By Justin H. Markowski, Jacob Wallace, and Chima D. Ndumele

After 50 Years, Health Professional Shortage Areas Had No Significant Impact On Mortality Or Physician Density

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ABSTRACT **Since 1965, the US federal government has incentivized physicians to practice in high-need areas of the country through the designation of Health Professional Shortage Areas (HPSAs). Despite its being in place for more than half a century and directing more than a billion dollars annually, there is limited evidence of the HPSA program's effectiveness at reducing geographic disparities in access to care and health outcomes. Using a generalized difference-in-differences design with matching, we found no statistically significant changes in mortality or physician density from 1970 to 2018 after a county-level HPSA designation. As a result, we found that 73 percent of counties designated as HPSAs remained physician shortage areas for at least ten years after their inclusion in the program. Fundamental improvements to the program's design and incentive structure may be necessary for it to achieve its intended results.**

Justin H. Markowski (justin.markowski@yale.edu), Yale University, New Haven, Connecticut.

Jacob Wallace, Yale University.

Chima D. Ndumele, Yale University.

It is well documented that access to health care and even longevity are shaped by where a person resides in the US.[1–4] One hypothesized driver of geographic disparities in access to health care and health in the US is the inequitable distribution of physicians across localities.[5–7] Recognizing this, the federal government introduced the Health Professional Shortage Area (HPSA) program in 1965 with the intent of increasing access to physicians in designated underserved areas as a means to reduce geographic disparities in access to care and, ultimately, health outcomes.[8]

Prior research has found an association between access to physicians and improved health at the population level. For example, increased physician density, as measured by the number of physicians per capita, is positively correlated with both greater access to health care[6] and lower mortality.[5,9,10] In fact, increased access to health care has been shown to be positively associated with improvements in mortality.[11,12] HPSAs are designed to encourage health care professionals to relocate to shortage areas by offering a set of incentives (for example, student loan forgiveness, higher Medicare reimbursement, and so on) that make practicing in these areas more attractive. However, few empirical studies have examined whether, and under what circumstances, HPSA designations have reduced geographic inequities.[13,14]

The HPSA program represents the most robust federal effort to address geographic inequities in care; however, several critiques of the program have surfaced in recent years. These include concerns about whether the algorithms are effective in identifying shortage areas, whether the incentives associated with HPSA designations are strong enough to meaningfully affect physicians' decisions about where to practice, and whether incentives designed to increase access to physicians are a sufficient intervention to address geographic inequities that are known to be shaped by a complex set of intersecting inputs. In addition to uncertainty regarding the efficacy of the

HPSA program's design, long-standing concerns about physician shortages in the US highlight an additional challenge: The large number of shortage areas may partly reflect the undersupply of physicians as opposed to their distribution.[15] If so, policies that increase the number of available providers, such as expanding roles for physician assistants or nurse practitioners, may be preferred strategies to expand the set of available providers in shortage areas.[7,15–18] Although the goals of the HPSA program, including reducing health inequities, remain key priorities for policy makers, the optimal approach for achieving these goals remains unclear.[17] Some estimates suggest that the incentives and administration associated with the HPSA program exceed $1 billion annually; hence, it is critical to understand whether these resources are helping achieve their stated goals.[14,19,20]

Estimating the impact of the HPSA program presents multiple empirical challenges for researchers. First, the counties that are designated as HPSAs differ in several dimensions from those that are not, making it difficult to construct credible comparison groups. Second, factors unrelated to the HPSA program's incentives may also affect where physicians choose to practice and how those choices evolve over time. To account for these challenges, we employed a generalized difference-in-differences research design, comparing changes in mortality and in physician density (a proxy for health care access) before and after counties received a HPSA designation relative to matched comparison counties with similar characteristics.

Study Data And Methods

STUDY DESIGN AND POPULATION To identify county-level HPSA designations, we obtained a publicly available data set of primary care HPSAs, maintained by the Health Resources and Services Administration, which contains historical details on each HPSA designation in the country.[21] From this file, we abstracted information on the type and timing of all HPSA designations from 1978 to 2020, which spans the period from the implementation of the modern HPSA program to the present (with federal officials beginning to identify what were then termed "health manpower shortage areas" in 1965).[22] These data include the date of the designation, whether the designation was withdrawn, a HPSA score that measures the intensity of the medical underservice, and the number of physicians needed to resolve the shortage. We focused our analyses on county-level HPSA designations (as opposed to subcounty designations) to measure the "treatment" (that is, HPSA designation) at the same geographic level for which our outcomes (the age-adjusted mortality rate and physician density) were available.

Only geographic areas that were ever considered for HPSA designation receive a HPSA score as calculated by the state agency that submitted the request, and only those with sufficiently high HPSA scores that resulted in designation are included in this data set. As opposed to a centralized process, where a single entity initiates HPSA designations, becoming a HPSA requires state-level initiation. States vary considerably in their use of this process, even when counties would potentially qualify. Therefore, it is likely that counties that would be a HPSA if located in other states remain unidentified. Thus, we believe that there are valid counterfactual counties across the US, which we have identified through propensity score matching.

We linked our panel data on county-level HPSA designations to three additional data sets. First, to measure county-level mortality rates, we used the Centers for Disease Control and Prevention Wide-ranging Online Data for Epidemiologic Research (CDC WONDER) Compressed Mortality files for 1970–2019. Second, to measure physician density, we obtained annual data on counts of practicing physicians in each county from the Area Health Resources Files for 1970–2018, which are the years of available Area Health Resources File data that coincided with our study period. Third, we used the decennial US census for 1970–2010 to assess county-level measures of population size, sex, racial and ethnic composition, poverty rates, age, and educational attainment. Missing data, although rare, were imputed via a nearest neighbor interpolation.

From this panel of all US counties, we selected the final treated sample to include all counties whose first HPSA designation was a geographic designation at the county level and that did not have any competing designations or changes to this status within four years. There were two additional sample restrictions. First, we excluded counties with changing or noncontiguous borders during the measurement period (for example, counties in Virginia, Hawaii, and so on), lowering the risk for geographic contamination bias in this study. We also excluded counties that obtained HPSA designations in response to a natural disaster (for example, New Orleans Parish after Hurricane Katrina), as our estimates may have been confounded by other funding because of the emergency response. Last, we used propensity score matching to select a single control county, which did not have a competing HPSA designation, from the sample of untreated counties remaining in our panel for each treated county.

We found that 73 percent of counties designated as HPSAs continued to qualify as shortage areas ten years after their initial designation.

This study was approved by Yale University's Institutional Review Board (IRB Protocol ID 2000031608). The requirement for informed consent was waived because participation involved no more than minimal risk to the study participants.

VARIABLES The primary outcomes of interest were annual age-adjusted mortality rates and physician density at the county level. Our measure of physician density was the count of total active nonfederal MDs from the Area Health Resources Files in each county annually. Both variables were divided by county-year population and scaled to be per 100,000 residents.

The primary independent variable was an indicator variable for whether a county was a designated HPSA in a particular year (hereafter these are referred to as "treated" counties). To have sufficient pre- and posttreatment observations, we studied only designations for which we had at least four years of pre- and posttreatment data for both of our primary outcomes. This led to us limiting our sample to counties designated as HPSAs between 1978 and 2015, inclusive. For counties that were designated as HPSAs multiple times, we only evaluated the first designation applied to that county. For all of our treatment counties, we also required that there be no other HPSA designations (for example, at the census tract level) within that county in the four years after the initial designation, to avoid detecting effects that were attributable to other changes, such as a federally qualified health center opening simultaneously or additional subcounty HPSA designations.

For each of the counties newly treated in a particular year, we selected a control county from the set of untreated counties, using propensity score matching via the "Matching" package in R.[23] Our propensity score matching model used the following baseline covariates: share of county residents who were female, share of county residents who were Black, share of county residents who were Hispanic, share of county residents with incomes below the federal poverty level, share of county residents in each of three age groups (≤17, 18–64, and 65+), and share of county residents in three groups based on educational attainment (less than ninth grade, some high school to some college, and bachelor's degree or higher). We selected these characteristics because they are included or highly correlated with the criteria used to identify shortage areas.[24] We allowed counties to be matched with replacement and used nearest neighbor matching ($k = 1$) to select a control county for each treated county. We chose to include only matched control counties in our final analytic sample because of concerns about diverging trends in mortality and physician density. By matching, we reduced the risk of biasing our treatment effect estimates by selecting a control group that may have been a better counterfactual for our treated counties. We found that trends in both mortality and physician density were more parallel after matching compared with before, supporting our approach (online appendix exhibit A1).[25]

STATISTICAL ANALYSIS Our primary approach used a staggered difference-in-differences analysis, which compared the change in our outcomes of interest in treated counties after a HPSA designation relative to the change in those outcomes for matched control counties during the same period. Because our treatment (that is, the HPSA designation) occurred at different times, we used difference-in-differences methods developed specifically for research designs with staggered treatment timing.[26–28] These methods estimated a separate treatment effect for each cohort of counties defined by their year of designation and then took a weighted average of these treatment effects across periods to construct the overall difference-in-differences estimate. We estimated this model without baseline covariates, using the Callaway-Sant'Anna approach via the "DID" package (version 2.1.1) in R,[29] with standard errors clustered at the county level.

We also conducted event study analyses. This approach set the reference group to the year before HPSA designation and estimated a difference-in-differences effect for each year relative to the reference, allowing us to assess whether there were parallel pre trends and to examine how treatment effects evolved over time. Effect estimates were presented as percentage changes relative to the designation year. This approach allowed us to partially assess the validity of the parallel trends assumption—the assumption that trends in our outcome measures would have evolved similarly between the treat-

ment and control groups in the absence of treatment. As is common in the literature, we built support for this assumption by presenting transparent visual evidence that trends in physician density and mortality for the treatment and control groups were parallel before HPSA designation. We also tested formally for parallel trends, evaluating the changes in treated- and control-group outcomes in the five years leading up to HPSA designation (appendix exhibit A1).[25]

In addition to our primary analyses, we conducted three secondary analyses. First, we used the ratio of active physicians to population in each county to calculate the proportion of designated counties that would continue to be deemed a primary shortage area (and thus HPSA eligible) both four years and ten years after the original designation. Second, we assessed the effects of HPSA designations for subgroups of counties or health conditions where we expected they may have been more impactful. We estimated our difference-in-differences model separately for counties, stratifying by the share of county residents with income below the federal poverty level and, separately, the share of county residents older than age sixty-five. We hypothesized that health outcomes in counties with a larger share of low-income or elderly residents may have benefited more from a HPSA designation because of the increased and more complex health care needs of these populations.[30]

In addition, we replaced our overall county-level annual age-adjusted mortality rate measure with a disease-specific measure for four different conditions: endocrine-related mortality, cardiovascular-related mortality, cancer-related mortality, and infectious disease–related mortality. Because HPSAs are focused on building a primary care workforce, we expected any effects of these designations to be concentrated among disease conditions that could be affected by increased access to primary care services. Conditions such as diabetes mellitus, primary hypertension, hyperlipidemia, and cancer are often managed by primary care providers and are associated with an elevated risk for mortality.[31,32]

We performed several sensitivity analyses to evaluate the robustness of our primary results to alterations in our statistical model. First, for transparency we presented our overall difference-in-differences estimates along with designation decade–specific estimates (that is, estimates grouped by decade of designation) to assess the consistency of treatment effects over time. Second, because we were concerned that treated counties and matched control counties could be systematically different, we followed the literature and used only future treated counties to form our comparison group. Third, we refined our matching algorithm and restricted the set of potential control counties to be contiguous to our treatment counties, and then again with noncontiguous counties. Fourth, we extended our follow-up period to ten years in treatment counties with no additional designation, to assess the long-term effects of HPSA designation. Details and figures for these analyses are in the appendix.[25]

Although reducing geographic disparities in access is critical to reducing disparities in outcomes, the mechanisms available to do so are unclear.

Analyses were conducted using R, version 4.0.4, and all statistical tests are reported with p values derived from two-tailed tests of statistical significance ($p < 0.05$).

LIMITATIONS Our study had some limitations. First, our analysis focused only on HPSA designations at the county level. Although county-level designations are the most common, there are many subcounty-level designations (for example, census tracts and independent facilities), and our results might not generalize to these other types of designations. Second, the counties designated as HPSAs during our study period were concentrated in the Midwest, South, and West regions of the US (appendix exhibit A2),[25] limiting the generalizability of our estimates to the Northeast. Third, our study included only 40 percent of US counties. However, the HPSA program is specifically designed for disadvantaged areas, so our sample likely captured a significant proportion of these target areas. Last, we did not have access to data on provider quality of care, physician demographics, or additional primary health care workforce data (for example, counts of physician assistants, nurse practitioners, and so on), preventing a more holistic evaluation of the HPSA program.

Study Results

STUDY POPULATION Comparisons of counties that were ever designated as HPSAs with coun-

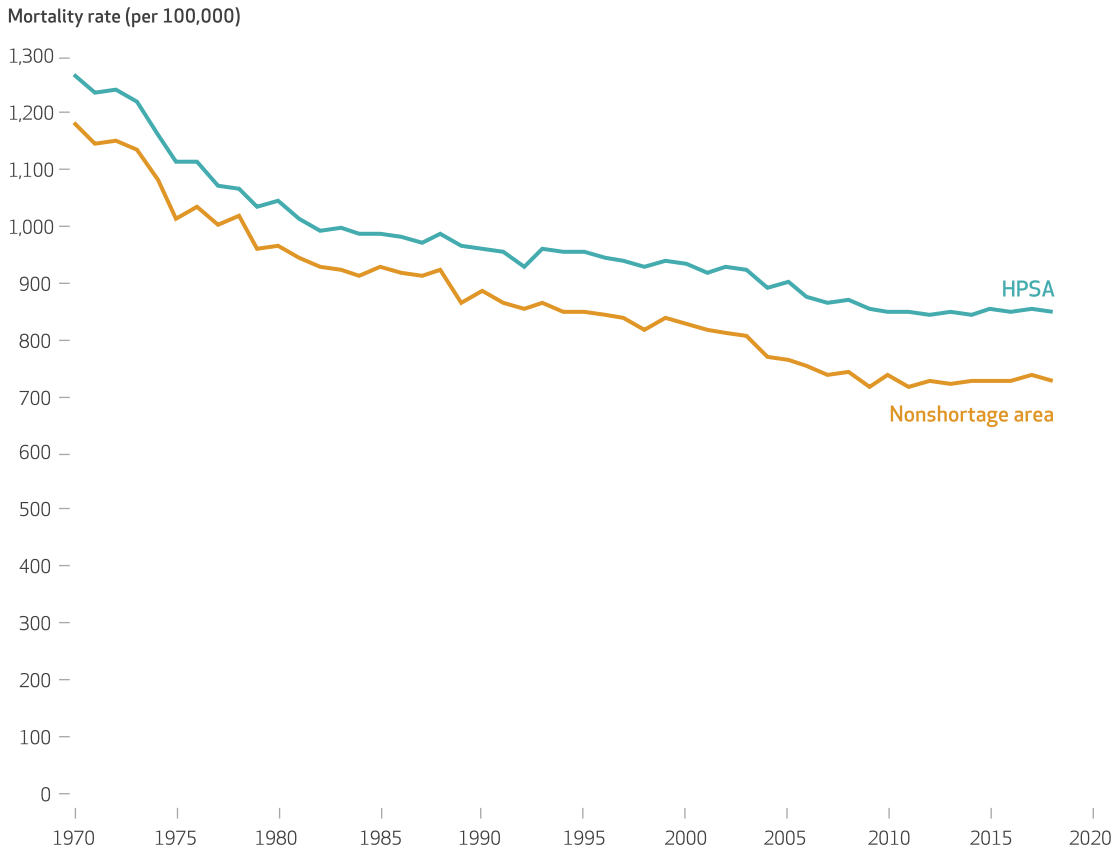
ties that were never designated as such revealed that counties with HPSA designations had, on average, higher mortality rates (exhibit 1) and lower physician density (exhibit 2) throughout the study period. Our final analytic sample comprised 844 treatment counties and 844 matched control counties (exhibit 3). The treatment counties represent 53 percent of counties that ever received a county-level HPSA designation (data not shown). After matching, only two significant differences in a time-varying covariate between treatment and control counties were identified, for population size and percentage female, with control counties having 4,125 more residents (95% confidence interval: 1,972, 6,278) and 0.24 percentage points more women (95% CI: 0.07, 0.41) compared with treatment counties (exhibit 3; 95% CI not shown). All other differences were not statistically significant.

DIFFERENCE-IN-DIFFERENCES ESTIMATES In our primary analysis, we observed no effect of HPSA designation on population-level mortality (exhibit 4). Overall, in counties designated as a HPSA (treatment counties), we found a change from 1,056 annual age-adjusted deaths per 100,000 county residents in the four-year period before a HPSA designation to 989 annual age-adjusted deaths per 100,000 county residents in the four-year period after a HPSA designation. In matched control counties, we found concurrent changes from 1,054 age-adjusted deaths per 100,000 residents to 991 age-adjusted deaths per 100,000 residents. This corresponded to an unadjusted between-group difference of −2.60. The fully adjusted difference-in-differences estimate was a statistically insignificant −5.92 (95% CI: −44.83, 32.99) deaths per 100,000 residents. Treatment effect estimates stratified by decade of HPSA designation revealed qualitatively similar results.

Similarly, we did not find an effect of HPSA designation on physician density (exhibit 4).

EXHIBIT 1

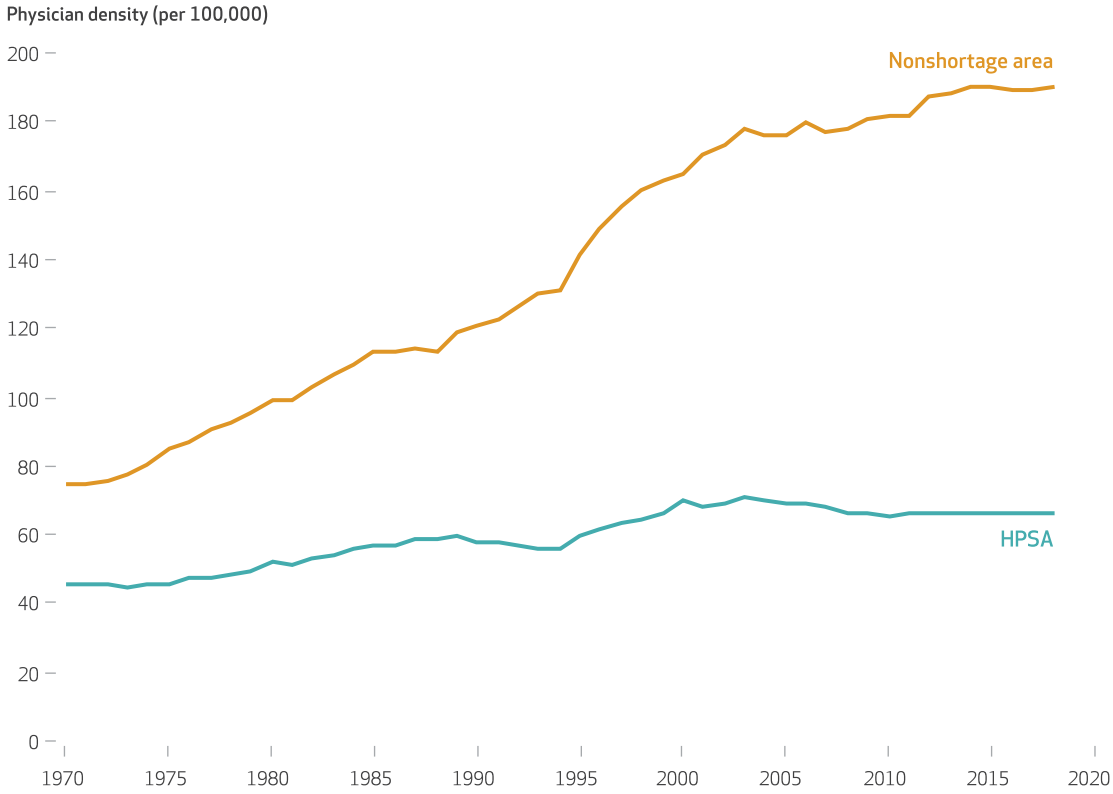
Age-adjusted mortality rates by Health Professional Shortage Area (HPSA) designation status in US counties, 1970–2018



SOURCE Authors' analysis of data from the HPSA–Primary Care data set, Area Health Resources Files, and Centers for Disease Control and Prevention Wide-ranging Online Data for Epidemiologic Research (CDC WONDER) Compressed Mortality Files. **NOTES** "Ever-HPSA" classification ("HPSA" in the figure legend) is limited to counties that ever had a designated county-level geographic HPSA. "Never-HPSA" classification ("Nonshortage area") is restricted to counties that never received a HPSA designation at any geographic or population level.

EXHIBIT 2

Physician density by Health Professional Shortage Area (HPSA) designation status in US counties, 1970–2018



SOURCE Authors' analysis of data from the HPSA–Primary Care data set, Area Health Resources Files, and Centers for Disease Control and Prevention Wide-ranging Online Data for Epidemiologic Research (CDC WONDER) Compressed Mortality Files. **NOTES** The two designation categories are defined in the exhibit 1 notes. Our measure of physician density began with the count of physicians in each county annually, which was then divided by county-year population and scaled to be per 100,000 residents.

The adjusted difference-in-differences coefficient was –1.93 (95% CI: –6.33, 2.47) physicians per 100,000 county residents, and estimates stratified by decade of HPSA designation were qualitatively similar. Perhaps unsurprisingly, then, we also found that 73 percent of the treatment counties in our sample were still experiencing a physician shortage ten years after designation (appendix exhibit A3).[25]

Results from the event studies were consistent with our overall findings. We found a statistically insignificant change of –0.72 percentage points (95% CI: –2.38, 0.93) in age-adjusted mortality after HPSA designation in treatment versus matched control counties (appendix exhibit A4).[25] This effect size was small, and our 95% confidence intervals ruled out the 10 percent reduction in age-adjusted mortality rates that would be needed to eliminate the mortality disparity between ever-treated and never-treated counties observed in exhibit 1. For physician density, we found a –2.64-percentage-point (95% CI: –9.86, 4.57) change after HPSA designation in the treatment versus matched control counties (appendix exhibit A4).[25] To alleviate the physician density disparity between ever-treated and never-treated counties observed in exhibit 1, a +134 percent change in physician density would need to occur in treatment counties.

SENSITIVITY ANALYSES We found no evidence that the HPSA program increased physician density or reduced age-adjusted mortality rates in any of the subgroups we studied, nor did we find any statistically significant reductions in mortality when restricting the sample to deaths for reasons that could be affected by physician access (appendix exhibit A5).[25] Additional sensitivity analyses supported our primary analyses. We did not find an association between HPSA designation and either age-adjusted mortality or physician density with alternative, regression-based difference-in-differences estimation techniques (appendix exhibit A6), when extending the study period to ten years before and after HPSA designation (appendix exhibit A7), or when preferentially selecting matched controls from neighboring counties (appendix exhibit A8) and nonneighboring counties (appendix exhib-

EXHIBIT 3

Characteristics of a selected sample of US counties after matching, study of effects of Health Professional Shortage Area (HPSA) designations on mortality and physician density, 1970–2018

	Control counties (n = 844)		Treatment counties (n = 844)	
Characteristics	**Mean**	**SD**	**Mean**	**SD**
Demographics				
Population	21,979	21,756	17,854	23,319
Female, %	50.80	1.62	50.56	1.95
Black, %	10.58	16.79	11.03	17.84
Hispanic, %	5.75	13.99	6.22	14.89
Poverty,[a] %	18.43	7.93	19.10	8.48
Age (years), %				
≤17	29.62	3.98	29.65	4.16
18–64	56.09	3.47	56.04	3.65
65+	14.29	4.23	14.31	4.39
Educational attainment, %				
Low (less than 9th grade)	14.33	6.60	14.51	6.74
Mid (some high school to some college)	39.50	8.33	39.44	8.52
High (bachelor's degree or higher)	6.21	2.64	6.21	2.89

SOURCE Authors' analysis of data from the HPSA–Primary Care data set, Area Health Resources Files, Centers for Disease Control and Prevention Wide-ranging Online Data for Epidemiologic Research (CDC WONDER) Compressed Mortality Files, and census data via the National Historical Geographic Information System. **NOTES** Control counties were matched one-to-one with treatment counties based on propensity score matching with replacement. Treatment counties were defined per study protocol. Data for control counties are limited to the year of HPSA designation of the matched treatment county. Data for treatment counties are limited to the year of HPSA designation. Comparisons to all other counties are in appendix exhibit A9 (see note 25 in text). [a]Percent with income below the federal poverty level.

EXHIBIT 4

Effect estimates of Health Professional Shortage Area (HPSA) designations on mortality and physician density in US counties, average and stratified by decennial group, 1970–2018

		Control counties		Treatment counties			Effect estimate	
Groups	**No.**	**Before**	**After**	**Before**	**After**	**Unadjusted difference**	**Adjusted DID**	**95% CI**
AGE-ADJUSTED MORTALITY								
Overall	1,688	1,054.42	990.97	1,055.50	989.45	−2.60	−5.92	−44.83, 32.99
Decennial groups								
1970	950	1,117.92	1,028.37	1,116.56	1,022.61	−4.40	−2.26	−23.29, 18.05
1980	344	1,022.48	981.30	1,033.07	988.07	−3.82	−23.14	−58.98, 12.70
1990	208	965.11	944.38	949.80	938.34	9.69	−1.15	−32.39, 30.09
2000	144	914.96	886.99	918.70	887.78	−2.95	−11.54	−41.29, 18.20
2010	42	799.24	809.10	850.09	850.34	−9.61	−19.63	−75.11, 35.84
PHYSICIAN DENSITY								
Overall	1,688	57.50	62.33	39.05	41.64	−2.24	−1.93	−6.33, 2.47
Decennial groups								
1970	950	51.79	58.59	32.35	37.40	−1.75	0.26	−0.83, 1.35
1980	344	56.31	59.58	43.10	47.44	1.07	1.14	−1.74, 4.02
1990	208	67.49	71.99	49.98	45.50	−8.98	−4.30	−8.75, 0.16
2000	144	74.23	73.39	54.22	48.95	−4.43	−1.17	−6.86, 4.52
2010	42	89.58	84.07	51.46	46.24	0.29	6.23	−1.04, 13.50

SOURCE Authors' analysis of data from the HPSA–Primary Care data set, Area Health Resources Files, Centers for Disease Control and Prevention Wide-ranging Online Data for Epidemiologic Research (CDC WONDER) Compressed Mortality Files, and census data via the National Historical Geographic Information System. **NOTES** This table shows the effect of US county-level HPSA designations on age-adjusted mortality and physician density. For each decennial group, we repeated our primary analysis on subsets of treated counties, grouped by the decade in which they received their first county-level geographic HPSA designation. Adjusted difference-in-differences (DID) estimates were calculated from designation-year specific average effect estimates that were weighted using the Callaway-Sant'Anna DID package in R (see note 29 in text). Estimates are in units of deaths per 100,000 residents for age-adjusted mortality and physicians per 100,000 residents for physician density.

it A9).[25] Estimates remained consistent when we grouped designation-year cohort averages (appendix exhibit A10)[25] into decades (exhibit 4).

Discussion

In this national-level evaluation of the Health Professional Shortage Area program, we found no evidence of statistically significant changes in county-level mortality rates or physician density after HPSA designation. Sensitivity analyses supported these primary conclusions. Rather, we found that 73 percent of counties designated as HPSAs continued to qualify as shortage areas ten years after their initial designation, highlighting the challenge of reshaping geographic disparities in access to care in the US. The HPSA program, which has existed for more than fifty years, is responsible for directing federal funds to shortage areas via the National Health Service Corps, increased reimbursement rates via the Medicare program, and extended waivers for J-1 visa recipients. Despite this, the program has not been rigorously evaluated, and our results suggest that HPSA designations—at least at the county level—do not appear to increase access to primary care physicians. This presents a challenge for federal policy makers. Although reducing geographic disparities in access is critical to reducing disparities in outcomes, the mechanisms available to do so are unclear. Some policy observers have questioned whether the magnitude of the financial incentives associated with HPSA designations are too small to induce physician redistribution into HPSAs. Although our study did not provide direct evidence to inform that debate, our results suggest that the overall approach may need to be adjusted.

However, it may be difficult to justify increasing the generosity of the financial incentives attached to HPSA designations without evidence that the program is currently working or a clear rationale for how increased financial incentives would improve its effectiveness. During the past few decades, there have been boosts in National Health Service Corps scholarships and loan repayment amounts,[33–35] and although our study did not assess these policy changes, we found little evidence that HPSA designations in any period (including those where the scholarships were more generous) have reduced mortality or increased physician density. Likewise, the introduction of Medicare bonus payments in 1989 and adjusted payments for rural health clinics in 1997 do not appear to have modified the effect of HPSAs on mortality or physician density.[14,20]

The inequitable distribution of physicians has long been a recognized problem with little evidence of progress despite significant policy attention.[7,36] Prior work has shown that fewer than 6 percent of primary care physicians moved their practices in a five-year period.[37] When physicians do move and cross a county line, prior research shows that they are more likely to leave a HPSA than to enter one, suggesting that the incentives needed to displace physicians must overcompensate for their baseline inertia and preferences.[37] Moreover, if there is a shortage in the number of US practicing physicians, as has been suggested, a focus on redistributing physicians may redirect resources that could be better spent solving the long-term workforce challenge. Several states have expanded the role of advanced practice nurses and other health professionals to meet the needs of residents in underserved areas, and our results indicate that such strategies may be more effective than HPSA designations—and their associated financial incentives—at reducing geographic disparities in access.[16,38] However, nonphysician practitioners are also distributed unequally, and significant variation across states in scope of practice hinders a uniform federal approach.[2,39,40]

According to our findings, there are at least two policy solutions with the potential to ameliorate primary care shortages and augment the efforts of the existing HPSA program. First, policy makers may consider refocusing HPSA-dependent programs, such as the National Health Service Corps, toward attracting new medical graduates and encouraging them to practice in HPSAs. Prior research shows that once physicians have established their practices, they are unlikely to move more than ten miles from an initial practice location.[37] Therefore, these programs should target resources toward recruiting young physicians, as opposed to the current, blanketed approach.

Second, we propose that other types of health care providers serve as physician substitutes in underserved settings. As the primary care physician shortage increases,[15] the current set of HPSA

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incentives may become even more insufficient to resolve these disparities. Alternatively, the scope of practice of nurse practitioners or physician assistants could be broadened in these underserved areas. This may work as a low-cost incentive, where expanded clinical autonomy and independence would be permitted in exchange for working in an underserved area. Synergistically, the expansion of community health center residency training programs for nurse practitioners could elevate their skill set while establishing their practice in underserved areas.[41]

Conclusion

In conducting this evaluation of county-level federal Health Professional Shortage Areas, we found that 73 percent of HPSA-designated counties were still shortage areas ten years after designation, with no significant impact on physician density and mortality across four decades. Current programs and incentives may need to be redesigned to address persistent geographic disparities in health and access to care in the US. ■

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