification, explanatory variables, and the specific data sources used for each variable.

Dependent Variable

Our dependent variable was the natural log of the ratio of physician earnings to the locality work GPCI value.¹ We deflated by the GPCI

¹We use the method described in J. D. Gottlieb, M. Polyakova, K. Rinz, H. Shiplett, and V.

because the GPCI is intended to account for variation in physician compensation across different localities. Under the base model, if the GPCI is performing its role as a geographic adjuster at the locality level, there should be no significant explanatory power in the set of locality dummies included in the model, once we control for factors affecting physicians' earnings, aside from location alone, which should reflect non-physicians and physicians alike.² As a result, it is expected that work GPCI values assigned to localities would be higher in localities with higher physician labor costs and lower in localities with lower physician labor costs. Under the full model, if the GPCI is performing as it is supposed to, there should be no significant explanatory power in the set of locality dummies included in the model, once we control for factors affecting physicians' earnings and factors associated with the locality that may affect a physician's decision on where to live and practice.

We interpret a significant locality dummy as suggesting that the work GPCI value is below the level needed to reflect geographic variation in physician earnings (a significant positive coefficient) or above the level needed (a significant negative coefficient), in that locality given the other variables in our model.

Explanatory Variables in the Base Model

Individual Physician Characteristics

- We used data from the Census Bureau's ACS for individual-level demographic characteristics of the physicians, such as age, gender, marital status and race. We also used data from ACS on the number of weekly hours worked, as this has been shown to be a key driver of physicians' earnings.
- We included the physician's medical specialty, as the type of specialty can affect earnings. For example, physicians in specialties tend to earn more than primary care physicians, as noted in a report from the

Udalova, *Who Values Human Capitalists' Human Capital? Healthcare Spending and Physician Earnings*, U.S. Census Bureau, Working Paper CES-20-23 (Washington, D.C.: July 27, 2020). We use physicians' earnings net of capital gains and spousal wage income as reported on the spouse's W-2 form. The physician earnings are measured as adjusted gross income net of passive income, estimated capital gains and the spouse's income reported on a W-2.

²See K. D. Gillis, R. J. Wilke, and R. A. Reynolds, "Assessing the Validity of the Geographic Practice Cost Index," *Inquiry*, vol. 30, no. 3 (1993): 265-280.

Center for Studying Health System Change.³ We used data from CMS's National Plan and Provider Enumeration System to identify specialty for the physicians in our sample.

- We used IRS tax data to identify whether physicians were sole proprietors of their medical practices, measured by whether the physician had a Schedule C in the tax data (which is used to report income or losses as a sole proprietor).

Characteristics of the Locality's Health Care Market

- Medicare—Medicare is an important payer as it had over 60 million beneficiaries in 2018 and the presence of Medicare in an area may affect physician earnings. We used data from the Area Health Resource File for 2012 through 2018 for several county-level variables related to Medicare: the percentage of the population who are Medicare beneficiaries; the percentage of the population enrolled in Medicare Advantage; Medicare costs per beneficiary adjusted for inflation; and the average Medicare fee-for-service hierarchical condition code—a risk score that accounts for a beneficiary's conditions in order to estimate expected health care costs. We used CMS data for the other two GPCI components—the practice expense GPCI and malpractice premium GPCI—because these affect the amount of compensation physicians receive from Medicare and also measure variation in physician cost of doing business across localities.
- Medicaid—as with Medicare, Medicaid is an important payer. It had over 73 million enrollees in 2018 and the prevalence of Medicaid beneficiaries and the amount of Medicaid spending may affect physician earnings. We used data from ACS for 2012 through 2018 for the percentage of a locality's population who were enrolled in Medicaid. In addition, we used data from CMS's quarterly report of state Medicaid expenditures (called the CMS form 64) applied to the state in which a locality was located, from 2012 through 2018, which we then adjusted for inflation.
- Private health insurance—we used data from ACS for 2012 through 2018 for the percentage of a locality's population who were enrolled in private health insurance at the county level. As with Medicare and Medicaid, private health insurance is an important payer that covered

³J. D. Reschovsky and A. B. Staiti, *Physician Incomes in Rural and Urban America*, Center for Studying Health System Change (Jan. 2005).

over two-thirds of the population in 2018, thus the presence of private health insurance may affect physician earnings.

Characteristics of the Locality More Broadly That May Affect a Physician's Decision on Where to Live and Practice

- We also used data from the Area Health Resource File for 2012 through 2018 for several county-level variables related to physician market conditions: the number of hospitals in a locality per capita, the number of active, non-federal physicians per capita; and the percentage of teaching and research physicians as a percent of all physicians. We included these variables because the presence of hospitals, other physicians, and research opportunities may affect a physician's decision on where to live and practice. These factors are related to physicians specifically, unlike other geographic factors that may be related to many different occupations, such as school quality and poverty level. For example, physicians may be willing to accept lower earnings in an area with greater research or training opportunities, which may increase their potential future earnings.
- Our model included a set of locality payment dummies, which included separate dummies in areas that experienced a major change in locality area definition beginning in 2017. For example, the Rest of California locality definition changed, so we have separate dummies for before and after the change for that locality. We estimated our model with a total of 119 locality dummies. The model itself can identify only 119 minus one parameters, but the procedure calculates a table of values for all 119 by setting the sum of the dummy variables to equal zero. Our regression results reflect this method by using the locality with the smallest absolute value from that table as our base locality case in our model.

Base Econometric Model

We specified our base econometric model as follows:

$$\ln(y_{it}/GPCI_{it}) = X_{it}\beta + h_{it}\lambda + s_{it}\theta + M_{ct}\gamma + D_{it}\delta + e_{it}$$

In this specification,

- The subscripts i, l, t, and c represent the individual physician, the locality, year and county, respectively.
- y_{it} is physician earnings.

- $GPCI_{it}$ is the value of the locality's work GPCI value.
- X_{it} is a set of individual characteristics and a time dummy—marital status, age category, physician specialty, race, gender and year—and all their interactions.
- h_{it} is the logarithm of the number of hours worked by the physician each week.
- s_{it} is an indicator variable for whether the physician filed as a sole proprietor worked by the physician.
- M_{ct} represents the set of characteristics related to health care payers (Medicare, Medicaid, and private insurers), measured at the county level in which the physician resides. We also include key characteristics of the county that are relevant to physicians specifically, such as the number of physicians per capita, the number of hospitals per capita, and the percent of active physicians who are teaching or research.
- D_{it} is a dummy variable for the locality in which the physician resides.
- e_{it} is a random error term.
- β , λ , θ , γ , and δ are parameters of the model to be estimated.
- We estimated our model using our four definitions of the GPCI using the *reghdfe* procedure in Stata.TM This procedure allowed us to saturate the model with respect to the set of individual characteristics, which allowed for over 7,000 interaction effects between the different levels of these characteristics and each year in the analysis.
- We estimated our model using heteroskedastic robust standard errors, clustered at the county level.

Regression Results for Base Model

In the base model, the work GPCI as implemented and the three modifications to the work GPCI generally reflect geographic variation in physician earnings in most localities. (See table 2.)

Appendix I: Scope, Methodology, and Regression Results

Table 2: Localities where the Work Geographic Practice Cost Index (GPCI) Value Did or Did Not Reflect Geographic Variation in Physician Earnings, for Work GPCI as Implemented and Modifications—Base Model

	Work GPCI as implemented	Removing the floor (modification 1)	Removing the floor and one-quarter adjustment (modification 2)	Applying no work GPCI (modification 3)
Localities where the work GPCI value as implemented reflected geographic variation in physician earnings.	90	87	88	87
Localities where the work GPCI value as implemented was below the level needed to reflect geographic variation in physician earnings.	14	22	16	23
Localities where the work GPCI value as implemented was above the level needed to reflect geographic variation in physician earnings.	15	10	15	9

Source: GAO analysis of data from IRS, U.S. Census Bureau, and Centers for Medicare & Medicaid Services; and other data on locality characteristics for 2012 through 2018. U.S. Census Bureau CBDRB-FY22-050 | GAO-22-103876.

Note: The information in this table is based on our base econometric model, which contains variables related to the individual characteristics of the physicians in the sample and variables related to the characteristics of the locality's health care market.

The results for the base model other than the locality dummies are shown in table 3. In all versions of the model we rejected the null hypothesis that the locality dummies were not jointly significant. We found that physicians filing as sole proprietors and physicians who work more hours per week, had higher earnings. In addition, we found that physician earnings were lower in counties with more Medicare beneficiaries per capita; lower in counties with higher Medicaid beneficiaries per capita and higher in states where Medicaid spending per capita is higher. In modification 2 (which removes the work GPCI floor and one-quarter adjustment), physicians earn less in areas with higher practice expense GPCIs. We also found that physicians earned more where there were fewer physicians per capita and earned less where there was a higher proportion of teaching and research positions.

Table 3: Regression Results for Key Variables Included in Base Econometric Model by Work Geographic Practice Cost Index (GPCI) Modification, 2012—2018

Variable	Work GPCI as implemented	Removing the floor (modification 1)	Removing the floor and one-quarter adjustment (modification 2)	Applying no work GPCI (modification 3)
Schedule C filed (sole proprietorship)	.06766***	.06768***	.06778***	.06764***
Log of weekly hours worked	.2714***	.2714***	.2714***	.2713***

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Variable	Work GPCI as implemented	Removing the floor (modification 1)	Removing the floor and one-quarter adjustment (modification 2)	Applying no work GPCI (modification 3)
Locality-Practice expense GPCI	-.245	-.3189	-.7632*	-.1709
Locality-Malpractice GPCI	.01341	.00778	-.01845	.01599
County-Percent Medicare Advantage	-.001169	-.001168	-.001154	-.001175
County-Medicare hierarchical condition category	.1603	.1572	.1482	.1598
County-Medicare beneficiaries as a percent of the population	-.00257*	-.002593*	-.00262*	-.002587*
County-Medicare spending per beneficiary-inflation adjusted	-3.71e-06	-3.75e-06	-4.20e-06	-3.61e-06
State-Medicaid spending per capita - inflation adjusted	.0000569***	.0000571***	.0000567***	.0000572***
County-Percent of population enrolled in Medicaid	-.8769***	-.8748***	-.8545***	-.8816***
County-Percent of population with private health care insurance	-.2952	-.2966	-.2885	-.2996
County-Teaching and research physicians as a percent of all active physicians	-.02143***	-.02144***	-.02148***	-.02143***
County-Number of active non-federal physicians per 100,000 residents	-.0000684***	-.0000684***	-.0000684***	-.0000684***
County-Hospitals per capita	.0001645	.0001657	.0002253	.0001444
R-squared	.4023	.4027	.411	.4022
Observations	70000	70000	70000	70000
Root mean sq error	.6892	.6892	.6893	.6892

Legend:

* = Significant at the 5 percent level.

** = Significant at the 1 percent level.

*** = Significant at the 0.1 percent level.

Source: GAO analysis of data from IRS, U.S. Census Bureau, and Centers for Medicare & Medicaid Services; and other data on locality characteristics for 2012 through 2018. U.S. Census Bureau CBDRB-FY22-050 | GAO-22-103876.

Note: The models include locality dummies and saturation effects for gender, marital-status, age, race, specialty and year. Standard errors are robust and clustered at the county-level. The results for the locality dummy variables are reported in table 10.

Explanatory Variables for Full Model

We examined the extent to which certain additional geographic location variables were able to predict physician earnings and to determine the extent to which their inclusion reduced the number of significant locality dummies in the model results. We included the following additional variables to supplement those variables used in the base model. Specifically,

- We used county-level data from the Area Health Resource File for 2012 through 2018 for several variables to measure the sociodemographic environment and other key factors that affect area earnings.⁴ Specifically, we used data about whether the county was deemed to be a whole- or part-county primary care or mental health HPSA; population density; the county’s median household income (logarithm); the percent of the population living below the poverty level; and the percent of health care providers (including nurse practitioners, physician assistants, medical doctors, and doctors of osteopathy) who are medical doctors or doctors of osteopathy. We used county-level data from ACS for 2012 through 2018 for several variables: the percent of housing that is owner occupied; the percent of the population by race; and the percent of the population with a bachelor’s degree or higher. We used data from the Census Bureau’s County Business Patterns data set for 2012 through 2018 to identify the number of arts, entertainment, recreation, and retail establishments in each county. We used ACS data from 2012 through 2018 to identify the Gini index—a standard measure for distribution of income across a population—for each county within a locality.
- We used data from a variety of sources to identify the concentration of the hospital market, the physician market, and the state health insurance market, using a Herfindahl-Hirschman Index (HHI) for each market. These were used in addition to the physicians per capita and hospitals per capita variables from the base model, which also could be considered measures of market power for physicians and hospitals respectively. For the hospital HHI, we used data from the Medicare Fee-For-Service Provider Utilization and Payment Data Public Use File from CMS. For the physician HHI, we used Medicare fee-for-service claims data from 2012 through 2018 and developed HHIs using health service areas and physician specialty. For the state health insurance market HHI, we used data from the American Medical Association’s “Competition in Health Insurance: A Comprehensive Study of U.S. Markets” for 2012 through 2014, and 2016 to 2018.⁵

⁴For an example of the use of some of these variables, see L. Taylor, *Updating Wyoming’s Hedonic Wage Index*, State of Wyoming Legislature, The Joint Education Committee (Sept. 2018), 21.

⁵We interpolated the values for 2015 using the 2014 and 2016 data.

Regression Results for Full Model

The full model results are similar to the results from the base model, with some differences. As in the base model, the work GPCI as implemented and the three modifications to the work GPCI generally reflect geographic variation in physician earnings in most localities in our full model. When comparing the full and base models, the full model had more localities that reflected geographic variation in physician earnings for the work GPCI as implemented and the three modifications than in the base model. However, we found that with the full model, modification 1 (removing the work GPCI floor) reflected geographic variation in the most localities followed by modification 2 (removing the work GPCI floor and one-quarter adjustment). (See table 4.)

Table 4: Localities where the Work Geographic Practice Cost Index (GPCI) Value Did or Did Not Reflect Geographic Variation in Physician Earnings, for Work GPCI as Implemented and Modifications—Full Model

	Work GPCI as implemented	Removing the floor (modification 1)	Removing the floor and one-quarter adjustment (modification 2)	Applying no work GPCI (modification 3)
Localities where the work GPCI value as implemented reflected geographic variation in physician earnings.	93	104	100	97
Localities where the work GPCI value as implemented was below the level needed to reflect geographic variation in physician earnings.	12	12	12	12
Localities where the work GPCI value as implemented was above the level needed to reflect geographic variation in physician earnings.	14	3	7	10

Source: GAO analysis of data from IRS, U.S. Census Bureau, and Centers for Medicare & Medicaid Services; and other data on locality characteristics for 2012 through 2018. U.S. Census Bureau CBDRB-FY22-050 | GAO-22-103876.

Note: The information in this table is based on our full econometric model, which contains variables from the base model as well as measures of local amenities, quality of life, and other social factors associated with the locality that may affect a physician's decision on where to live and practice.

Table 5 shows our results from estimating the full model. In the full model, the Medicaid spending per capita was no longer significant, but most of the other variables produced similar results to the base model in terms of sign and significance. Among our sociodemographic variables, we found that physician earnings in general were higher in (1) counties with lower population density; (2) counties with a smaller percent of people below the poverty level; (3) counties with higher median household income (logged); and (4) counties with a higher (less equal) Gini index. Our HHI found that earnings were higher in more concentrated physician markets

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but lower in states with more concentrated health insurance markets. In each of the versions of the full model, we found the localities dummies rejected the null of no joint significance.

Table 5: Regression Results for Key Variables Included in Full Econometric Model by Work Geographic Practice Cost Index (GPCI) Modification, 2012—2018

Variable	Work GPCI as implemented	Removing the floor (modification 1)	Removing the floor and one-quarter adjustment (modification 2)	Applying no work GPCI (modification 3)
Schedule C filed (sole proprietorship)	.0675***	.06751***	.06761***	.06748***
Log of weekly hours worked	.2725***	.2725***	.2725***	.2725***
Locality-Practice expense GPCI	-.234	-.3086	-.7542*	-.16
Locality-Malpractice GPCI	.0244	.01886	-.006718	.02684
County-Percent Medicare Advantage	-.001279	-.001277	-.001235	-.001294
County-Medicare hierarchical condition category	.1283	.1252	.1133	.1291
County-Medicare beneficiaries as a percent of the population	-.004439*	-.004452*	-.00442*	-.004471*
County-Medicare spending per beneficiary-inflation adjusted	-6.43e-06	-6.48e-06	-6.90e-06	-6.35e-06
State-Medicaid spending per capita - inflation adjusted	.0000237	.0000236	.0000229	.0000238
County-Percent of population enrolled in Medicaid	.1258	.1345	.168	.1241
County-Percent of population with private health care insurance	-.2171	-.2198	-.2155	-.2215
County-Teaching and research physicians as a percent of all active physicians	-.02534***	-.02534***	-.02534***	-.02534***
County-Number of active non-federal physicians per 100,000 residents	-.0000962***	-.0000962***	-.0000959***	-.0000962***
County-Hospitals per capita	.0009598	.0009732	.001042	.0009517
County-Percent poverty level	-.00639**	-.006409**	-.006241**	-.006482**
County-Percent non-White	-.01694	-.01756	-.01913	-.01714
County-Housing percent owner occupied	.00136	.001345	.001252	.001378
County-Gini index (lower Gini index means more equal income distribution)	1.868***	1.868***	1.88***	1.863***
County-Population density	-3.10e-06*	-3.14e-06*	-3.22e-06*	-3.11e-06*
No primary care health professional shortage area (HPSA) in county	0	0	0	0
Primary care HPSA in part of county	-.006894	-.00662	-.006896	-.006499
All county is primary care HPSA	.01121	.01112	.009072	.01179
No mental health HPSA in county	0	0	0	0

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Variable	Work GPCI as implemented	Removing the floor (modification 1)	Removing the floor and one-quarter adjustment (modification 2)	Applying no work GPCI (modification 3)
Mental health HPSA in part of county	.005424	.005352	.006938	.004827
All county is mental health HPSA	-.004219	-.004487	-.003126	-.004944
County-Log of number of entertainment/retail establishments	.008386	.008432	.008343	.00848
County-Percent of population with bachelor's degree or higher	.0002593	.0002595	.000089	.0003254
County-Log of median household income	.182**	.1841**	.2009**	.1778**
Percent of health care providers who are medical doctors or doctors of osteopathy	-.002267***	-.002265***	-.002261***	-.002265***
State Herfindahl-Hirschman Index (HHI) for health insurance market	-.0000346*	-.0000356*	-.0000362*	-.0000357*
Physician HHI using hospital service area and specialty	.03365*	.03372*	.03387*	.03368*
Hospital HHI using hospital referral region	.04848	.04865	.04954	.04831
R-squared	.404	.4045	.4128	.404
Observations	70000	70000	70000	70000
Root mean sq error	.6882	.6882	.6883	.6882

Legend:

* = Significant at the 5 percent level.

** = Significant at the 1 percent level.

*** = Significant at the 0.1 percent level.

Source: GAO analysis of data from IRS, U.S. Census Bureau, and Centers for Medicare & Medicaid Services; and other data on locality characteristics for 2012 through 2018. U.S. Census Bureau CBDRB-FY22-050 | GAO-22-103876.

Note: The models include locality dummies and saturation effects for gender, marital-status, age, race, specialty and year. Standard errors are robust and clustered at the county-level.

Limitations

- Our measure of income follows that of Gottlieb et al., but we note that the amount of capital gains was not available and had to be estimated. Similarly, data on business income was imputed and for those filing jointly with their spouse; some spousal business income may have been included in the calculation of income attributed to the physician.
- We regarded measuring hours worked as critical to explaining physician earnings, which meant we could only include physicians in our model if there was a match to the ACS, which contains the variable for hours worked.

- There is a limit to which our measures of Medicare-related factors can fully account for the influence of Medicare payments on physician earnings. This is a key issue because ideally, we would like to know the level of earnings from the non-Medicare sectors. The GPCI is itself determining the amount paid to physicians through the Medicare program.
- In some localities, the number of observations was relatively small so care should be taken in placing too much emphasis on coefficients in those cases. In particular, in areas, such as parts of California, where the locality definition changed from 2017, we have only 2 years of ACS data to capture physicians in those localities.
- Our base model includes all variables that we believe relate to physicians specifically as opposed to all professional occupations. However, we did not include the HHI measures in the base model because the variables for physicians per capita and hospitals per capita were capturing these effects to some extent.

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Tables 6, 7, and 8 provide details on estimated changes to Medicare physician payments for 2018, by locality and based on three modifications that we conducted as a part of our analysis: (1) by removing the work GPCI floor for localities where the value had been raised to the national average (1.00); (2) by removing the work GPCI floor and removing the one-quarter adjustment, which limits the variation to one-quarter; and (3) by removing the work GPCI altogether and setting each locality's work GPCI value to the national average (1.00). In addition, this appendix provides details on certain characteristics associated with each of the localities in table 9.

Table 6: Work Geographic Practice Cost Index (GPCI) Values, Medicare Physician Payments, and Estimated Amount and Percent Changes in Payments for Modification in Which Work GPCI Floor is Removed, 2018

Locality	Work GPCI value applied in 2018	2018 total Medicare physician payments (in millions of dollars)	Portion of total payments that are work component (percent)	Modified work GPCI value (no work GPCI floor)	Change in payments as a result of modified work GPCI value (in millions of dollars)	Percent change in payments
Alabama	1.000	906.71	54.68	0.979	-10.41	-1.15
Alaska ^a	1.500	123.61	59.21	1.031	-22.89	-18.52
Arizona	1.000	1,574.64	47.84	0.980	-15.07	-0.96
Arkansas	1.000	688.88	56.62	0.971	-11.31	-1.64
Bakersfield, CA	1.020	19.44	32.24	1.020	0.00	0.00
Chico, CA	1.020	9.88	45.93	1.020	0.00	0.00
El Centro, CA	1.020	667.29	49.31	1.020	0.00	0.00
Fresno, CA	1.020	29.21	33.33	1.020	0.00	0.00
Hanford-Corcoran, CA	1.020	1.95	44.04	1.020	0.00	0.00

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Locality	Work GPCI value applied in 2018	2018 total Medicare physician payments (in millions of dollars)	Portion of total payments that are work component (percent)	Modified work GPCI value (no work GPCI floor)	Change in payments as a result of modified work GPCI value (in millions of dollars)	Percent change in payments
Los Angeles-Long Beach-Anaheim (Los Angeles County), CA	1.046	2,035.02	47.39	1.046	0.00	0.00
Los Angeles-Long Beach-Anaheim (Orange County), CA	1.046	682.68	47.38	1.046	0.00	0.00
Madera, CA	1.020	0.77	35.60	1.020	0.00	0.00
Merced, CA	1.020	5.33	32.72	1.020	0.00	0.00
Modesto, CA	1.020	12.52	38.60	1.020	0.00	0.00
Napa, CA	1.055	126.41	47.67	1.055	0.00	0.00
Oxnard-Thousand Oaks-Ventura, CA	1.024	206.85	43.64	1.024	0.00	0.00
Redding, CA	1.020	11.79	30.17	1.020	0.00	0.00
Rest of California, CA	1.020	1,739.78	50.23	1.020	0.00	0.00
Riverside-San Bernardino-Ontario, CA	1.020	57.30	38.18	1.020	0.00	0.00
Sacramento-Roseville-Arden-Arcade, CA	1.025	46.95	41.74	1.025	0.00	0.00
Salinas, CA	1.024	9.82	45.73	1.024	0.00	0.00
San Diego-Carlsbad, CA	1.022	72.61	39.85	1.022	0.00	0.00
San Francisco-Oakland-Hayward (Alameda/Contra Costa County), CA	1.075	403.15	46.44	1.075	0.00	0.00
San Francisco-Oakland-Hayward (Marin County), CA	1.062	7.25	45.97	1.062	0.00	0.00
San Francisco-Oakland-Hayward (San Francisco County), CA	1.075	179.27	52.80	1.075	0.00	0.00
San Francisco-Oakland-Hayward (San Mateo County), CA	1.075	92.30	45.84	1.075	0.00	0.00
San Jose-Sunnyvale-Santa Clara (San Benito County), CA	1.041	0.44	55.42	1.041	0.00	0.00
San Jose-Sunnyvale-Santa Clara (Santa Clara County), CA	1.083	374.38	46.84	1.083	0.00	0.00
San Luis Obispo-Paso Robles-Arroyo Grande, CA	1.020	11.15	39.63	1.020	0.00	0.00

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Locality	Work GPCI value applied in 2018	2018 total Medicare physician payments (in millions of dollars)	Portion of total payments that are work component (percent)	Modified work GPCI value (no work GPCI floor)	Change in payments as a result of modified work GPCI value (in millions of dollars)	Percent change in payments
Santa Cruz-Watsonville, CA	1.026	9.06	30.29	1.026	0.00	0.00
Santa Maria-Santa Barbara, CA	1.028	19.54	36.77	1.028	0.00	0.00
Santa Rosa, CA	1.023	9.82	44.34	1.023	0.00	0.00
Stockton-Lodi, CA	1.020	12.22	34.04	1.020	0.00	0.00
Vallejo-Fairfield, CA	1.055	7.03	37.48	1.055	0.00	0.00
Visalia-Porterville, CA	1.020	10.05	37.04	1.020	0.00	0.00
Yuba City, CA	1.020	5.54	35.42	1.020	0.00	0.00
Colorado	1.000	819.22	51.64	0.996	-1.69	-0.21
Connecticut	1.021	817.90	49.15	1.021	0.00	0.00
Delaware	1.007	330.17	50.45	1.007	0.00	0.00
DC and MD/VA suburbs	1.045	1,022.82	44.03	1.045	0.00	0.00
Fort Lauderdale, FL	1.000	1,880.08	46.01	0.983	-14.71	-0.78
Miami, FL	1.000	464.74	46.93	0.990	-2.18	-0.47
Rest of Florida	1.000	3,739.57	48.70	0.975	-45.53	-1.22
Atlanta, GA	1.000	859.90	50.95	0.998	-0.88	-0.10
Rest of Georgia	1.000	967.27	52.93	0.980	-10.24	-1.06
Hawaii, Guam	1.001	191.42	49.25	1.001	0.00	0.00
Idaho	1.000	239.98	57.96	0.962	-5.29	-2.20
Chicago, IL	1.008	1,200.18	52.02	1.008	0.00	0.00
East St. Louis, IL	1.000	103.17	53.19	0.984	-0.88	-0.85
Rest of Illinois	1.000	825.98	54.27	0.982	-8.07	-0.98
Suburban Chicago, IL	1.009	709.27	51.05	1.009	0.00	0.00
Indiana	1.000	1,358.82	57.31	0.969	-24.14	-1.78
Iowa	1.000	578.46	56.23	0.969	-10.08	-1.74
Kansas	1.000	644.40	55.19	0.966	-12.09	-1.88
Kentucky	1.000	899.58	57.39	0.974	-13.42	-1.49
New Orleans, LA	1.000	185.97	55.24	0.987	-1.34	-0.72
Rest of Louisiana	1.000	778.89	53.58	0.977	-9.60	-1.23
Rest of Maine	1.000	119.54	62.03	0.970	-2.22	-1.86
Southern Maine	1.000	118.70	56.83	0.980	-1.35	-1.14
Baltimore/surr. counties, MD	1.023	980.99	47.89	1.023	0.00	0.00
Rest of Maryland	1.009	369.15	48.82	1.009	0.00	0.00

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Locality	Work GPCI value applied in 2018	2018 total Medicare physician payments (in millions of dollars)	Portion of total payments that are work component (percent)	Modified work GPCI value (no work GPCI floor)	Change in payments as a result of modified work GPCI value (in millions of dollars)	Percent change in payments
Metropolitan Boston, MA	1.033	935.91	52.56	1.033	0.00	0.00
Rest of Massachusetts	1.020	915.55	52.84	1.020	0.00	0.00
Detroit, MI	1.000	1,143.67	52.94	1.000	0.00	0.00
Rest of Michigan	1.000	959.13	54.91	0.978	-11.59	-1.21
Minnesota	1.000	603.73	56.01	0.998	-0.68	-0.11
Mississippi	1.000	659.63	57.48	0.961	-14.79	-2.24
Metropolitan Kansas City, MO	1.000	215.99	54.97	0.984	-1.90	-0.88
Metropolitan St. Louis, MO	1.000	492.21	54.03	0.985	-3.99	-0.81
Rest of Missouri	1.000	496.89	57.50	0.961	-11.14	-2.24
Montana	1.000	208.92	52.88	0.965	-3.87	-1.85
Nebraska	1.000	406.73	57.05	0.970	-6.96	-1.71
Nevada	1.002	579.85	49.77	1.002	0.00	0.00
New Hampshire	1.000	320.94	54.62	0.991	-1.58	-0.49
Northern NJ	1.041	1,653.09	47.74	1.041	0.00	0.00
Rest of New Jersey	1.024	1,250.56	47.91	1.024	0.00	0.00
New Mexico	1.000	297.33	52.58	0.982	-2.81	-0.95
Manhattan, NY	1.052	853.67	45.24	1.052	0.00	0.00
NYC suburbs/Long Island, NY	1.041	2,543.81	43.16	1.041	0.00	0.00
Poughkeepsie/N NYC suburbs, NY	1.016	309.13	49.75	1.016	0.00	0.00
Queens, NY	1.052	316.09	43.91	1.052	0.00	0.00
Rest of New York	1.000	862.03	54.85	0.987	-6.15	-0.71
North Carolina	1.000	2,132.42	53.74	0.975	-28.65	-1.34
North Dakota	1.000	129.11	58.39	0.978	-1.66	-1.28
Ohio	1.000	1,963.93	57.25	0.990	-11.24	-0.57
Oklahoma	1.000	778.07	55.65	0.961	-16.89	-2.17
Portland, OR	1.010	180.68	53.97	1.010	0.00	0.00
Rest of Oregon	1.000	362.10	51.38	0.991	-1.67	-0.46
Metropolitan Philadelphia, PA	1.022	1,042.81	51.43	1.022	0.00	0.00
Rest of Pennsylvania	1.000	1,557.42	55.50	0.990	-8.64	-0.55
Puerto Rico	1.000	84.93	48.06	0.998	-0.08	-0.10
Rhode Island	1.027	195.04	50.78	1.027	0.00	0.00
South Carolina	1.000	1,233.23	53.65	0.977	-15.22	-1.23

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Locality	Work GPCI value applied in 2018	2018 total Medicare physician payments (in millions of dollars)	Portion of total payments that are work component (percent)	Modified work GPCI value (no work GPCI floor)	Change in payments as a result of modified work GPCI value (in millions of dollars)	Percent change in payments
South Dakota	1.000	174.69	56.87	0.961	-3.87	-2.22
Tennessee	1.000	1,400.07	54.28	0.976	-18.24	-1.30
Austin, TX	1.000	270.00	50.41	0.994	-0.82	-0.30
Beaumont, TX	1.000	67.92	51.03	0.985	-0.52	-0.77
Brazoria, TX	1.020	29.92	50.33	1.020	0.00	0.00
Dallas, TX	1.012	579.96	49.89	1.012	0.00	0.00
Fort Worth, TX	1.007	359.94	50.96	1.007	0.00	0.00
Galveston, TX	1.020	36.16	59.63	1.020	0.00	0.00
Houston, TX	1.020	789.58	52.53	1.020	0.00	0.00
Rest of Texas	1.000	2,572.82	52.05	0.990	-13.39	-0.52
Utah	1.000	383.75	51.75	0.980	-3.97	-1.03
Vermont	1.000	91.93	58.97	0.979	-1.14	-1.24
Virgin Islands	1.000	10.83	45.68	0.998	-0.01	-0.09
Virginia	1.000	1,547.85	52.38	0.992	-6.49	-0.42
Rest of Washington	1.000	808.23	51.36	0.997	-1.25	-0.15
Seattle (King County), WA	1.027	398.10	51.17	1.027	0.00	0.00
West Virginia	1.000	348.42	58.07	0.966	-6.88	-1.97
Wisconsin	1.000	838.79	57.88	0.983	-8.25	-0.98
Wyoming	1.000	108.37	51.15	0.983	-0.94	-0.87
Total		\$66,878.74			-\$438.66	

Source: GAO analysis of 2018 Medicare physician payments. | GAO-22-103876.

Notes: This analysis is based on a hypothetical modification to the work GPCI. It is possible that modifying the work GPCI in this way would change physician behavior, such as changing where physicians choose to practice or what types of services they provide most frequently. In addition, this analysis is based on a single point in time, 2018, and would likely look different in other years. As a result, the payment changes we report for this modification should be considered estimates that would likely be different if the work GPCI were actually modified.

^aIn this modification, we also removed the statutorily required floor for the Alaska locality that raises its work GPCI value to 1.50.

**Appendix II: Additional Data on Estimated
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Table 7: Work Geographic Practice Cost Index (GPCI) Values, Medicare Physician Payments, and Estimated Amount and Percent Changes in Payments for Modification in Which Work GPCI Floor and One-Quarter Adjustment Are Removed, 2018

Locality	Work GPCI value applied in 2018	2018 total Medicare physician payments (in millions of dollars)	Portion of total payments that are work component (percent)	Modified work GPCI value (no work GPCI floor and one-quarter adjustment)	Change in payments as a result of modified work GPCI value (in millions of dollars)	Percent change in payments
Alabama	1.000	906.71	54.68	0.923	-38.28	-4.22
Alaska ^a	1.500	123.61	59.21	1.130	-18.03	-14.59
Arizona	1.000	1,574.64	47.84	0.927	-55.15	-3.50
Arkansas	1.000	688.88	56.62	0.891	-42.60	-6.18
Bakersfield, CA	1.020	19.44	32.24	1.087	0.41	2.11
Chico, CA	1.020	9.88	45.93	1.087	0.30	3.01
El Centro, CA	1.020	667.29	49.31	1.087	21.54	3.23
Fresno, CA	1.020	29.21	33.33	1.087	0.64	2.18
Hanford-Corcoran, CA	1.020	1.95	44.04	1.087	0.06	2.88
Los Angeles-Long Beach-Anaheim (Los Angeles County), CA	1.046	2,035.02	47.39	1.191	133.47	6.56
Los Angeles-Long Beach-Anaheim (Orange County), CA	1.046	682.68	47.38	1.191	44.77	6.56
Madera, CA	1.020	0.77	35.60	1.087	0.02	2.33
Merced, CA	1.020	5.33	32.72	1.087	0.11	2.14
Modesto, CA	1.020	12.52	38.60	1.087	0.32	2.53
Napa, CA	1.055	126.41	47.67	1.227	9.81	7.76
Oxnard-Thousand Oaks-Ventura, CA	1.024	206.85	43.64	1.103	6.94	3.36
Redding, CA	1.020	11.79	30.17	1.087	0.23	1.98
Rest of California, CA	1.020	1,739.78	50.23	1.087	57.21	3.29
Riverside-San Bernardino-Ontario, CA	1.020	57.30	38.18	1.087	1.43	2.50
Sacramento-Roseville-Arden-Arcade, CA	1.025	46.95	41.74	1.107	1.56	3.33
Salinas, CA	1.024	9.82	45.73	1.103	0.35	3.52
San Diego-Carlsbad, CA	1.022	72.61	39.85	1.095	2.06	2.84
San Francisco-Oakland-Hayward (Alameda/Contra Costa County), CA	1.075	403.15	46.44	1.307	40.36	10.01

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Locality	Work GPCI value applied in 2018	2018 total Medicare physician payments (in millions of dollars)	Portion of total payments that are work component (percent)	Modified work GPCI value (no work GPCI floor and one-quarter adjustment)	Change in payments as a result of modified work GPCI value (in millions of dollars)	Percent change in payments
San Francisco-Oakland-Hayward (Marin County), CA	1.062	7.25	45.97	1.255	0.60	8.34
San Francisco-Oakland-Hayward (San Francisco County), CA	1.075	179.27	52.80	1.307	20.41	11.38
San Francisco-Oakland-Hayward (San Mateo County), CA	1.075	92.30	45.84	1.307	9.12	9.88
San Jose-Sunnyvale-Santa Clara (San Benito County), CA	1.041	0.44	55.42	1.171	0.03	6.91
San Jose-Sunnyvale-Santa Clara (Santa Clara County), CA	1.083	374.38	46.84	1.339	41.42	11.06
San Luis Obispo-Paso Robles-Arroyo Grande, CA	1.020	11.15	39.63	1.087	0.29	2.59
Santa Cruz-Watsonville, CA	1.026	9.06	30.29	1.111	0.23	2.50
Santa Maria-Santa Barbara, CA	1.028	19.54	36.77	1.119	0.63	3.25
Santa Rosa, CA	1.023	9.82	44.34	1.099	0.32	3.28
Stockton-Lodi, CA	1.020	12.22	34.04	1.087	0.27	2.23
Vallejo-Fairfield, CA	1.055	7.03	37.48	1.227	0.43	6.10
Visalia-Porterville, CA	1.020	10.05	37.04	1.087	0.24	2.43
Yuba City, CA	1.020	5.54	35.42	1.087	0.13	2.32
Colorado	1.000	819.22	51.64	0.991	-3.90	-0.48
Connecticut	1.021	817.90	49.15	1.091	27.47	3.36
Delaware	1.007	330.17	50.45	1.035	4.59	1.39
DC and MD/VA suburbs	1.045	1,022.82	44.03	1.187	61.09	5.97
Fort Lauderdale, FL	1.000	1,880.08	46.01	0.939	-52.96	-2.82
Miami, FL	1.000	464.74	46.93	0.967	-7.25	-1.56
Rest of Florida	1.000	3,739.57	48.70	0.907	-169.78	-4.54
Atlanta, GA	1.000	859.90	50.95	0.999	-0.54	-0.06
Rest of Georgia	1.000	967.27	52.93	0.927	-37.49	-3.88
Hawaii, Guam	1.001	191.42	49.25	1.011	0.92	0.48

**Appendix II: Additional Data on Estimated
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Locality	Work GPCI value applied in 2018	2018 total Medicare physician payments (in millions of dollars)	Portion of total payments that are work component (percent)	Modified work GPCI value (no work GPCI floor and one-quarter adjustment)	Change in payments as a result of modified work GPCI value (in millions of dollars)	Percent change in payments
Idaho	1.000	239.98	57.96	0.855	-20.20	-8.42
Chicago, IL	1.008	1,200.18	52.02	1.039	19.06	1.59
East St. Louis, IL	1.000	103.17	53.19	0.943	-3.14	-3.04
Rest of Illinois	1.000	825.98	54.27	0.935	-29.23	-3.54
Suburban Chicago, IL	1.009	709.27	51.05	1.043	12.12	1.71
Indiana	1.000	1,358.82	57.31	0.883	-91.28	-6.72
Iowa	1.000	578.46	56.23	0.883	-38.13	-6.59
Kansas	1.000	644.40	55.19	0.871	-45.96	-7.13
Kentucky	1.000	899.58	57.39	0.903	-50.19	-5.58
New Orleans, LA	1.000	185.97	55.24	0.955	-4.65	-2.50
Rest of Louisiana	1.000	778.89	53.58	0.915	-35.56	-4.57
Rest of Maine	1.000	119.54	62.03	0.887	-8.40	-7.02
Southern Maine	1.000	118.70	56.83	0.927	-4.94	-4.16
Baltimore/surr. counties, MD	1.023	980.99	47.89	1.099	34.80	3.55
Rest of Maryland	1.009	369.15	48.82	1.043	6.03	1.63
Metropolitan Boston, MA	1.033	935.91	52.56	1.139	50.37	5.38
Rest of Massachusetts	1.020	915.55	52.84	1.087	31.67	3.46
Detroit, MI	1.000	1,143.67	52.94	1.007	4.10	0.36
Rest of Michigan	1.000	959.13	54.91	0.919	-42.78	-4.46
Minnesota	1.000	603.73	56.01	0.999	-0.41	-0.07
Mississippi	1.000	659.63	57.48	0.851	-56.58	-8.58
Metropolitan Kansas City, MO	1.000	215.99	54.97	0.943	-6.79	-3.15
Metropolitan St. Louis, MO	1.000	492.21	54.03	0.947	-14.15	-2.88
Rest of Missouri	1.000	496.89	57.50	0.851	-42.64	-8.58
Montana	1.000	208.92	52.88	0.867	-14.72	-7.04
Nebraska	1.000	406.73	57.05	0.887	-26.27	-6.46
Nevada	1.002	579.85	49.77	1.015	3.68	0.63
New Hampshire	1.000	320.94	54.62	0.971	-5.12	-1.60
Northern NJ	1.041	1,653.09	47.74	1.171	98.38	5.95
Rest of New Jersey	1.024	1,250.56	47.91	1.103	46.09	3.69
New Mexico	1.000	297.33	52.58	0.935	-10.20	-3.43
Manhattan, NY	1.052	853.67	45.24	1.215	59.76	7.00

**Appendix II: Additional Data on Estimated
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Locality	Work GPCI value applied in 2018	2018 total Medicare physician payments (in millions of dollars)	Portion of total payments that are work component (percent)	Modified work GPCI value (no work GPCI floor and one-quarter adjustment)	Change in payments as a result of modified work GPCI value (in millions of dollars)	Percent change in payments
NYC suburbs/Long Island, NY	1.041	2,543.81	43.16	1.171	136.88	5.38
Poughkeepsie/N NYC suburbs, NY	1.016	309.13	49.75	1.071	8.29	2.68
Queens, NY	1.052	316.09	43.91	1.215	21.47	6.79
Rest of New York	1.000	862.03	54.85	0.955	-21.38	-2.48
North Carolina	1.000	2,132.42	53.74	0.907	-106.83	-5.01
North Dakota	1.000	129.11	58.39	0.919	-6.12	-4.74
Ohio	1.000	1,963.93	57.25	0.967	-37.36	-1.90
Oklahoma	1.000	778.07	55.65	0.851	-64.61	-8.30
Portland, OR	1.010	180.68	53.97	1.047	3.55	1.97
Rest of Oregon	1.000	362.10	51.38	0.971	-5.44	-1.50
Metropolitan Philadelphia, PA	1.022	1,042.81	51.43	1.095	38.19	3.66
Rest of Pennsylvania	1.000	1,557.42	55.50	0.967	-28.71	-1.84
Puerto Rico	1.000	84.93	48.06	0.999	-0.05	-0.06
Rhode Island	1.027	195.04	50.78	1.115	8.47	4.34
South Carolina	1.000	1,233.23	53.65	0.915	-56.38	-4.57
South Dakota	1.000	174.69	56.87	0.851	-14.82	-8.49
Tennessee	1.000	1,400.07	54.28	0.911	-67.81	-4.84
Austin, TX	1.000	270.00	50.41	0.983	-2.34	-0.87
Beaumont, TX	1.000	67.92	51.03	0.947	-1.84	-2.72
Brazoria, TX	1.020	29.92	50.33	1.087	0.99	3.29
Dallas, TX	1.012	579.96	49.89	1.055	12.23	2.11
Fort Worth, TX	1.007	359.94	50.96	1.035	5.06	1.41
Galveston, TX	1.020	36.16	59.63	1.087	1.41	3.90
Houston, TX	1.020	789.58	52.53	1.087	27.15	3.44
Rest of Texas	1.000	2,572.82	52.05	0.967	-44.49	-1.73
Utah	1.000	383.75	51.75	0.927	-14.54	-3.79
Vermont	1.000	91.93	58.97	0.923	-4.19	-4.55
Virgin Islands	1.000	10.83	45.68	0.999	-0.01	-0.06
Virginia	1.000	1,547.85	52.38	0.975	-20.45	-1.32
Rest of Washington	1.000	808.23	51.36	0.995	-2.17	-0.27
Seattle (King County), WA	1.027	398.10	51.17	1.115	17.41	4.37

Appendix II: Additional Data on Estimated Payment Changes for Hypothetical Modifications to the Work Geographic Practice Cost Index (GPCI)

Locality	Work GPCI value applied in 2018	2018 total Medicare physician payments (in millions of dollars)	Portion of total payments that are work component (percent)	Modified work GPCI value (no work GPCI floor and one-quarter adjustment)	Change in payments as a result of modified work GPCI value (in millions of dollars)	Percent change in payments
West Virginia	1.000	348.42	58.07	0.871	-26.15	-7.50
Wisconsin	1.000	838.79	57.88	0.939	-29.72	-3.54
Wyoming	1.000	108.37	51.15	0.939	-3.39	-3.13
Total		\$66,878.74			-\$399.17	

Source: GAO analysis of 2018 Medicare physician payments. | GAO-22-103876.

Notes: The one-quarter adjustment is calculated before budget neutrality, which is done to ensure that total physician payments do not increase as a result of the updated GPCIs. As a result, we removed the one-quarter adjustment from the locality's work GPCI values—then re-calculated the values—so that they were budget neutral.

This analysis is based on a hypothetical modification to the work GPCI. It is possible that modifying the work GPCI in this way would change physician behavior, such as changing where physicians choose to practice or what types of services they provide most frequently. In addition, this analysis is based on a single point in time, 2018, and would likely look different in other years. As a result, the payment changes we report for this modification should be considered estimates that would likely be different if the work GPCI were actually modified.

^aIn this modification, we also removed the statutorily required floor for the Alaska locality that raises its work GPCI value to 1.50.

Table 8: Work Geographic Practice Cost Index (GPCI) Values, Medicare Physician Payments, and Estimated Amount and Percent Changes in Payments for Modification in Which There Is No Work GPCI, 2018

Locality	Work GPCI value applied in 2018	2018 total Medicare physician payments (in millions of dollars)	Portion of total payments that are work component (percent)	Modified work GPCI value (no work GPCI)	Change in payments as a result of modified work GPCI value (in millions of dollars)	Percent change in payments
Alabama	1.000	906.71	54.68	1.000	0.00	0.00
Alaska ^a	1.500	123.61	59.21	1.000	-24.40	-19.74
Arizona	1.000	1,574.64	47.84	1.000	0.00	0.00
Arkansas	1.000	688.88	56.62	1.000	0.00	0.00
Bakersfield, CA	1.020	19.44	32.24	1.000	-0.12	-0.63
Chico, CA	1.020	9.88	45.93	1.000	-0.09	-0.90
El Centro, CA	1.020	667.29	49.31	1.000	-6.45	-0.97
Fresno, CA	1.020	29.21	33.33	1.000	-0.19	-0.65
Hanford-Corcoran, CA	1.020	1.95	44.04	1.000	-0.02	-0.86
Los Angeles-Long Beach-Anaheim (Los Angeles County), CA	1.046	2,035.02	47.39	1.000	-42.41	-2.08

**Appendix II: Additional Data on Estimated
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Locality	Work GPCI value applied in 2018	2018 total Medicare physician payments (in millions of dollars)	Portion of total payments that are work component (percent)	Modified work GPCI value (no work GPCI)	Change in payments as a result of modified work GPCI value (in millions of dollars)	Percent change in payments
Los Angeles-Long Beach-Anaheim (Orange County), CA	1.046	682.68	47.38	1.000	-14.23	-2.08
Madera, CA	1.020	0.77	35.60	1.000	-0.01	-0.70
Merced, CA	1.020	5.33	32.72	1.000	-0.03	-0.64
Modesto, CA	1.020	12.52	38.60	1.000	-0.09	-0.76
Napa, CA	1.055	126.41	47.67	1.000	-3.14	-2.49
Oxnard-Thousand Oaks-Ventura, CA	1.024	206.85	43.64	1.000	-2.12	-1.02
Redding, CA	1.020	11.79	30.17	1.000	-0.07	-0.59
Rest of California, CA	1.020	1,739.78	50.23	1.000	-17.13	-0.98
Riverside-San Bernardino-Ontario, CA	1.020	57.30	38.18	1.000	-0.43	-0.75
Sacramento-Roseville-Arden-Arcade, CA	1.025	46.95	41.74	1.000	-0.48	-1.02
Salinas, CA	1.024	9.82	45.73	1.000	-0.11	-1.07
San Diego-Carlsbad, CA	1.022	72.61	39.85	1.000	-0.62	-0.86
San Francisco-Oakland-Hayward (Alameda/Contra Costa County), CA	1.075	403.15	46.44	1.000	-13.06	-3.24
San Francisco-Oakland-Hayward (Marin County), CA	1.062	7.25	45.97	1.000	-0.19	-2.68
San Francisco-Oakland-Hayward (San Francisco County), CA	1.075	179.27	52.80	1.000	-6.60	-3.68
San Francisco-Oakland-Hayward (San Mateo County), CA	1.075	92.30	45.84	1.000	-2.95	-3.20
San Jose-Sunnyvale-Santa Clara (San Benito County), CA	1.041	0.44	55.42	1.000	-0.01	-2.18
San Jose-Sunnyvale-Santa Clara (Santa Clara County), CA	1.083	374.38	46.84	1.000	-13.44	-3.59
San Luis Obispo-Paso Robles-Arroyo Grande, CA	1.020	11.15	39.63	1.000	-0.09	-0.78
Santa Cruz-Watsonville, CA	1.026	9.06	30.29	1.000	-0.07	-0.77
Santa Maria-Santa Barbara, CA	1.028	19.54	36.77	1.000	-0.20	-1.00
Santa Rosa, CA	1.023	9.82	44.34	1.000	-0.10	-1.00

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Locality	Work GPCI value applied in 2018	2018 total Medicare physician payments (in millions of dollars)	Portion of total payments that are work component (percent)	Modified work GPCI value (no work GPCI)	Change in payments as a result of modified work GPCI value (in millions of dollars)	Percent change in payments
Stockton-Lodi, CA	1.020	12.22	34.04	1.000	-0.08	-0.67
Vallejo-Fairfield, CA	1.055	7.03	37.48	1.000	-0.14	-1.95
Visalia-Porterville, CA	1.020	10.05	37.04	1.000	-0.07	-0.73
Yuba City, CA	1.020	5.54	35.42	1.000	-0.04	-0.69
Colorado	1.000	819.22	51.64	1.000	0.00	0.00
Connecticut	1.021	817.90	49.15	1.000	-8.27	-1.01
Delaware	1.007	330.17	50.45	1.000	-1.16	-0.35
DC and MD/VA suburbs	1.045	1,022.82	44.03	1.000	-19.39	-1.90
Fort Lauderdale, FL	1.000	1,880.08	46.01	1.000	0.00	0.00
Miami, FL	1.000	464.74	46.93	1.000	0.00	0.00
Rest of Florida	1.000	3,739.57	48.70	1.000	0.00	0.00
Atlanta, GA	1.000	859.90	50.95	1.000	0.00	0.00
Rest of Georgia	1.000	967.27	52.93	1.000	0.00	0.00
Hawaii, Guam	1.001	191.42	49.25	1.000	-0.09	-0.05
Idaho	1.000	239.98	57.96	1.000	0.00	0.00
Chicago, IL	1.008	1,200.18	52.02	1.000	-4.95	-0.41
East St. Louis, IL	1.000	103.17	53.19	1.000	0.00	0.00
Rest of Illinois	1.000	825.98	54.27	1.000	0.00	0.00
Suburban Chicago, IL	1.009	709.27	51.05	1.000	-3.23	-0.46
Indiana	1.000	1,358.82	57.31	1.000	0.00	0.00
Iowa	1.000	578.46	56.23	1.000	0.00	0.00
Kansas	1.000	644.40	55.19	1.000	0.00	0.00
Kentucky	1.000	899.58	57.39	1.000	0.00	0.00
New Orleans, LA	1.000	185.97	55.24	1.000	0.00	0.00
Rest of Louisiana	1.000	778.89	53.58	1.000	0.00	0.00
Rest of Maine	1.000	119.54	62.03	1.000	0.00	0.00
Southern Maine	1.000	118.70	56.83	1.000	0.00	0.00
Baltimore/surr. counties, MD	1.023	980.99	47.89	1.000	-10.56	-1.08
Rest of Maryland	1.009	369.15	48.82	1.000	-1.61	-0.44
Metropolitan Boston, MA	1.033	935.91	52.56	1.000	-15.72	-1.68
Rest of Massachusetts	1.020	915.55	52.84	1.000	-9.49	-1.04
Detroit, MI	1.000	1,143.67	52.94	1.000	0.00	0.00
Rest of Michigan	1.000	959.13	54.91	1.000	0.00	0.00

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Locality	Work GPCI value applied in 2018	2018 total Medicare physician payments (in millions of dollars)	Portion of total payments that are work component (percent)	Modified work GPCI value (no work GPCI)	Change in payments as a result of modified work GPCI value (in millions of dollars)	Percent change in payments
Minnesota	1.000	603.73	56.01	1.000	0.00	0.00
Mississippi	1.000	659.63	57.48	1.000	0.00	0.00
Metropolitan Kansas City, MO	1.000	215.99	54.97	1.000	0.00	0.00
Metropolitan St. Louis, MO	1.000	492.21	54.03	1.000	0.00	0.00
Rest of Missouri	1.000	496.89	57.50	1.000	0.00	0.00
Montana	1.000	208.92	52.88	1.000	0.00	0.00
Nebraska	1.000	406.73	57.05	1.000	0.00	0.00
Nevada	1.002	579.85	49.77	1.000	-0.58	-0.10
New Hampshire	1.000	320.94	54.62	1.000	0.00	0.00
Northern NJ	1.041	1,653.09	47.74	1.000	-31.08	-1.88
Rest of New Jersey	1.024	1,250.56	47.91	1.000	-14.04	-1.12
New Mexico	1.000	297.33	52.58	1.000	0.00	0.00
Manhattan, NY	1.052	853.67	45.24	1.000	-19.09	-2.24
NYC suburbs/Long Island, NY	1.041	2,543.81	43.16	1.000	-43.24	-1.70
Poughkeepsie/N NYC suburbs, NY	1.016	309.13	49.75	1.000	-2.42	-0.78
Queens, NY	1.052	316.09	43.91	1.000	-6.86	-2.17
Rest of New York	1.000	862.03	54.85	1.000	0.00	0.00
North Carolina	1.000	2,132.42	53.74	1.000	0.00	0.00
North Dakota	1.000	129.11	58.39	1.000	0.00	0.00
Ohio	1.000	1,963.93	57.25	1.000	0.00	0.00
Oklahoma	1.000	778.07	55.65	1.000	0.00	0.00
Portland, OR	1.010	180.68	53.97	1.000	-0.97	-0.53
Rest of Oregon	1.000	362.10	51.38	1.000	0.00	0.00
Metropolitan Philadelphia, PA	1.022	1,042.81	51.43	1.000	-11.55	-1.11
Rest of Pennsylvania	1.000	1,557.42	55.50	1.000	0.00	0.00
Puerto Rico	1.000	84.93	48.06	1.000	0.00	0.00
Rhode Island	1.027	195.04	50.78	1.000	-2.60	-1.34
South Carolina	1.000	1,233.23	53.65	1.000	0.00	0.00
South Dakota	1.000	174.69	56.87	1.000	0.00	0.00
Tennessee	1.000	1,400.07	54.28	1.000	0.00	0.00
Austin, TX	1.000	270.00	50.41	1.000	0.00	0.00
Beaumont, TX	1.000	67.92	51.03	1.000	0.00	0.00

Appendix II: Additional Data on Estimated Payment Changes for Hypothetical Modifications to the Work Geographic Practice Cost Index (GPCI)

Locality	Work GPCI value applied in 2018	2018 total Medicare physician payments (in millions of dollars)	Portion of total payments that are work component (percent)	Modified work GPCI value (no work GPCI)	Change in payments as a result of modified work GPCI value (in millions of dollars)	Percent change in payments
Brazoria, TX	1.020	29.92	50.33	1.000	-0.30	-0.99
Dallas, TX	1.012	579.96	49.89	1.000	-3.43	-0.59
Fort Worth, TX	1.007	359.94	50.96	1.000	-1.28	-0.35
Galveston, TX	1.020	36.16	59.63	1.000	-0.42	-1.17
Houston, TX	1.020	789.58	52.53	1.000	-8.13	-1.03
Rest of Texas	1.000	2,572.82	52.05	1.000	0.00	0.00
Utah	1.000	383.75	51.75	1.000	0.00	0.00
Vermont	1.000	91.93	58.97	1.000	0.00	0.00
Virgin Islands	1.000	10.83	45.68	1.000	0.00	0.00
Virginia	1.000	1,547.85	52.38	1.000	0.00	0.00
Rest of Washington	1.000	808.23	51.36	1.000	0.00	0.00
Seattle (King County), WA	1.027	398.10	51.17	1.000	-5.36	-1.35
West Virginia	1.000	348.42	58.07	1.000	0.00	0.00
Wisconsin	1.000	838.79	57.88	1.000	0.00	0.00
Wyoming	1.000	108.37	51.15	1.000	0.00	0.00
TOTAL		\$66,878.74			-\$374.99	

Source: GAO analysis of 2018 Medicare physician payments. | GAO-22-103876.

Notes: This analysis is based on a hypothetical modification to the work GPCI. It is possible that modifying the work GPCI in this way would change physician behavior, such as changing where physicians choose to practice or what types of services they provide most frequently. In addition, this analysis is based on a single point in time, 2018, and would likely look different in other years. As a result, the payment changes we report for this modification should be considered estimates that would likely be different if the work GPCI were actually modified.

^aIn this modification, we also removed the statutorily required floor for the Alaska locality that raises its work GPCI value to 1.50.

Table 9: Characteristics of Medicare Payment Localities, 2018

Locality	Work GPCI value is above or below the national average	Percent of population in whole county HPSA ^a		Percent of population in non-metropolitan counties	Percent of population who are Medicare beneficiaries	Percent of population living in poverty	Percent of providers who are physicians	Total providers per 100,000 residents
		Primary care HPSA	Mental health HPSA					
Alabama	Below	12.32	35.41	24.10	21.02	17.46	65.98	331.33
Alaska	Above	11.00	39.71	32.45	13.05	10.81	57.47	417.39
Arizona	Below	0.00	0.00	4.90	17.73	16.06	66.77	359.67

**Appendix II: Additional Data on Estimated
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Locality	Work GPCI value is above or below the national average	Percent of population in whole county HPSA ^a		Percent of population in non-metropolitan counties	Percent of population who are Medicare beneficiaries	Percent of population living in poverty	Percent of providers who are physicians	Total providers per 100,000 residents
		Primary care HPSA	Mental health HPSA					
Arkansas	Below	2.65	15.53	36.90	20.83	17.54	66.74	310.34
Bakersfield, CA	Above	0.00	0.00	0.00	12.88	22.00	67.35	185.44
Chico, CA	Above	0.00	100.0	0.00	21.54	20.10	62.21	297.51
El Centro, CA	Above	0.00	100.0	0.00	16.77	24.20	52.23	135.84
Fresno, CA	Above	0.00	0.00	0.00	13.96	24.10	71.27	293.64
Hanford-Corcoran, CA	Above	0.00	100.0	0.00	11.23	20.80	52.51	171.11
Los Angeles-Long Beach-Anaheim (Los Angeles County), CA	Above	0.00	0.00	0.00	14.49	16.00	79.55	348.56
Los Angeles-Long Beach-Anaheim (Orange County), CA	Above	0.00	0.00	0.00	15.44	11.50	82.17	391.15
Madera, CA	Above	0.00	100.0	0.00	15.19	20.80	59.79	178.22
Merced, CA	Above	0.00	100.0	0.00	12.87	22.70	62.71	150.31
Modesto, CA	Above	0.00	0.00	0.00	15.54	16.10	72.38	230.44
Napa, CA	Above	0.00	0.00	0.00	20.79	8.10	81.65	390.91
Oxnard-Thousand Oaks-Ventura, CA	Above	0.00	0.00	0.00	17.09	9.60	82.47	268.17
Redding, CA	Above	0.00	100.0	0.00	26.13	17.10	67.99	334.93
Rest of California, CA	Above	6.95	52.66	100.0	24.98	16.54	63.18	226.05
Riverside-San Bernardino-Ontario, CA	Above	0.00	0.00	0.00	14.15	15.92	71.36	220.28
Sacramento-Roseville-Arden-Arcade, CA	Above	0.00	0.00	0.00	17.40	14.29	81.24	376.38
Salinas, CA	Above	0.00	0.00	0.00	14.54	14.10	76.91	246.56
San Diego-Carlsbad, CA	Above	0.00	0.00	0.00	15.46	12.50	77.38	388.47
San Francisco-Oakland-Hayward (Alameda/Contra Costa County), CA	Above	0.00	0.00	0.00	15.34	9.99	82.14	365.96
San Francisco-Oakland-Hayward (Marin County), CA	Above	0.00	0.00	0.00	22.22	7.60	87.78	608.47

**Appendix II: Additional Data on Estimated
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Locality	Work GPCI value is above or below the national average	Percent of population in whole county HPSA ^a		Percent of population in non-metropolitan counties	Percent of population who are Medicare beneficiaries	Percent of population living in poverty	Percent of providers who are physicians	Total providers per 100,000 residents
		Primary care HPSA	Mental health HPSA					
San Francisco-Oakland-Hayward (San Francisco County), CA	Above	0.00	0.00	0.00	16.50	10.90	82.94	821.12
San Francisco-Oakland-Hayward (San Mateo County), CA	Above	0.00	0.00	0.00	16.16	7.00	88.92	459.62
San Jose-Sunnyvale-Santa Clara (San Benito County), CA	Above	0.00	0.00	0.00	13.80	9.20	65.22	112.13
San Jose-Sunnyvale-Santa Clara (Santa Clara County), CA	Above	0.00	0.00	0.00	13.61	7.90	81.50	458.10
San Luis Obispo-Paso Robles-Arroyo Grande, CA	Above	0.00	0.00	0.00	21.82	13.30	76.57	359.14
Santa Cruz-Watsonville, CA	Above	0.00	0.00	0.00	17.78	14.30	76.70	331.81
Santa Maria-Santa Barbara, CA	Above	0.00	0.00	0.00	16.73	14.80	76.95	315.77
Santa Rosa, CA	Above	0.00	0.00	0.00	20.61	10.30	78.24	354.84
Stockton-Lodi, CA	Above	0.00	0.00	0.00	14.54	15.90	80.09	196.24
Vallejo-Fairfield, CA	Above	0.00	0.00	0.00	17.35	10.40	80.00	269.81
Visalia-Porterville, CA	Above	0.00	0.00	0.00	13.17	25.50	59.85	198.34
Yuba City, CA	Above	0.00	100.0	0.00	16.82	16.89	63.01	208.75
Colorado	Below	3.14	32.18	12.51	15.47	10.95	67.99	413.60
Connecticut	Above	0.00	9.62	5.07	18.69	10.02	67.70	524.76
Delaware	Above	0.00	0.00	0.00	20.79	11.88	63.17	400.03
DC and MD/VA suburbs	Above	0.00	0.00	0.00	13.60	8.93	76.82	522.56
Fort Lauderdale, FL	Below	0.00	0.00	0.00	20.83	13.25	68.20	372.59
Miami, FL	Below	0.00	0.00	2.64	16.73	17.84	68.06	453.89
Rest of Florida	Below	2.05	7.74	4.65	21.53	14.75	64.76	381.91
Atlanta, GA	Below	3.13	11.93	0.00	13.10	12.86	68.39	383.13
Rest of Georgia	Below	13.90	59.79	34.04	18.74	19.26	59.06	302.83
Hawaii, Guam	Above	0.00	0.00	19.23	18.79	9.93	79.52	356.43

**Appendix II: Additional Data on Estimated
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Locality	Work GPCI value is above or below the national average	Percent of population in whole county HPSA ^a		Percent of population in non-metropolitan counties	Percent of population who are Medicare beneficiaries	Percent of population living in poverty	Percent of providers who are physicians	Total providers per 100,000 residents
		Primary care HPSA	Mental health HPSA					
Idaho	Below	5.77	70.59	25.89	18.25	13.81	60.64	301.10
Chicago, IL	Above	0.00	0.00	0.00	15.64	15.10	78.81	485.80
East St. Louis, IL	Below	16.25	65.69	9.82	20.05	13.81	56.75	199.66
Rest of Illinois	Below	9.25	53.07	34.53	20.08	14.02	63.72	281.25
Suburban Chicago, IL	Above	0.00	0.00	0.00	15.38	7.82	77.39	376.34
Indiana	Below	8.89	55.51	21.88	18.44	14.15	67.07	333.85
Iowa	Below	8.86	51.95	38.92	19.40	11.70	64.34	327.71
Kansas	Below	3.06	41.29	30.71	17.97	12.42	64.70	381.42
Kentucky	Below	12.09	46.24	40.54	20.42	17.93	60.44	391.50
New Orleans, LA	Below	7.83	2.62	0.00	17.63	19.80	81.82	637.97
Rest of Louisiana	Below	17.32	65.63	19.68	18.36	19.33	65.32	325.14
Rest of Maine	Below	0.00	0.00	64.89	26.11	14.42	57.92	421.65
Southern Maine	Below	0.00	0.00	0.00	22.47	9.16	70.68	621.07
Baltimore/surr. counties, MD	Above	0.00	9.23	0.00	17.22	10.46	70.12	607.40
Rest of Maryland	Above	0.00	59.33	11.35	18.68	9.76	58.58	267.03
Metropolitan Boston, MA	Above	0.00	0.00	0.00	16.06	10.53	75.76	859.96
Rest of Massachusetts	Above	0.76	0.46	0.76	21.26	11.03	63.51	387.25
Detroit, MI	Above	0.00	0.00	0.00	18.63	15.61	75.57	563.70
Rest of Michigan	Below	4.28	40.45	31.43	21.46	14.50	64.62	319.88
Minnesota	Below	2.32	37.09	22.24	17.75	10.15	68.58	440.48
Mississippi	Below	35.85	81.52	51.84	19.79	20.74	58.36	322.45
Metropolitan Kansas City, MO	Below	0.00	0.00	0.00	17.05	12.67	67.07	429.66
Metropolitan St. Louis, MO	Below	0.00	0.00	0.00	18.69	11.20	74.73	578.79
Rest of Missouri	Below	1.88	7.34	47.95	21.13	16.51	63.04	266.21
Montana	Below	9.20	34.95	64.15	21.00	13.66	62.81	376.63
Nebraska	Below	0.47	56.72	34.92	17.52	11.55	63.77	394.97
Nevada	Above	3.59	0.00	9.15	16.86	13.63	70.10	280.68
New Hampshire	Below	0.00	0.00	37.00	21.39	7.90	63.89	479.56

**Appendix II: Additional Data on Estimated
Payment Changes for Hypothetical
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Cost Index (GPCI)**

Locality	Work GPCI value is above or below the national average	Percent of population in whole county HPSA ^a		Percent of population in non-metropolitan counties	Percent of population who are Medicare beneficiaries	Percent of population living in poverty	Percent of providers who are physicians	Total providers per 100,000 residents
		Primary care HPSA	Mental health HPSA					
Northern NJ	Above	0.00	0.00	0.00	16.10	10.47	79.87	412.85
Rest of New Jersey	Above	0.00	0.00	0.00	20.52	10.27	74.47	386.71
New Mexico	Below	26.73	52.61	32.78	19.56	19.47	66.25	349.86
Manhattan, NY	Above	0.00	0.00	0.00	17.31	16.60	73.83	1,415.91
NYC suburbs/Long Island, NY	Above	0.00	0.00	0.00	16.68	15.55	73.55	495.93
Poughkeepsie/NYC suburbs, NY	Above	0.00	0.00	19.26	19.84	11.32	64.67	298.75
Queens, NY	Above	0.00	0.00	0.00	15.55	13.00	72.08	307.43
Rest of New York	Below	1.32	7.40	19.54	21.45	14.01	59.31	449.18
North Carolina	Below	7.34	12.55	19.12	18.61	15.40	64.02	391.69
North Dakota	Below	20.87	41.27	49.93	16.80	10.89	60.50	387.99
Ohio	Below	3.94	16.04	19.78	19.63	14.54	69.83	418.81
Oklahoma	Below	4.34	21.76	33.59	18.32	15.96	66.16	308.13
Portland, OR	Above	0.00	0.00	0.00	15.94	11.80	76.76	520.86
Rest of Oregon	Below	2.42	34.60	28.57	23.09	15.92	65.57	308.53
Metropolitan Philadelphia, PA	Above	0.00	0.00	0.00	18.09	13.96	74.78	584.87
Rest of Pennsylvania	Below	0.28	17.78	16.75	22.32	12.20	65.83	408.96
Puerto Rico	Below	0.00	0.26	3.61	23.20	44.53	99.29	275.95
Rhode Island	Above	0.00	19.74	0.00	20.46	13.13	74.27	537.40
South Carolina	Below	6.55	21.20	14.52	20.46	15.97	67.99	335.53
South Dakota	Below	15.88	48.05	52.25	19.38	13.52	58.45	397.51
Tennessee	Below	5.19	32.36	21.84	19.57	16.09	60.87	423.57
Austin, TX	Below	0.00	0.00	0.00	10.51	13.10	73.66	422.67
Beaumont, TX	Below	0.00	0.00	0.00	16.57	18.40	59.49	324.31
Brazoria, TX	Above	0.00	0.00	0.00	12.98	9.20	74.97	252.57
Dallas, TX	Above	0.00	0.00	0.00	11.89	16.60	69.55	458.23
Fort Worth, TX	Above	0.00	0.00	0.00	12.58	12.90	67.08	303.75
Galveston, TX	Above	0.00	0.00	0.00	16.04	13.20	79.01	548.40
Houston, TX	Above	0.00	0.00	0.00	11.19	16.20	72.26	409.14
Rest of Texas	Below	12.81	35.14	18.23	15.48	15.60	67.86	265.60
Utah	Below	4.67	35.36	10.47	12.22	10.36	67.68	327.61
Vermont	Below	0.00	0.00	64.70	22.92	11.18	71.42	523.39

**Appendix II: Additional Data on Estimated
Payment Changes for Hypothetical
Modifications to the Work Geographic Practice
Cost Index (GPCI)**

Locality	Work GPCI value is above or below the national average	Percent of population in whole county HPSA ^a		Percent of population in non-metropolitan counties	Percent of population who are Medicare beneficiaries	Percent of population living in poverty	Percent of providers who are physicians	Total providers per 100,000 residents
		Primary care HPSA	Mental health HPSA					
Virgin Islands	Below	100.0	100.0	100.0	18.65	22.46	75.63	187.32
Virginia	Below	12.53	18.75	15.23	18.38	12.00	67.53	349.56
Rest of Washington	Below	8.19	34.81	14.57	19.04	12.32	64.11	293.36
Seattle (King County), WA	Above	0.00	0.00	0.00	13.93	9.50	77.03	568.88
West Virginia	Below	6.01	10.65	35.56	24.03	17.73	61.38	413.66
Wisconsin	Below	3.54	30.31	25.35	19.65	11.86	66.58	393.68
Wyoming	Below	18.19	100.0	69.17	18.37	11.19	61.36	310.87

Source: GAO analysis of 2018 Area Health Resource File data. | GAO-22-103876.

Notes: Localities are categorized into one of two groups: (1) those with work geographic practice cost index (GPCI) values below the national average or (2) those with GPCI values at or above the national average—based on what the locality’s work GPCI value would have been without the work GPCI floor or one-quarter adjustment applied.

^aWe only included health professional shortage areas (HPSA) for geographic areas and did not include population HPSAs and facility HPSAs in our analysis. In addition, this analysis was limited to entire counties that had been deemed HPSAs. There are some counties where part of the county is a HPSA but we did not include these areas in our analysis. The data do not distinguish areas that are partial counties and facility or population-based HPSAs.

Appendix III: Additional Econometric Model Output by Locality

Table 10 provides additional base model output for each locality.

Table 10: Sign, Significance, and Model Coefficients, by Medicare Payment Localities for Base Econometric Model, 2012—2018

	Work GPCI as implemented		Removing the floor (modification 1)		Removing the floor and one-quarter adjustment (modification 2)		Applying no work GPCI (modification 3)	
	Sign and significance	Model coefficient	Sign and significance	Model coefficient	Sign and significance	Model coefficient	Sign and significance	Model coefficient
Alabama	0	0.0391	0	0.0366	0	0.0267	0	0.04
Alaska	-	-0.376	0	-0.0033	0	-0.0474	0	0.0129
Arizona	0	0.0051	0	0.0084	0	0.0435	0	-0.0029
Arkansas	0	0.0434	0	0.0504	0	0.0699	0	0.0453
Anaheim/Santa Ana, CA	0	-0.0517	0	-0.049	-	-0.074	0	-0.0381
Bakersfield, CA	+	0.3355	+	0.3258	+	0.2751	+	0.3436
Chico, CA	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
El Centro, CA	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
Fresno, CA	0	0.0715	0	0.0613	0	0.007	0	0.0803
Hanford-Corcoran, CA	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
Los Angeles, CA	0	0.0523	0	0.0508	0	0	0	0.0706
Los Angeles-Long Beach-Anaheim (Los Angeles Cnty), CA	0	0.094	+	0.0926	0	0.0271	+	0.1185
Los Angeles-Long Beach-Anaheim (Orange Cnty), CA	0	-0.0241	0	-0.0247	-	-0.0781	0	-0.0032
Madera, CA	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
Marin/Napa/Solano, CA	0	0.0739	0	0.0776	0	0.0297	0	0.0984
Merced, CA	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
Modesto, CA	0	0.0733	0	0.0634	0	0.0097	0	0.0823
Napa, CA	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
Oakland/Berkeley, CA	0	0.1121	+	0.1157	0	0.055	+	0.1418

**Appendix III: Additional Econometric Model
Output by Locality**

	Work GPCI as implemented		Removing the floor (modification 1)		Removing the floor and one-quarter adjustment (modification 2)		Applying no work GPCI (modification 3)	
	Sign and significance	Model co-efficient	Sign and significance	Model co-efficient	Sign and significance	Model co-efficient	Sign and significance	Model co-efficient
Oxnard-Thousand Oaks-Ventura, CA	0	0.1475	+	0.146	+	0.135	+	0.1509
Redding, CA	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
Rest of California	0	0.0128	0	0.0036	0	-0.0525	0	0.0236
Rest of California (2017 & 2018)	0	0.0105	0	0.0004	0	-0.052	0	0.0188
Riverside-San Bernardino-Ontario, CA	0	0.0345	0	0.025	0	-0.0268	0	0.0432
Sacramento-Roseville-Arden-Arcade, CA	0	0.073	0	0.0635	0	0.0071	0	0.0835
Salinas, CA	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
San Diego-Carlsbad, CA	0	0.0727	0	0.0643	0	0.0185	0	0.0806
San Francisco, CA	0	0.1867	+	0.1988	+	0.1553	+	0.2219
San Francisco-Oakland-Hayward (Alameda/Contra Costa Cnty), CA	0	0.2194	+	0.2262	+	0.1543	+	0.2587
San Francisco-Oakland-Hayward (Marin Cnty), CA	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
San Francisco-Oakland-Hayward (San Francisco Cnty), CA	0	0.2479	+	0.2571	+	0.1907	+	0.2888
San Francisco-Oakland-Hayward (San Mateo Cnty), CA	+	0.3002	+	0.3086	+	0.2387	+	0.3414
San Jose-Sunnyvale-Santa Clara (San Benito Cnty), CA	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
San Jose-Sunnyvale-Santa Clara (Santa Clara Cnty), CA	+	0.327	+	0.3366	+	0.2561	+	0.3749
San Luis Obispo-Paso Robles-Arroyo Grande, CA	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
San Mateo, CA	0	0.2189	+	0.2299	+	0.1799	+	0.2553
Santa Clara, CA	0	0.1587	+	0.1675	0	0.0892	+	0.2043
Santa Cruz-Watsonville, CA	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
Santa Maria-Santa Barbara, CA	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
Santa Rosa, CA	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
Stockton-Lodi, CA	0	0.1064	0	0.0963	0	0.0448	0	0.1144
Vallejo-Fairfield, CA	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
Ventura, CA	0	-0.0602	0	-0.0604	-	-0.0809	0	-0.0522
Visalia-Porterville, CA	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
Yuba City, CA	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)

**Appendix III: Additional Econometric Model
Output by Locality**

	Work GPCI as implemented		Removing the floor (modification 1)		Removing the floor and one-quarter adjustment (modification 2)		Applying no work GPCI (modification 3)	
	Sign and significance	Model coefficient	Sign and significance	Model coefficient	Sign and significance	Model coefficient	Sign and significance	Model coefficient
Colorado	0	-0.0363	0	-0.0467	0	-0.049	0	-0.046
Connecticut	0	0.0118	0	0.0093	0	-0.0073	0	0.016
Delaware	-	-0.1365	-	-0.1473	-	-0.1772	-	-0.137
DC and MD/VA suburbs	0	-0.0226	0	-0.0192	0	-0.0627	0	0
Fort Lauderdale, FL	0	0.0265	0	0.0334	0	0.0983	0	0.0123
Miami, FL	0	0.026	0	0.0334	0	0.1094	0	0.0091
Rest of Florida	0	-0.0058	0	0.0011	0	0.0476	0	-0.0132
Atlanta, GA	0	0.035	0	0.0232	0	0.0137	0	0.0265
Rest of Georgia	0	0.02	0	0.0222	0	0.0358	0	0.0185
Hawaii-Guam	0	0.0029	0	0	0	0.0445	0	-0.015
Idaho	0	0.0391	0	0.0501	0	0.0905	0	0.039
Chicago, IL	0	-0.0694	0	-0.0736	0	-0.094	0	-0.0652
East St. Louis, IL	0	0.0553	0	0.0571	0	0.083	0	0.0489
Rest of Illinois	0	0.0628	0	0.0684	0	0.0967	0	0.0599
Suburban Chicago, IL	0	0.0512	0	0.0461	0	0.0319	0	0.0517
Indiana	0	0.0262	0	0.0354	0	0.0723	0	0.024
Iowa	0	0.0067	0	0.0201	0	0.0664	0	0.0072
Kansas	0	0.0477	0	0.0629	0	0.1175	0	0.0468
Kentucky	0	-0.0444	0	-0.0405	0	-0.0283	0	-0.0436
New Orleans, LA	0	-0.0255	0	-0.0254	0	0	0	-0.0337
Rest of Louisiana	0	0.0672	0	0.073	0	0.0958	0	0.0665
Rest of Maine	0	-0.109	0	-0.0972	0	-0.0508	0	-0.1107
Southern Maine	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
Baltimore/surr. counties, MD	0	-0.0719	0	-0.0761	-	-0.1052	0	-0.0652
Rest of Maryland	0	0.0677	0	0.0576	0	0.0283	0	0.0679
Metropolitan Boston, MA	0	0.0933	+	0.0915	+	0.0934	+	0.0914
Rest of Massachusetts	0	0.0512	0	0.042	0	0.009	0	0.0539
Detroit, MI	0	-0.051	0	-0.0593	0	-0.0728	0	-0.054
Rest of Michigan	0	-0.0248	0	-0.0282	0	-0.029	0	-0.0277
Minnesota	+	0.0973	0	0.0853	0	0.0713	0	0.0894
Mississippi	0	-0.0492	0	-0.0342	0	0.0152	0	-0.0479

**Appendix III: Additional Econometric Model
Output by Locality**

	Work GPCI as implemented		Removing the floor (modification 1)		Removing the floor and one-quarter adjustment (modification 2)		Applying no work GPCI (modification 3)	
	Sign and significance	Model co-efficient	Sign and significance	Model co-efficient	Sign and significance	Model co-efficient	Sign and significance	Model co-efficient
Metropolitan Kansas City, MO	0	-0.041	0	-0.0394	0	-0.0148	0	-0.0471
Metropolitan St. Louis, MO	0	-0.0829	0	-0.0858	0	-0.0756	0	-0.0888
Rest of Missouri	0	-0.0462	0	-0.0245	0	0.0472	0	-0.0443
Montana	-	-0.1324	0	-0.0976	0	0.0518	0	-0.1424
Nebraska	+	0.0858	0	0.0949	0	0.1292	0	0.0855
Nevada	0	0.0411	0	0.0329	0	0.0391	0	0.031
New Hampshire	0	-0.1057	-	-0.1103	0	-0.0858	-	-0.1187
Northern NJ	0	0.1084	+	0.1096	0	0.0699	+	0.1263
Rest of New Jersey	0	0.056	0	0.0529	0	0.0336	0	0.0604
New Mexico	-	-0.1093	0	-0.1146	0	-0.1193	0	-0.1127
Manhattan	+	0.2029	+	0.206	+	0.1411	+	0.2336
NYC suburbs/Long Island, NY	0	0.0106	0	0.0192	0	0.008	0	0.0273
Poughkeepsie/N NYC suburbs, NY	0	-0.1232	-	-0.1293	-	-0.1351	-	-0.1271
Queens, NY	-	-0.2452	-	-0.2382	-	-0.2807	-	-0.218
Rest of New York	-	-0.1454	0	-0.1516	-	-0.1582	0	-0.1494
North Carolina	0	-0.0024	0	0.003	0	0.0326	0	-0.0055
North Dakota	+	0.2573	+	0.2738	+	0.3517	+	0.2495
Ohio	-	-0.1023	0	-0.1107	0	-0.1269	0	-0.1055
Oklahoma	0	0.0257	0	0.0446	0	0.1099	0	0.0263
Portland, OR	0	-0.0025	0	-0.0143	0	-0.0341	0	-0.0079
Rest of Oregon	0	-0.0272	0	-0.0306	0	-0.0251	0	-0.0328
Metropolitan Philadelphia, PA	0	-0.0386	0	-0.0433	0	-0.063	0	-0.0356
Rest of Pennsylvania	0	-0.0483	0	-0.0559	0	-0.0685	0	-0.0517
Rhode Island	-	-0.1352	-	-0.1446	-	-0.1935	-	-0.127
South Carolina	0	-0.0036	0	-0.0015	0	0.011	0	-0.0052
South Dakota	+	0.1926	+	0.2225	+	0.3476	+	0.1851
Tennessee	0	0	0	0.0046	0	0.0226	0	-0.0002
Austin, TX	0	0.0778	0	0.072	0	0.0837	0	0.068
Beaumont, TX	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
Brazoria, TX	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
Dallas, TX	+	0.108	0	0.0947	0	0.0454	0	0.1116

**Appendix III: Additional Econometric Model
Output by Locality**

	Work GPCI as implemented		Removing the floor (modification 1)		Removing the floor and one-quarter adjustment (modification 2)		Applying no work GPCI (modification 3)	
	Sign and significance	Model coefficient	Sign and significance	Model coefficient	Sign and significance	Model coefficient	Sign and significance	Model coefficient
Fort Worth, TX	0	0.0471	0	0.0325	0	0.0007	0	0.0428
Galveston, TX	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
Houston, TX	0	0.0074	0	-0.0058	0	-0.0599	0	0.013
Rest of Texas	0	-0.0436	0	-0.05	0	-0.0589	0	-0.0466
Utah	-	-0.0879	0	-0.0778	0	-0.0323	0	-0.0912
Vermont	-	-0.1897	-	-0.1837	0	-0.1367	-	-0.1989
Virginia	-	-0.0852	0	-0.0925	0	-0.0918	0	-0.0926
Rest of Washington	0	-0.0265	0	-0.0364	0	-0.0404	0	-0.0355
Seattle (King Cnty), WA	0	0.0478	0	0.0438	0	0.0175	0	0.0543
West Virginia	0	-0.0772	0	-0.0629	0	-0.0187	0	-0.075
Wisconsin	+	0.0775	0	0.0737	0	0.074	0	0.0734
Wyoming	0	0.044	0	0.0521	0	0.1075	0	0.0341

Legend:

0 = locality dummy variable is not significant

+ = locality dummy variable is significant at the 5 percent level and has a positive coefficient

- = locality dummy variable is significant at the 5 percent level and has a negative coefficient

(D) = data suppressed for disclosure avoidance.

Source: GAO analysis of data from IRS, U.S. Census Bureau, and Centers for Medicare & Medicaid Services; and other data on locality characteristics for 2012 through 2018. U.S. Census Bureau CBDRB-FY22-050 | GAO-22-103876.

Appendix IV: GAO Contact and Staff Acknowledgments

GAO Contact

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Staff Acknowledgments

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